December 2014

ENVIRONMENTAL ASSESSMENT OF THE PROPOSED CAPITAL REGION RESOURCE RECOVERY CENTRE

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The complete Environmental Assessment Study Report consists of the following components:

VOLUME I

Environmental Assessment

TECHNICAL SUPPORT DOCUMENTS

TSD #1 – Comparison of Alternative Sites

TSD #2 – Atmosphere - Noise

TSD #3 – Atmosphere – Air

TSD #4 – Biology

TSD #5 – Land Use & Socio-Economic

TSD #6 – Archaeological Assessment

TSD #7 – Cultural Heritage Evaluation Report

TSD #8 – Agriculture

TSD #9 – Traffic Impact Study

TSD #10 – Leachate Management

VOLUME II

Consultation Record

VOLUME III

Geology, Hydrogeology and Geotechnical Report

VOLUME IV

Design and Operations Reports

December 2014

VOLUME IV

Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Table of Contents

TABLES

FIGURES

APPENDICES

APPENDIX A
Stormwater Management System Design Report

APPENDIX B
Acoustic Assessment Report

APPENDIX C
Emission Summary and Dispersion Modelling Report

APPENDIX D
Construction and Demolition Processing Facility Design and Operations

APPENDIX E
Materials Recovery Facility Design and Operations

APPENDIX F
Organics Processing Facility Design and Operations

APPENDIX G
Compost Processing and Storage Area Design and Operations

APPENDIX H
Petroleum Hydrocarbon Contaminated Soil Treatment Design and Operations

APPENDIX I
Landfill Design and Operations

APPENDIX J
On-Site Leachate Pre-treatment Design Report

1.0 INTRODUCTION

1.1 Purpose and Scope

This Design and Operations (D&O) Report supports an application for approval under the *Environmental Assessment Act* (EAA), and also subsequent Environmental Compliance Approvals (ECA) under the *Environmental Protection Act* (EPA) and *Ontario Water Resources Act* (OWRA) for the Capital Region Resource Recovery Centre (CRRRC). The CRRRC is a proposed integrated waste management facility which, if approved, would provide facilities and capacity for recovery of resources and diversion of materials from disposal for wastes and soils generated by the Industrial, Commercial and Institutional (IC&I) and Construction and Demolition (C&D) sectors in Ottawa and eastern Ontario, as well as landfill disposal capacity for post-diversion residuals and materials that are not diverted.

The D&O Report provides a detailed description of the proposed CRRRC Site design to a level that will satisfy ECA requirements. The D&O Report is also intended for use by the operators of the facilities comprising the Site during the operational life of the CRRRC, after closure, and during the long-term maintenance period. The D&O Report addresses all relevant matters, including:

- Regulatory and approval requirements;
- Site development boundaries;
- Details about the characteristics and quantities of waste to be accepted at the Site;
- Assessments of potential impacts from the Site;
- Design and operation approach for each facility on-Site;
- Environmental controls in place to manage potential impacts from the Site;
- Monitoring, maintenance and reporting programs;
- Trigger mechanisms for the implementation of remedial measures, as part of a contingency plan; and,
- Site closure and post-closure maintenance.

The design and operation of each of the processing and treatment facilities as well as the landfill component are provided in the appendices to this report.

1.2 Regulatory Requirements

The proposed CRRRC requires approval under the EAA, the EPA and the OWRA. The application for approval under the EPA and OWRA are combined into an application for an ECA. Taggart Miller Environmental Services (Taggart Miller) is submitting the documentation to support both EAA approval and a subsequent EPA/OWRA application jointly in one submission. Taggart Miller is seeking EAA approval prior to actual submission of the application forms required for the EPA/OWRA approval.

1.2.1 Environmental Protection Act (EPA)

Waste disposal sites are subject to Part V of the EPA. Section 27 of the EPA requires that an ECA be obtained from the Director of the Ministry of the Environment and Climate Change (MOECC) for the establishment, operation, alterations, or enlargement of a waste disposal site or for the waste diversion, processing and transfer facilities.

Legislative framework for waste management is provided in Part V of the EPA Regulatory Requirements for the design and operation of a landfill, as detailed in *Ontario Regulation* (O. Reg.) 347 (MOE, 1990) and O. Reg. 232/98 (MOE, 1998a). O. Reg. 347 provides a definition of waste management terms and classes and provides standards for design and operation of landfills less than or equal to 40,000 cubic metres (m^3) in volume. O. Reg. 232/98 provides standards for design and operation of landfill sites greater than 40,000 m^3 in volume. As the landfill component of the CRRRC is greater than 40,000 m^3 in volume, the design and operation of the landfill are subject to O. Reg. 232/98.

The definition of "municipal waste", as described in O.Reg. 347 (MOE, 1990) is "any waste, whether or not it is owned, controlled or managed by a municipality, except, (i) hazardous waste, (ii) liquid industrial waste, or (iii) gaseous waste. Therefore, the following regulations that refer to municipal waste also apply to the CRRRC.

1.2.1.1 Guideline for the Production of Compost in Ontario

The Guideline for the Production of Compost in Ontario (MOE, 2012a) recommends planning, design and operational practices for aerobic composting facilities. The companion Ontario Compost Quality Standards (MOE, 2012b) sets environmentally protective standards for the production of compost for beneficial use and applies to compost produced by aerobic composting of non-hazardous organic materials. This guideline was used as guidance when developing this D&O report.

1.2.1.2 Ontario Regulation 101/94 – Recycling and Composting of Municipal Waste

Part IV and Part V of O.Reg. 101/94 (MOE, 1994b) applies to sites whose only function is to accept and transfer municipal waste as described in O.Reg. 347 (which includes waste from the IC&I and C&D sectors) for recycling, or to compost leaf and yard waste. Part IV and Part V of O.Reg. 101/94 were used as guidance when developing this D&O report for the diversion and composting facilities.

1.2.1.3 Ontario Regulation 232/98 – Landfill Sites

O. Reg. 232/98 (MOE, 1998a) contains detailed requirements for the design, operation, closure and post-closure care of municipal waste (as defined in Section 1.2.1) landfills. The document entitled *Landfill Standards, A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites* (MOE, 1998b) provides guidance to the application of the Regulation.

1.2.1.4 Ontario Water Resources Act (OWRA)

The purpose of the OWRA is for the protection and conservation of surface water and groundwater resources in the Province of Ontario. Any system that discharges to a surface water body requires approval under the OWRA. The CRRRC requires OWRA approval (Section 53 – Sewage Works) for the leachate pre-treatment facility and for the discharge of surface water from the Site to the Regimbald Municipal Drain to the northeast, to the Simpson Municipal Drain in the central portion, and to the Wilson-Johnston Municipal Drain via an existing ditch in the southern portion.

1.3 Related Documentation

Submitted in support of the Environmental Assessment (EA) and in association with this report are the Environmental Assessment Study Report (EASR) (Volume I), technical support documents (TSD's) for the EASR, and the Geology, Hydrogeology & Geotechnical Report submitted as Volume III of the EASR.

2.0 EXISTING SITE CONDITIONS

2.1 Site Location and Legal Description

The CRRRC Site is located on the property owned or controlled by Taggart Miller Environmental Services. The property is located in the east part of the City of Ottawa just southeast of the Highway 417/Boundary Road interchange. This portion of the City within which the Site is located is characterized by a provincial 400 series highway corridor, a partially developed industrial park, and a combination of general rural and agricultural uses. The closest developed area is the Hamlet of Edwards about 2 kilometres to the west; separated from the Site by the Highway 417 corridor are the Village of Vars about 5.5 kilometres to the east and the Village of Carlsbad Springs about 3 kilometres to the north. A 43 rural lot subdivision is located within the Township of Russell along Route 100 about 4 kilometres to the south of the Site.

The property is located on the east side of Boundary Road, north of Devine Road and west of Frontier Road, and east of an existing industrial park. Taggart Miller has acquired about 192 hectares (475 acres) of land on Lots 22 to 25, Concession XI, Township of Cumberland (refer to Figure 1, Key Plan and Figure 2, Legal Survey Plan).

2.2 Land Use

The Site itself was formerly used for farming, which was mostly discontinued decades ago and vegetation cover has re-established. According to the City of Ottawa's Official Plan (City of Ottawa, 2013) (Schedule A) and as shown on Figure 3, the CRRRC is designated as a General Rural Area. Designations in the vicinity of the CRRRC include: General Rural Area, Agricultural Resource Area and Rural Natural Features Area. As shown on Figure 4, the Site is zoned as Rural Countryside Zone (RU) and Rural Heavy Industrial Zone (RH).

2.3 Adjacent Land Use

There is limited development surrounding the Site; development has been constrained due to poor quality groundwater. Land uses adjacent to the Site boundaries are as follows:

- To the North: Highway 417 followed by a golf course;
- To the East: Frontier Road followed by rural and agricultural lands. These lands are zoned Rural Countryside Zone and Agricultural;
- To the South: vacant, regenerating agricultural area. These lands are zoned Rural Countryside Zone; and,
- To the West: various industrial park uses both east and west of Boundary Road, with several residences among the industrial and commercial uses along Boundary Road within 500 m of the Site. These lands are zoned Rural Heavy Industrial, Rural General Industrial Zone, Rural Commercial Zone and Rural Countryside Zone.

The approximate locations of the residential and commercial buildings located nearest to the Site are indicated on Figure 3. The nearest water well to the Site, as reported in the MOECC Water Well Information System (WWIS), is also indicated on Figure 3. It should be noted that dug wells not reported to the MOECC WWIS are not indicated on Figure 3, though are assumed to exist on the residential and commercial properties in the area of the Site.

2.4 Topography

As illustrated on Figure 5, the topography at the CRRRC Site is flat, and varies between 76 m above sea level (asl) on the east side of the Site to 77.5 m asl in the southwest portion of the Site. Surface water features within the vicinity of the CRRRC Site generally drain in an easterly direction following the general topographic slope.

2.5 Hydrology

There are four notable natural watercourses within 5 km of the CRRRC Site, which is located within the Bear Brook Creek Subwatershed. Bear Brook Creek is 3.4 kilometres to the northwest of the property boundary, and Shaw's Creek is 1.6 kilometres to the east. Bear Brook Creek is a major tributary of the South Nation River. The North Castor River is 4.7 kilometres to the southwest, while Black Creek is approximately 2.5 kilometres southeast. Both the North Castor River and Black Creek are part of the Castor River subwatershed and, as such, are isolated by the subwatershed boundary from receiving potential drainage from the CRRRC Site. The Site drains to the east via the Regimbald Municipal Drain to the northeast, to the Simpson Municipal Drain in the central portion, and to a ditch in the southern portion that leads to the Wilson-Johnston Municipal Drain. All these drains converge at the commencement of Shaw's Creek. The hydrology of the Site is described in further detail in Appendix A, Stormwater Management System Design Report.

2.6 Geology/Hydrogeology

Regionally, the Ottawa Valley area, within which the CRRRC Site is located, is located within the Ottawa Embayment, an area underlain by a Paleozoic sedimentary sequence which lies unconformably upon Precambrian basement rocks of the Grenville age, and structurally bounded by Precambrian rock of the Frontenac Arch, Laurentian Arch, Oka-Beauharnois Arch and the Adirondack Dome. The Ottawa Valley terrain is largely flat associated with the extensive deposition of marine clay during inundation of the region by the Champlain Sea during the post glacial period. Areas of glaciomarine sand and gravel beaches developed above the clay deposit during the retreat of the Champlain Sea from the valley, and the Ottawa River cut down into the underlying clay following former meander channels in the region. Locally, the area surrounding the CRRRC Site is underlain by shale and limestone of various sedimentary formations, followed by lower bedrock formations that lie unconformably upon the Precambrian basement.

The CRRRC Site is underlain by approximately 32 m to 40 m of soil, representing one of the thicker areas of soil deposits within the area. Much of the area is underlain by deposits of offshore marine silts and clays associated with the former Champlain Sea. Glacial till deposits situated above the bedrock underlie these marine deposits. Boreholes drilled on-Site encountered a 1 m to 2 m thick veneer of silty sand at surface overlying marine silty clay, while a few boreholes encountered the upper weathered zone of the underlying marine silty clay at surface. The silty clay is the dominant soil deposit overlying a comparatively thin (varying between 4 m to 8 m thick) glacial till layer above the bedrock. An apparent continuous but thin (0.1 m to 0.6 m), near flat lying layer of sandy silt to silty sand, trace clay (hereafter referred to as the silty layer) was encountered at a consistent depth of approximately 4 m to 6 m below ground surface. This silty layer thins to the north and south of the Site and appears to be thickest in a diagonal band passing from northwest to southeast through the central part of the Site where it locally thickens to approximately 0.4 m to 0.6 m, possibly reflecting a local erosional pattern in the surface of the clay deposit.

The horizontal groundwater flow direction in the surficial silty sand layer, the silty layer and the silty clay at the Site are consistently to the east while the groundwater flow direction in the glacial till and upper bedrock zone is towards the northeast. The Site has a predominantly downward vertical gradient with some seasonal fluctuations.

The geology and hydrogeology of the Site are described in detail in Volume III of the submission: Geology, Hydrogeology & Geotechnical Report.

3.0 CRRRC SITE DESCRIPTION

3.1 Waste Stream

3.1.1 Service Area

The proposed service area of the CRRRC consists of the City of Ottawa, and the Counties of Prescott-Russell, Stormont, Dundas and Glengarry, Lanark, Leeds & Grenville, Frontenac, Lennox and Addington, and Prince Edward. It is anticipated that the CRRRC would receive waste primarily from the Capital Region.

3.1.2 Waste Characteristics

The CRRRC is intended to be used for the recovery of resources, diversion of materials from disposal and disposal of residuals for wastes generated by IC&I and C&D sectors within the service area.

The materials to be accepted are solid, non-hazardous waste and surplus soils, and include the following:

- IC&I waste
- C&D waste
- Source separated organics and mixed organics from the IC&I sector
- Petroleum hydrocarbon (PHC) impacted soil
- Surplus soil

The recyclable stream from multi-residential buildings is considered part of the IC&I waste stream for this purpose and will be accepted at the CRRRC if/when available.

3.1.3 Waste Quantities

It is proposed that the CRRRC will accept waste from the IC&I and C&D sectors up to a maximum of 450,000 tonnes per year. The average daily receipt will be 1,500 tonnes per day (averaged over a calendar year). The maximum daily rate will be 3,000 tonnes per day.

Details of the maximum amount of waste intended to be accepted/processed/stored at each diversion and processing facility are outlined in Appendices D through G as well as in Table 1. The actual amount that will be accepted and processed at each facility will depend on the composition and tonnage of the waste materials received up to the maximum of 450,000 tonnes per year. The incoming material that is not diverted will go to the landfill.

Table 1: Waste Quantities

Facility	Daily Maximum Incoming Waste (tonnes)	Annual Maximum Incoming Waste (tonnes)	Storage of Unprocessed Waste (tonnes)	Storage of Processed Waste (tonnes)
C&D processing facility	800	199,680	2,200	2,890
Materials Recovery Facility (MRF)	800	199,680	850	1,680
Organics processing facility	500	50,000	1,800	1,600*
Compost processing area	400	20,000	Not applicable	Not applicable
PHC contaminated soil treatment area	Based on need	25,000	12,500	Not applicable

Note: * pre-processed organic waste/slurry

3.2 Site Layout

The following proposed diversion facilities/operations are components of the CRRRC:

- Materials Recovery Facility (MRF);
- C&D processing;
- Organics processing;
- Compost processing and storage (leaf and yard waste and wood);
- PHC contaminated soil treatment;
- Surplus soil management; and,
- Drop off for separated materials or for separation of materials.

The following activities would also take place at the Site:

- Landfill for disposal of residual and non-diverted wastes;
- Leachate pre-treatment facility to treat the leachate generated by the landfill and organics processing; and,
- Flare and possibly power generation to manage the landfill gas (LFG) and the bio-fuel from the organics processing facility.

The proposed layout of the diversion facilities, the landfill component and the ancillary facilities is provided on Figure 6 Site Development Plan. The flow of waste material and products at the Site is shown on Figure 7. The diversion facilities, Site entrance facilities, ancillary facilities and administrative buildings are proposed for the area north of the Simpson Drain, while the landfill component and associated stormwater management and buffer areas are proposed for the area south of the Simpson Drain.

4.0 ASSESSMENT OF POTENTIAL IMPACTS

4.1 Groundwater Assessment

Modelling of long term groundwater quality impacts for new or expanding landfill sites is required under O. Reg. 232/98 (MOE, 1998a). Typically, the modelling is conducted to demonstrate that the proposed design will meet the requirements of MOECC Guideline B-7 (MOE, 1994a).

A comprehensive description of the contaminant transport modelling that was carried out in consideration of the CRRRC landfill, including the groundwater protection features described herein (e.g., a low permeability natural clay liner, a geosynthetic clay liner (perimeter hydraulic barrier), and a leachate collection system), is provided in the Geology, Hydrogeology & Geotechnical Report(Volume III).

The conceptual contaminant transport movement at the Site is downward towards the silty layer. Shallow groundwater in the surficial silty sand layer potentially impacted by the landfill will be cut off by a geosynthetic clay liner (GCL) barrier around the landfill perimeter footprint and keyed into the upper silty clay. It was considered conservative to model concentrations in the silty layer.

The results of the hydrogeologic/contaminant transport modelling are described in the Geology, Hydrogeology & Geotechnical Report (Volume III). All parameter results in the silty layer were negligible (i.e., the impact of the landfill is not measurable in the silty layer) and, considering Site characteristics and the proposed design and operation of the other components of the CRRRC, the overall Site performance is predicted to meet the Reasonable Use Performance Objective (RUPO) (MOE, 1994a).

4.2 Surface Water Assessment

The surface water assessment considered surface water quantity and surface water quality as described in Appendix A, Stormwater Management System Design Report.

The post-development model results were compared to the pre-development results, with consideration of proposed mitigation systems, to determine the “net effects” of the proposed project on surface water.

The objectives of the stormwater management design are to:

1) Control post-development stormwater discharges from the Site to the three Municipal Drains (that are the receivers of both existing and proposed surface water runoff) at or below pre-development rates, for the 1 in 2 year to 1 in 100 year design storm events;

2) Minimize sediment loading in runoff leaving the Site during and post-construction, to adhere to the MOECC Guidelines for Enhanced Level of treatment (80% Total Suspended Solids (TSS) removal) or greater (MOE, 2003); and,

3) Maintain Site runoff water quality at or above Site water quality standards.

The stormwater management design criteria for the Site to meet the objectives outlined above are set out in the following:

- The City of Ottawa, Stormwater Control Quantity and Surface Water Quality Policies (City of Ottawa, 2009);
- Ontario Reg. 232/98 for Landfilling Sites (MOE, 1998a); and,
- The MOECC stormwater management pond sizing guidelines for impervious area percentages to achieve TSS removal objectives (MOE, 2003).

The surface water assessment concluded as follows:

- The total Site drainage area is not expected to change, although the drainage area boundaries within each of the three on-Site sub-catchments will be shifted to provide stormwater management for the proposed Site development. The sub-catchment area contributing to the Regimbald Municipal Drain will increase somewhat, as will that contributing to the Simpson Drain, while that associated with the Wilson-Johnston Drain will decrease;
- Under the post-development scenario, the increase in respective impervious land use and average slopes for the sub-catchment areas are expected to generate increased runoff conditions;
- Due to the proposed changes in land use, the overall Site is expected to see a decrease in annual infiltration and a corresponding increase in annual runoff;
- The proposed stormwater management ponds are sized to meet storage volume requirements to manage peak flows without flooding, and the detention and controlled release will mitigate the shifting of post-development on-Site sub-catchment areas; and,
- The proposed works are predicted to result in water quality conditions that are comparable to existing conditions and meet MOECC Provincial Water Quality Objectives (PWQO) (MOE, 1994c). Post-closure, the ponds will continue to operate to ensure surface water quality downstream of the Site remains protected.

4.3 Noise Assessment

The noise assessment addressed the noise effects of the proposed operations at the CRRRC on the neighbouring sensitive points of reception (PORs). The noise study was prepared in accordance with the MOECC publications Noise Guidelines for Landfill Sites (MOE, 1998d) and Environmental Noise Guideline NPC-300 (MOE, 2013a). The results of the noise assessment are provided in Appendix B, Acoustic Assessment Report and TSD #2.

4.3.1 Criteria and Guidelines

The noise assessment methodology used in this study was based on the guidelines stipulated by the Landfill Standards publication issued by MOECC (MOE, 1998b). The Landfill Standards outline the sound level limit criteria for evaluating on-Site stationary noise sources. The Landfill Standards also outline the protocol for evaluating ancillary facilities and off-Site haul road truck traffic.

All existing receptor locations identified in this study are located in a Class 1 area, as per MOECC Publication NPC-300 (MOE, 2013a). A Class 1 area means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as “urban hum”.

NPC-300 (MOE, 2013a) defines the establishment of sound level limits as either the applicable exclusion limit, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment.

These studies have addressed noise associated with the landfill operations and ancillary equipment. Calculations of the noise levels at receptor locations have been done in accordance with the relevant international standards; namely, International Organization for Standardization (ISO) 9613-2 (ISO, 1996) on sound propagation outdoors.

4.3.2 Receptor Summary Locations

Ten receptor locations have been identified as being the most sensitive receptors in the vicinity of the CRRRC Project. Three vacant lots (VLs) zoned to allow possible future noise sensitive land use have also been identified. The table below provides a summary of the PORs and VLs used in the assessment. The table also includes the UTM coordinates and indicates which baseline noise monitoring location was used to establish the existing noise level at each POR or VL.

Table 2: Description of Receptor Locations

Receptor	UTM Coordinates	Representative Noise Monitoring Location
POR01	465558, 5020774	Measurement Location #2
POR02	465319, 5020015	Measurement Location #3
POR03	465888, 5019611	Measurement Location #3
POR04	465421, 5020818	Measurement Location #2
POR05	465428, 5021084	Measurement Location #2
POR06	465323, 5021149	Measurement Location #2
POR07	465319, 5021197	Measurement Location #2
POR08	465306, 5021229	Measurement Location #2
POR09	465318, 5021389	Measurement Location #2
POR10	464934, 5021613	Measurement Location #1
VL01	465916, 5020949[1]	Measurement Location #2
VL02	466206, 5020603[1]	Measurement Location #3
VL03	466808, 5021378[1, 2]	N/A[3]
	467094, 5020583[1, 4]	N/A[5]

Notes: Locations are shown on Figure 2 and 3 of Appendix B.
1 UTM coordinates are for the assumed location of the future developments.
2 Assumed location representative of worst-case noise impact for ancillary noise sources.
3 Noise monitoring was not carried out at this location. The minimum background sound level due to road traffic was calculated using STAMSON v5.04 (see Table 5, TSD #2).
4 Assumed location representative of worst-case noise impact for landfill noise sources.
5 MOECC exclusionary sound level limits for Class 1 areas have been used.

4.3.3 Compliance

Measurable changes to existing noise levels were predicted at some locations, however, the noise levels were evaluated and it has been concluded that they are in compliance with MOECC guidelines.

Follow-up monitoring as described in Section 7.4 is recommended to confirm that the mitigation measures considered integral to the CRRRC are being incorporated as planned, and are effective. Follow-up monitoring shall take place annually during the initial period of operations at the CRRRC; modifications would be determined in consultation with the MOECC.

4.4 Air Quality and Odour Assessment

The air quality and odour assessment for the proposed CRRRC consisted of the following steps:

- Calculating representative air and odour (where applicable) emission rates for each source at the proposed CRRRC during operations;
- Dispersion modelling to predict resulting concentrations of indicator compounds; and,
- Comparison of resulting concentrations to MOECC standards and guidelines.

Under Section 9 of the EPA, an ECA for Air and Noise must be obtained from the MOECC for operation of the proposed facility. As part of this approval, operations at the proposed facility are required to demonstrate compliance with O.Reg 419/05 (MOE, 2013c). Sections 19 and 20 of O.Reg 419/05 outline the standards to which facilities must comply. The section that a facility must comply with is dependent on the North American Industrial Classification System (NAICS) (Statistics Canada, 2012) code for the facility, the date that operations commence, and the type of activities that occur on-Site.

The NAICS codes (Statistics Canada, 2012) that best describe the CRRRC's primary operations are 562920 (Materials Recovery Facilities) and 562210 (Waste Treatment and Disposal), the second of which is listed in Schedule 5 of O.Reg 419/05 (MOE, 2013c). As a result, the CRRRC must demonstrate compliance with Section 20 of O.Reg. 419/05.

In addition to the air quality standards provided in O.Reg. 419/05 (MOE, 2013C), the MOECC has air quality guideline values that are also used to assess air quality. Relevant to the operation of the CRRRC is the MOECC's odour guideline of 1 odour unit (OU)/m^3. This value is aimed at preventing odour impacts at sensitive receptors (e.g., residences, schools).

The air quality and odour assessment of the proposed CRRRC is focused on concentrations of the following compounds, which could be emitted from the proposed CRRRC, and for which air quality criteria exist:

- Particulate matter, including suspended particulate matter (SPM), particles nominally smaller than 10 µm in diameter (PM_{10}), and particles nominally smaller than 2.5 µm in diameter ($PM_{2.5}$);
- Oxides of nitrogen (NO_X);
- Sulphur dioxide (SO_2);
- Carbon monoxide (CO);

- Hydrogen sulphide (H_2S);
- Vinyl chloride (C_2H_3Cl); and,
- Odour.

As part of the ECA (Air and Noise) application for the proposed CRRRC, an Emission Summary and Dispersion Modelling (ESDM) report has been prepared for the facility to demonstrate compliance with Section 20 of O.Reg. 419/05 (MOE, 2013C), as well as the MOECC's odour guideline. The ESDM report is provided in Appendix C.

The ESDM report for the CRRRC assesses all sources and contaminants which, as defined by the MOECC within O.Reg 419/05 (MOE, 2013C) and O.Reg 524/98 (MOE, 1998c), require ECA (Air and Noise) permitting. Table 3 outlines the emission sources at the proposed CRRRC.

Table 3: Summary of Sources Assessed as part of the Compliance Assessment

Source Information		Significant (Yes or No)?	Modelled (Yes or No)?	Rationale
General Location	**Source**			
Flare and/or Electrical Generation Plant	Enclosed LFG and biogas flare and/or engines	Yes	Yes	—
Construction and Demolition Facility	Dust collector	Yes	Yes	—
Material Recovery Facility	Dust collector	Yes	Yes	—
Organics Processing Facility	Biofilter	Yes	Yes	—
	Organics processing operations (material handling)	Yes	Yes	—
	Organics processing operations (tailpipe emissions)	Yes	Yes	—
Composting	Composting, curing, and post processing (material handling)	Yes	Yes	—
	Composting, curing, and post processing (tailpipe emissions)	Yes	Yes	—
PHC Impacted Soil Treatment Area	Biofilter	Yes	Yes	—
	PHC soil treatment operations (material handling)	Yes	Yes	—
	PHC soil treatment operations (tailpipe emissions)	Yes	Yes	—
Landfill	Landfill Cap	Yes	Yes	—
	Landfill operations (material handling)	Yes	Yes	—
	Landfill operations (tailpipe emissions)	Yes	Yes	—
Leachate Pre-treatment	Leachate pre-treatment	Yes	Yes	—
	Leachate ponds	Yes	Yes	—
Paved Roads	Vehicle exhaust and fugitive road dust	Yes	Yes	-
Unpaved Roads	Vehicle exhaust and fugitive road dust	Yes	Yes	—
Emergency Generator	Diesel emergency power generator used to provide electricity during power outages.	Yes	No	The emergency power equipment only operates periodically (rather than continuously) and therefore produces emissions that are negligible relative to the overall emissions from the CRRRC. Additionally, the emergency power generator will not be operating at the same time as any other equipment and therefore is not a part of the worst-case scenario.
Support Activities	Operational support activities, such as maintenance activities (including welding, compressor, diesel fire pump, lights)	No	No	These activities are considered to be negligible in comparison to the other activities occurring on site.
	Stationary fuel combustion	Yes	Yes	Emissions from these sources occur seasonally (i.e., do not occur at all times during a year) and are very small compared to mobile combustion sources. For this assessment, only nitrogen oxide emissions were modelled.

The ESDM report was compiled in accordance with Section 26 of O.Reg 419/05 (MOE, 2013C) and the MOECC's Procedure for Preparing an Emission Summary and Dispersion Modelling Report (MOE, 2009), as appropriate.

When assessing compliance with Section 20 of O.Reg. 419/05 (MOE, 2013C), it was conservatively assumed that all of the sources are operating simultaneously, at their maximum capacities. Estimated emissions from these sources were input to the US EPA AERMOD atmospheric dispersion model, to predict the maximum off-property point of impingement concentrations for each contaminant.

The following were also input to the AERMOD model for the Site:

- Digital elevation model (DEM) terrain data provided by the MOECC;
- Surface and upper air meteorological data for the Ottawa area, provided by the MOECC as the regional dataset for the Site;
- An off-property receptor grid that corresponds with the requirements under Section 14 of O.Reg. 419/05 (MOE, 2013C);
- A fenceline receptor grid that corresponds with the requirements under Section 14 of O.Reg. 419/05 (MOE, 2013C);
- Sensitive receptors in the Site vicinity; and,
- Model source parameters derived in accordance with the MOECC's Air Dispersion Modelling Guideline for Ontario (MOE, 2009).

Table 4 presents the concentrations of the indicators at the applicable point-of-impingement. The assessment indicates that the proposed facility will be in compliance with O. Reg. 419/05, even with mobile equipment and fugitive emissions from roadways and storage piles considered. The results of the modelling are documented in the ESDM report.

Table 4: Predicted Compliance Air Quality Concentrations at POI

Indicator	Averaging Period	Air Quality Criteria (µg/m³)	Maximum Concentration at POI (µg/m³) (1)	Percentage of Limit (%)
SPM (24-hr)	24-hour	120	98.23	82%
PM_{10} (24-hr)	24-hour	50	23.30	47%
$PM_{2.5}$ (24-hr)	24-hour	25	20.16	81%
NO_X (1-hr)	1-hour	400	68.90	17%
NO_X (24-hr)	24-hour	200	37.15	19%
NO_2 (1-hr)(2)	1-hour	400	68.90	17%
NO_2 (24-hr)(2)	24-hour	200	37.15	19%
SO_2 (1-hr)	1-hour	690	15.91	2%
SO_2 (24-hr)	24-hour	275	8.54	3%
CO (1/2-hr)	½-hour	6000	860.01	14%
H_2S (24-hr)	24-hour	7	0.26	4%
H_2S (10-min)	10-min	13	0.79	6%
C_2H_3Cl (24-hr)	24-hour	1	0.021	2%
Odour (10-min) (3)	10-min	1(3)	0.58	58%

Notes:
(1) Represents the maximum predicted concentrations at POI locations within the Site vicinity.
(2) A conservative concentration conversion value of 100% of NO_x was applied to NO_2.
(3) The 99.5th percentile predicted concentration at discrete receptors

The results of the modelling are documented in the ESDM report, provided in Appendix C, and show that the proposed CRRRC is capable of operating in compliance with Section 20 of O.Reg 419/05 (MOE, 2013C) as well as pertinent MOECC air quality guidelines (e.g., odour guideline of 1 OU/m³).

A Site-specific "best management practice" dust and odour management plan will be implemented to mitigate against potential dust emissions (SPM and PM_{10}) and odour.

4.5 Lateral Gas Migration Assessment

At landfill sites, the potential for lateral migration of gases off-Site and the explosion hazard of methane should it migrate and collect in confined spaces at a concentration of between 5 and 15 percent in air, is commonly assessed. Methane gas is lighter than air and migrates under both concentration and pressure gradients.

Based on the physical Site setting of the CRRRC landfill, potential lateral migration of LFG through the subsurface is expected to be very limited. The surficial silty sand layer and silty clay soils and high water table conditions are the natural limiting factors for potential lateral migration of LFG between the waste disposal area and the property boundaries.

As indicated in the Geology, Hydrogeology & Geotechnical Report, the groundwater table is located on average 0.4 m below ground surface. In the Guideline for Assessing Methane Hazards from Landfill Sites (MOE, 1987) it is stated that "a commonly applied rule of thumb is that significant methane migration may extend for a distance equal to 10 times the depth of landfill, between the ground surface and the water table", i.e., 10 times the effective thickness of refuse, H. Moreover, this Guideline goes on to say that "any proposed development may be approved if it can be shown that it is at a distance in excess of D in the relationship D = 10H."

If the depth to the groundwater table is conservatively taken as 2 m (the deepest water level recorded in 2013 at the Site was >1.5 m when monitoring well 13-21-2 was dry), "D" would equal 20 m. As discussed in Section 5.2, the on-Site buffer zones that will be provided meet or exceed these conservative approximations of "D" by five to six times.

It is noted that a GCL barrier will surround the landfill perimeter and be keyed into the upper silty clay. The GCL will add an additional barrier to LFG migration. As well, there is a minimum 100 metre wide buffer between the landfill footprint and the Site property boundaries; and there are ditches and drains that would interrupt the movement of any LFG in the unlikely event that it had migrated away from the landfill through the thin unsaturated zone.

In light of the physical Site setting, the engineered perimeter cut-off around the landfill and the proposed active LFG collection system that will impose negative gas pressures in the waste mound, the potential for lateral migration at this Site is negligible. No subsurface LFG monitoring is proposed at the property boundaries.

4.6 Biological Assessment

Complete details of the biological impact assessment are provided in TSD #4 for the EASR. The report states that with the recommended mitigation measures, potential direct and indirect effects of the CRRRC are not expected to adversely affect the biology in the Site-vicinity. A monitoring program was recommended as discussed in Section 7.3.

5.0 SITE DESIGN

As discussed in the Geology, Hydrogeology & Geotechnical Report (Volume III), a geotechnical analysis of landfill stability was completed to assess the geometrical requirements of this landform, including its interaction with the required stormwater ponds, Simpson Drain, leachate management and other Site features. The proposed Site Development Plan provided in this section takes the geotechnical analysis into consideration.

5.1 Site Access, Entrance Facilities and Roads

Primary access to the CRRRC will be provided from Boundary Road, as indicated on Figure 6. The Site entrance is located as far north as possible along Boundary Road, as this will minimize travel distance for Site-related traffic on Boundary Road between Highway 417 and the access location, and also adequately separate the access location from the intersections of Boundary Road with Mitch Owens Road and Devine Road further to the south. The road from the primary Site entrance consists of a 450 metre long two way main road to the in-bound scale, the provision of a separate single out-bound lane to an out-bound scale, and a separate 400 metre long truck queuing lane. All queuing of waiting Site traffic will be on-Site and there will be no backup of incoming traffic onto Boundary Road. The 30 metre wide access road allowance will accommodate entrance and exit lanes, an area to ensure that truck queuing will take place off Boundary Road, appropriate geometry to accommodate turning at Boundary Road, and roadside drainage. At the east end of this primary access road it enters the main part of the CRRRC property. A secondary Site access/exit will be provided at the northern end of Frontier Road for infrequent use by vehicles associated with Site operations, maintenance or emergency. Temporary haul roads will be constructed within the landfill footprint to provide access for vehicles to the active phase of the landfill.

The primary in-bound and out-bound weigh scales will have associated scale houses. A secondary weigh scale and associated scale house is proposed for the access/exit road to/from the landfill to weigh material to be disposed of in the landfill.

The administration building located just north of the primary access road will have an approximate footprint of 200 square metres (m^2). The administration building will house office functions for the CRRRC. Staff and visitor access to the building will be provided via a separate lane off the main access road prior to the in-bound scales. A paved parking and apron area will be provided around the administration building.

Ancillary facilities at the CRRRC include a maintenance garage (and associated employee parking lot) and a truck tire wash located along the exit road from the landfill.

All on-Site roads north of the Simpson Drain are paved, with the exception of the road running along the east side of the Site connecting the landfill to the maintenance garage; this road will remain gravel surfaced for use by equipment associated with landfill operations such as compactors, dozers, etc. The layout of facilities and roads has been designed to maximize “drive-through” methods of moving equipment on-Site to reduce the use of back-up beepers.

A small load drop-off area is located north of the administration building. Vehicles will enter the Site over the in-bound scales and proceed to this facility to drop off their material in the appropriate bunker, and then exit the Site. A separate road is provided for on-Site trucks to access the containers within the bunkers. The roadways associated with this facility will be paved.

5.2 Buffers

The width of the buffer area adjacent to the east side, the east half of the south side, and the northwest corner of the landfill is 125 m. Around the remainder of the landfill the perimeter buffer would be 100 m, as per O.Reg. 232/98 (MOE, 1998a).

5.3 Visual and Noise Screening

Screening will be provided by leaving an adequate width (15 to 20 m) of existing tree cover around the perimeter of the property where possible. Constructed screening consisting of earth berms 2 to 3 m high with trees transplanted on them will be required at the northeast and southeast corner areas and along a portion of the west central Site boundary. It is noted that a portion of the constructed screening proposed at the northeast corner could be replaced by transplanting trees in the gap in the existing tree line at the north end of the Frontier Road cul-de-sac; this would also effectively screen the view of the Site for persons travelling along Highway 417.

During the planning of the proposed CRRRC Project, ways to avoid or reduce potential negative effects from Site noise and enhance positive effects were identified. These will be incorporated into the CRRRC operating practices. The following design and operating considerations for controlling noise were assumed in the noise assessment:

- Constructed screening features (berms) will be located along the edge of the property at the proposed locations shown on Figure 6.
- Working face or noise screening berms will be located as shown on Figure 8 to shield existing receptor locations from equipment operating in the active cell. Noise screening berms will be required for areas within Phases 6, 7 and 8 of the landfill to break the line of sight between the equipment in the active cell and the most sensitive PORs. The following berm heights are recommended:
  - For Phase 6 of the landfill, equipment operating within 30 m of the southwest corner of the phase boundary should be screened by a berm with a minimum height of 2.5 m.
  - For Phase 7 of the landfill, equipment operating within 30 m of the southwest corner of the phase boundary should be screened by a berm with a minimum height of 3 m. Equipment operating between 30 m and 60 m of the southwest corner of the phase boundary should be screened by a berm with a minimum height of 2.5 m.
  - For Phase 8 of the landfill, equipment operating within 30 m of the southwest corner of the phase boundary should be screened by a berm with a minimum height of 2.5 m.
- Constructed noise screening berms will also be required for vacant lot receptors if a noise sensitive building is developed on those lands. Details are provided in TSD #2.
- “Drive-through” methods of moving equipment on-Site will be maximized to reduce the use of back-up beepers, and there will be speed limit control for traffic on-Site.
- Between 0600 and 0700 hours motorized equipment will only be idling, full operation will occur between 0700 and 1900 hours (i.e., daytime hours).
- Between 1900 and 2300 hours (i.e. evening hours) operations are limited to activities indoors within the MRF and C&D processing facility.

Complete phases may provide shielding for some PORs for operations occurring in adjacent cells. In addition, all motorized equipment will be kept in good repair and be fitted with standard operational exhaust mufflers.

5.4 Stormwater Management

The design of drainage requirements for the CRRRC is shown on Figure 6. The full Stormwater Management System Design Report is provided in Appendix A. The approach to system design is to closely match post-development flows to pre-development flows by providing the required retention time in on-Site ponds, and by doing so also provide an Enhanced level of TSS removal (MOE, 2003). The approach also divides up the Site into three drainage areas that are similar in size to the three pre-development drainage areas leading to the three surface water discharge locations from the Site. The three discharge locations, which all flow eastward and enter Shaw's Creek, are to the Regimbald Municipal Drain to the northeast, to the Simpson Municipal Drain in the central portion, and in the southern portion to the Wilson-Johnston Municipal Drain via an existing ditch. The system consists of Site grading, ditching and culverts leading to five linear stormwater ponds or pairs of ponds; one of the five ponds will receive stormwater drainage from a portion of the diversion areas to provide a large fire pond (as per the building code) to provide water for firefighting purposes, if required. Oil-water separators will be used in the vehicle maintenance garage and reversed slope outlet pipes will be used for stormwater management ponds that receive drainage from vehicle parking areas. Also, it is envisioned that the tire wash station will be a recirculating system with a solids interceptor.

5.5 Construction and Demolition Processing Facility

The C&D processing facility will recover waste materials received from C&D projects. The proposed C&D processing facility will have the capacity to process approximately 50 tonnes/hour of material. It is proposed that the C&D facility accept a maximum of 800 tonnes per day and 199,680 tonnes per year for processing. The main recovered products from the processing of C&D material will consist of shredded wood, ferrous and non-ferrous metals, mixed aggregate, shingles, cardboard and drywall. Storage of unprocessed C&D material will be limited to 2,200 tonnes.

The C&D processing facility will be housed in a building with a footprint of approximately 13,000 square metres. The C&D building will house mechanical processing equipment used for crushing, screening, air and magnetic separation, and shredding. Manual sorting of materials will also take place inside the building. The C&D processing facility will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system, and will have a dust collection system that will discharge through a bag house and cyclone with the air vented through the roof.

Incoming trucks will enter the building from the south side and unload onto the building floor. The eastern and southern parts of the building will be mostly open space for receiving and other processing operations, such as chipping of recovered wood. C&D waste materials, which are typically received at the Site in roll off bins, would be segregated initially according to their main material components (mostly concrete, mostly wood (clean or dirty), mostly asphalt, etc.), which can then be further sorted for appropriate processing. For example, metal is recovered directly, wood is often chipped or shredded and sent to the compost processing and storage area, asphalt is ground for re-use; and concrete is crushed. Materials that cannot be recovered will go to disposal. The building will also be set up to load trucks with recovered materials to be sent to off-Site markets, recovered materials to be re-used on-Site, and/or rejected and residual materials to be hauled to the on-Site landfill component.

Detailed information about the design and operation of the C&D processing facility is provided in Appendix D.

5.6 Materials Recovery Facility

The MRF will process and recover IC&I materials, and is designed to handle both mixed materials and source separated loads. The proposed MRF will have the capacity to process approximately 50 tonnes/hour of material. It is proposed that the MRF accept a maximum of 800 tonnes per day and 199,680 tonnes per year for processing. The recovered materials will generally consist of cardboard, paper, glass, plastics, ferrous and non-ferrous metals, wood and other fibres.

The MRF operation will be housed in a building with a footprint of approximately 13,000 m^2. The MRF will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system, and will have a dust collection system that will discharge through a bag house and cyclone with the air vented through the roof. Storage of unprocessed material at the MRF will be limited to 850 tonnes.

Incoming vehicles containing materials destined for the MRF will enter the MRF building along the west part of the south side of the building and unload onto the floor. Clean (source separated) loads will be kept separate from mixed loads. These incoming materials will be loaded into a system of processing equipment that includes both mechanical recovery and manual sorting of materials. The recovered materials will be baled and stored, and then loaded onto trucks along the eastern part of the south side of the building and hauled off-Site to end markets. Rejected and residual materials will be loaded onto trucks within the east end of the building and hauled for disposal in the on-Site landfill.

Detailed information about the design and operation of the MRF is provided in Appendix E.

5.7 Organics Processing Facility

The organics processing facility will be constructed to divert the organics component from those portions of the IC&I waste stream that contain a sufficient amount of organics, as well as source-separated organics. It is proposed that the following will be accepted at the organics processing facility: A maximum of 50,000 tonnes of organic waste (mixed IC&I and source separated organics) destined for the primary reactor at full operation including a maximum of 20,000 tonnes per year (out of the total of 50,000 tonnes per year) of source separated organics for pre-processing before being transported to off-Site farm based or other approved commercial AD processing. The organics processing facility will consist of a receiving and storage building, pre-processing operations, primary anaerobic digester reactors, and a secondary digester. The facility will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system.

The proposed BioPower process for anaerobic digestion of mixed organics from IC&I sources uses well known biological treatment processes, however this combination of processes has not been previously approved for full scale operation in Ontario. In accordance with MOECC preference for new technology, it is initially proposed to construct and operate an on-Site demonstration scale BioPower facility. Pre-processing of source-separated organics to create an organics slurry for off-Site anaerobic digesters will occur on-Site in the building established for the receipt and storage of organics. Should this operation prove successful and there be continued interest/demand from off-Site anaerobic digesters, Taggart Miller may elect to continue it for source-separated organics while operating the BioPower facility for organic streams for which that technology is more appropriate. This building, which is anticipated to serve for both the shorter term pre-processing and the full scale receiving and storage, has been assumed to have a footprint area of approximately 3,000 m^2.

The demonstration scale facility will be located within the Site area proposed for organics processing. The purpose of the demonstration scale project is to: confirm the effectiveness of the BioPower technology in treating organic waste; provide information to enhance and optimize the BioPower technology; and refine process design and operating parameters for operation on a full-scale commercial basis for implementation at the CRRRC Site.

The demonstration will be performed by constructing and operating a facility that parallels and incorporates all of the processes and facilities associated with the BioPower technology, and the anticipated full-scale facility. These facilities will subsequently be expanded as required and incorporated into the full-scale plant following successful completion of the demonstration phase, depending on the results of the demonstration phase and market demand.

The principal facilities to be used in the course of the demonstration (and subsequently in the full-scale operations) are:

- Organics processing building;
- Biofilter for treatment of air from the organics processing building;
- Primary anaerobic digestion reactor;
- Secondary anaerobic digester/reactor;
- Negative pressure extraction system for generated decomposition by-products;
- Flare;
- Equipment for blending organic materials, transportation and placement of blended material in primary reactor, installation of cover system, excavation and transportation of digested product, processing of digested product, curing of digested product, refurbishment of primary reactor for re-use; and,
- Monitoring and analytical equipment.

It is intended that the demonstration facility be sized to accommodate up to 4,000 tonnes of organic waste per calendar month, not to exceed 23,400 tonnes per year. The demonstration will be performed for a minimum of one complete treatment cycle (filling primary reactor, anaerobic treatment of organics in primary reactor and liquor in secondary reactor, aerobic stabilization of material in primary reactor, emptying of primary reactor, screening and further processing/curing of digested product, and analysis of compost quality). For planning purposes, it is anticipated that the demonstration will operate for a period of 24 to 36 months. Key operational parameters within the primary and secondary digesters will be monitored. Data will be analyzed and used to adjust operating conditions and processes as appropriate. The monitoring program may be adjusted in response to ongoing data review and analysis. The character of compost produced by the BioPower process will be monitored in accordance with MOECC compost guidelines (MOE, 2012a). As the demonstration progresses, data will be gathered and the performance assessed from three perspectives: environmental, operational and economic. The runoff from the curing of digested product will be collected in a dedicated cell of a stormwater management pond. As the quality of runoff from the curing digested product is not yet known, this data will also be obtained during the demonstration process. Potential uses of the runoff from the curing of digested product will be determined based on the water quality data collected during the demonstration process. Part V EPA approval will be sought for conversion of the system to full-scale commercial operation. The precise full-scale system requirements will be specified in the Part V application. Operationally, the transition from demonstration to full-scale is expected to be seamless, since the demonstration system will be fully incorporated into the commercial plant.

Detailed information about the design and operation of the organics processing facility is provided in Appendix F.

5.8 Compost Processing and Storage Area

The compost processing and storage area will occupy an area of approximately 3.5 hectares and will have a paved surface. The following activities will be carried out on the pad: 1) leaf and yard materials received will be ground, initially aerobically composted in a static pile, and transferred to open windrows/trapezoidal piles for composting and curing; 2) received clean wood will be ground and processed into chips; 3) the digested product from organics processing will be cured in windrows/trapezoidal piles; 4) these products will be screened and stored for subsequent use on- or off-Site; and 5) residual materials will be transferred for recovery or disposal. If it is found that the quality of the digested product requires further composting, consideration will be given to aerated pile composting to evaluate alternative processes during or after the demonstration-scale period. Runoff from the compost processing and storage area will be directed to the same stormwater management pond as discussed in Section 5.7.

Detailed information about the design and operation of the compost processing and storage area is provided in Appendix G.

5.9 Petroleum Hydrocarbon (PHC) Contaminated Soil Treatment

The PHC contaminated soil treatment area will accept soils contaminated with PHC products. It is proposed that the Site will accept up to 25,000 tonnes of PHC contaminated soil per year. The facility will initially consist of one or two biopile cells connected to a single treatment unit that controls air extraction rate, moisture and nutrients and the biopiles; future stages of the facility may include up to eight biopile cells. Treated PHC contaminated soil may be used on-Site or provided for off-Site use if there is market demand and its quality meets the applicable regulatory guideline. The initial treatment system approach will be to aerate the soil to promote volatilization of the lighter PHCs, where required, prior to use as daily cover in the landfill component of the CRRRC to prevent off-Site odour impacts. Any PHC impacted soil that is not treated will be used as daily cover material in the on-Site landfill.

Detailed information about the design and operation of the PHC contaminated soil treatment area is provided in Appendix H.

5.10 Surplus Soil Management

The surplus soil management area is located at the west central portion of the Site area north of the Simpson Drain. The ongoing operation in this area, as well as other areas of the Site where surplus uncontaminated soil (or rock) received from construction projects may be temporarily stored until such time that it is required for re-use, will basically consist of the dumping and dozing of incoming soil into a stockpile(s), and removal of this soil for re-use on-Site. Uncontaminated soil is comprised of native (undisturbed) earth materials (from undeveloped land) or native earth materials/fill materials that are unimpacted by development or human activity, or altered earth/fill material whose quality meets the applicable table in O. Reg. 153/04 (MOE, 2004). It is anticipated that the temporary stockpiles could be up to approximately 5 m in height. Other underdeveloped areas of the Site could also be used for this purpose to suit Site operations. The operational details of surplus uncontaminated soil management will change frequently depending on the quantities and types of materials that are available to be brought to the Site, and the Site requirements for materials for construction and operational purposes.

In addition to PHC contaminated soils, the CRRRC will also receive other types of non-hazardous contaminated soil (or rock). Contaminated soil, with the exception of PHC contaminated soil directed to treatment, will be managed within the landfill, either as waste or re-used as daily cover.

5.11 Landfill Component

The on-Site landfill component will accept residual and waste materials; for additional detail, refer to Appendix I, Section 2.0.

The total landfill footprint has been assumed to be approximately 84 hectares. The landfill base will be excavated 1.5 to 2.5 m below existing ground level and will be surrounded by a perimeter berm. The perimeter berm will screen the landfill and ensure landfill stability and will accommodate a perimeter road, header piping for leachate and LFG and other service lines, and provide conveyance of runoff to the stormwater management system.

The presence of the clay deposit beneath this Site requires the landfill to have relatively flat sideslopes, in order that the landfill has adequate stability. The landfill design has 14H:1V sideslopes above the perimeter berm up to approximately elevation 89 m asl or 12 to 13 m above ground level, and then a 20H:1V slope up to a central peak or ridge area. The maximum design height of the final landfill contours is approximately 25 m above ground level. This corresponds to an airspace volume of approximately 10,170,000 m^3 for waste and daily cover. The design of the leachate containment and leachate collection system will meet the requirements of O.Reg. 232/98 (MOE, 1998a), within the context of the Site-specific geological and hydrogeological setting, as follows:

- For leachate containment, a Site-specific design approach has been followed. The natural low permeability silty clay deposit will provide the low permeability bottom liner for the landfill. The perimeter berm will incorporate a constructed low permeability hydraulic barrier (GCL) extending the full height of the berm and down through the surficial silty sand layer or weathered clay zone and keyed into the underlying upper silty clay. This would cut off the potential pathway for off-Site leachate migration via the berm fill and surficial silty sand layer; and,

- The design of the landfill base recognizes that consolidation settlement of the silty clay deposit will occur and that the largest settlements will be below the central portion of the landfill where the waste thickness is greatest. As such, the landfill base will be shaped to provide drainage of leachate from the perimeter of the landfill towards the centre; the leachate will be conveyed through a system of perforated and non-perforated leachate piping and a granular drainage blanket. Leachate sumps (manholes) will be provided within the landfill; they will be located at the lowest points of the base grading, both when constructed initially and allowing for the longer term consolidation of the clay as the waste is placed. The leachate collection system design will accommodate the expected settlement of the subgrade. As the settlement of the clay occurs, the slope of the base and piping will increase from that originally constructed, thereby enhancing the transmission of leachate to the interior leachate sumps. Leachate removal from each sump will be by means of submersible pumps and via piping to a forcemain that will convey the collected leachate for treatment (as described in Section 5.12). Cleanout access for inspection and flushing/cleaning of the leachate collection piping system will be provided, both from the exterior of the landfill and by cleanouts provided from within the landfill.

A leachate detection and secondary containment system (LDSCS) will be positioned beneath the perimeter berm on the hydraulically downgradient (eastern) side of the landfill. The LDSCS, will be a granular filled trench completed in the surficial silty sand layer, will allow for the monitoring of the performance of the landfill's leachate containment system (the natural clay deposit, the LCS, and perimeter berm with the GCL) and provide secondary containment in the unlikely event that leachate enters the surficial silty sand layer outside of the landfill footprint.

The proposed LFG management system will be designed in accordance with the requirements of O.Reg. 232/98 (MOE, 1998a). Given the contemplated diversion of IC&I organics from disposal to the extent practical, LFG and odour associated with decomposition of organics within the landfill will be reduced. The proposed LFG management system is an active collection system consisting of horizontal collector piping installed in two layers within the waste as the waste is placed, header piping around the landfill perimeter and extending to the condensate management facilities, a vacuum extraction plant and an enclosed flare. The proposed LFG collection system will conform to the most recent version of B149.6-11 Code for Digester Gas and Landfill Gas Installations (CSA, 2011), which has been adopted by the Technical Safety and Standards Authority for use in Ontario as of December 2012. The LFG collection system will also be designed for the predicted subgrade settlement.

Detailed information about the design and operation of the on-Site landfill component is provided in Appendix I.

5.12 Leachate Pre-treatment Facility

Leachate is produced when precipitation (rainfall and/or snowmelt) percolates downward through waste and dissolves contaminants present in the refuse. The leachate will be captured at the bottom of the landfill within the granular drainage blanket and directed to a leachate collection pipe network. These pipes will direct the leachate to a system of maintenance holes where it will be pumped out of the landfill for treatment. In addition, this leachate pre-treatment facility will treat excess liquor from the on-Site organics processing facility. A full leachate management plan is provided in Appendix J and is summarized in this section.

It is proposed that leachate be pre-treated on-Site. It is currently anticipated that the leachate will be pre-treated as required to comply with the requirements of the City of Ottawa as set out in the required discharge agreement between the City of Ottawa and Taggart Miller, and then transported to the City of Ottawa sewage treatment plant (ROPEC) for final treatment and discharge.

The leachate pre-treatment facility consists of an equalization tank, leachate storage pond or tank(s), liquor storage tank, boilers and heat exchangers, Sequencing Batch Reactor (SBR) system, effluent storage ponds or tanks, truck filling station and sludge management system. It will pre-treat leachate from the landfill, condensate from the LFG collection system and liquor from the on-Site organics processing facility.

Leachate from the landfill will be pumped to the equalization tank. In periods of high leachate generation, excess leachate would be directed to the leachate storage pond or tank(s) where it will be temporarily held until process capacity becomes available. The liquor will be stored in a separate storage tank.

At the start of the treatment process, the leachate is blended with the liquor and, if necessary, heated by a boiler system to optimize biological treatment processes. The liquid then goes to the SBR system which consists of three stages: the leachate/liquor is mixed with the previously accumulated sludge in an anaerobic digestion tank. The solids remain in the tank and the liquid portion overflows into one of up to three holding/pre-treatment tanks where it will be aerated and dosed in sequential batches to one of up to six digestion tanks.

In the leachate digestion tanks, the liquid will be further aerated in cycles; in off cycles, the solid particles are allowed to settle to the bottom followed by decanting of the clarified supernatant to a mixing tank. Chemicals are added at the mixing tank and mixed with a mechanical mixer before discharge to a clarifier. The chemicals facilitate coagulation for metal precipitation and are added as required to meet the Sewer Use By-law (City of Ottawa, 2003) limits. If required, the pH of the clarified liquid will be adjusted back to the range required by the municipal by-law before being directed to the treated effluent ponds or tanks.

The sludge from both the bottom of the clarifier and the bottom of the sludge digestion tank will be pumped into a sludge storage tank. There, a liquid polymer will be added to the sludge to facilitate efficient dewatering. The sludge will then be dewatered using tube filters placed on a concrete pad. Each tube has a porous fabric made of a specifically engineered dewatering textile. As sludge is pumped into the tube, water filters out through the fabric and is collected and sent back to the leachate storage pond or tank(s) to re-enter the treatment cycle. The dewatered solids will be disposed of at the on-Site landfill.

It is currently anticipated that the pre-treated liquid effluent stored in the effluent storage ponds or tanks will be hauled by tanker truck to the City of Ottawa's municipal wastewater treatment plant for further treatment and discharge.

5.13 Flare and Power Generation Area

The flare and power generation area will consist of three main components: a gas extraction plant, a flare, and possibly a utilization facility. The facility will accept and process both biogas from the organics processing facility and LFG from the landfill. The layout of the flare and power generation area is shown on Figure 9.

5.13.1 Extraction Plant

A gas extraction plant will provide a vacuum to both the LFG collection system located within the landfill, and the organics processing facility, and would convey the LFG/biogas to the flare, and to the utilization facility or an on-Site heating application. The extraction plant will be located in the northeast portion of the Site near the secondary digester within the organics processing facility area, outside of the approved waste footprint. The main components of the extraction plant will be one or more centrifugal blowers, LFG treatment facilities, monitoring instrumentation and controls, and an air compressor.

5.13.1.1 Centrifugal Blower

One or more centrifugal blowers will be installed in the extraction plant. The blower(s) will be used to create a vacuum of some 15 to 25 inches water column at each horizontal collector connected to the LFG collection system, and will convey the LFG to the flare. A separate blower system may be used to provide a vacuum to the organics processing facility.

The blower(s) will be equipped with a direct-drive motor and a variable frequency drive to provide suitable control at low flow rates. The blower(s) and associated motor and controls will meet the requirements of CSA B149.6-11 (CSA, 2011). The blower(s) will be connected to a programmable logic controller (PLC) and to an external manually operated emergency shut-down device in accordance with CSA B149.6-11.

5.13.1.2 LFG Treatment Facilities

A condensate knockout will remove most water droplets and mist as well as dirt from the LFG. The resultant liquid condensate will be disposed of into the leachate treatment system. Additional LFG treatment may be warranted in the event that a utilization facility is developed.

5.13.1.3 Monitoring Instrumentation and Controls

Automated control and monitoring within the extraction plant will be conducted via a PLC computer. The PLC will control the blower(s), flare and automatic shut-off valves, with input from various sensors including the gas concentration instrumentation. A datalogger will store data from the flare, blower and other instrumentation.

A flow meter will provide flow measurement for a range of LFG flow rates.

A methane and oxygen gas analyzer system will continuously measure and display concentrations of methane and oxygen in the LFG. Due to instrumentation limitations and the length of the connection line with the LFG pipe, there will be a time lag in response of the instrument to actual LFG concentrations in the pipe.

A pressure sensor will be installed to measure the LFG pressure generated immediately downstream of the blowers. A second pressure sensor will be located upstream of the condensate knockout.

A safety shut-off valve will be installed upstream of the blower and a check valve and second safety shut-off valve will be installed downstream of the blower as required by CSA B149.6-11 (CSA, 2011). Safety shut-off valves are actuated valves that can be shut off by the PLC.

5.13.1.4 Air Compressor

An air compressor will be located at the extraction plant and will be used to supply compressed air to condensate trap pump(s), safety shut-off valves, and the LFG instrumentation sampling system.

5.13.2 Flare

An enclosed flare will be located in the northeast portion of the Site near the extraction plant and secondary digester.

The enclosed flare will have a capacity of some 2,000 to 2,500 standard cubic feet per minute (scfm) of LFG at 50% methane plus possibly additional capacity for biogas from the organics processing facility. A flare turn-down ratio of 4:1 is anticipated. An enclosed flare is specified because of its high hydrocarbon destruction efficiency and its flame will not be visible. The flare is estimated to have a diameter of approximately 3 m and a height of approximately 12 m. The enclosed flare will have a destruction efficiency of total organic compounds of approximately 99%. The temperature of the flare will be controlled by thermocouples at various heights inside the flare. An ultraviolet flame sensor, connected to the PLC, will enable the blower to be shut down if the flame extinguishes. The enclosed flare will meet the requirements of CSA B149.6-11 (CSA, 2011).

A flame arrestor (intended to reduce the flame temperature in the event of a flash-back) and a thermal valve (intended to shut in the event of a slow burn-back), both required by CSA B149.6-11 (CSA, 2011), will be located upstream of the enclosed flare. The header pipe leading from the extraction plant to the flare will be supported appropriately with pipe supports. The enclosed flare will be surrounded by a fence in accordance with CSA B149.6-11.

Two smaller flares (instead of one larger one) may be used for combustion if it is decided to combust biogas from the organics processing facility and that from the landfill in separate flares. The general location of the two flares would be at the same as that currently selected for the single flare.

5.13.3 Utilization Facility

A utilization facility may be installed in the future to generate electricity and/or heat or to upgrade the gas to natural gas pipeline quality. A future utilization facility would be located in the northeast portion of the Site near the flare and would accept both LFG from the LFG collection system and biogas from the organics processing facility. The flare would be retained to provide a method of destroying the LFG if the LFG utilization facility is unavailable for any reason.

6.0 SITE OPERATIONS

6.1 General Site Operations

6.1.1 Hours of Operation

It is proposed that the Site will be open for material and waste receipts between 6:00 a.m. and 6:00 p.m., Monday through Saturday. Operating hours for the MRF and C&D processing facilities will be between 7:00 a.m. and 11:00 p.m. Monday through Saturday, although it is expected they will generally operate between 7:00 a.m. and 5:00 p.m.; the evening hours provide the flexibility to run two shifts during high demand periods. Landfill operations, organics processing in the building, composting and PHC soils treatment are proposed to be between 6:00 a.m. to 7:00 p.m. Monday through Saturday. Operations related to organics processing at the primary reactor cells will occur between 7:00 a.m. and 7:00 p.m. Monday through Saturday. The Site is expected to operate a maximum of 312 days per year.

6.1.2 Site Staffing

The Site is expected to employ up to 80 to 100 staff at any given time. Each operating scale will have an attendant and each facility (including the landfill) will have a person designated to direct vehicles to the unloading areas. Equipment operators, mechanics, facility operational managers, facility workers and administrative staff will also be employed.

6.1.3 Waste Acceptance Procedures

Waste acceptance procedures are as follows:

1) The Site attendant registers all vehicles entering the Site. The vehicles are weighed and the attendant records the origin of the waste, type of waste, driver identification, truck identification and to which facility the waste is going. After being registered, the vehicle is directed to the appropriate facility/area or to the secondary scales if there appears to be no recoverable materials in the load. Clear signage directs vehicles to the unloading areas at the appropriate facilities;

2) If the load contains asbestos it will be sent directly to the landfill via the secondary scales where staff will be prepared to bury the waste immediately in the landfill. Procedures for handling and disposing asbestos waste are described in Appendix I;

3) Loads bound for the landfill will be sent to the secondary scale and another Site attendant will record the weight of the vehicle. The vehicle is then directed to the active face of the landfill. Clear signage directs vehicles to the unloading areas. Another attendant monitors appropriate waste placement at the tipping face and directs the traffic at the working face of the landfill;

4) The scale attendants and the employee at each facility designated as the person to direct incoming vehicles to unloading areas will be instructed as to the types of waste allowed on Site and the types of waste not allowed. At the facility, loads will be checked to verify that no liquid waste is present. Unacceptable waste that is inadvertently dumped at the Site is either placed back into the vehicle in which it was hauled to the Site, or temporarily stored in one of the Site's containers for future off-Site removal; and,

5) All weigh tickets are kept on-Site along with daily and monthly summaries of waste received. Materials rejected from the landfill will be reported at the required frequency to the local MOECC District Office. Records of rejected waste and material removed from the Site are maintained at the Site office.

6.1.4 Handling of Suspect Waste

In the unlikely event that unacceptable or prohibited waste is not detected until the waste hauler has left the Site, the waste will be segregated, characterized and managed in accordance with O.Reg. 347 (MOE, 1990). Effort will be made to identify and contact the customer and/or generator to ensure that prohibited wastes will not be delivered to the Site in the future.

6.1.5 Leachate Detection and Secondary Containment System

The LDSCS will be pumped out on a regular basis after the results of the spring, summer and fall monitoring sessions are reviewed to assess if the groundwater within the surficial silty sand layer has been impacted by landfill leachate. If the groundwater from the LDSCS is not impacted, the system will be pumped out to the stormwater management ponds. If the groundwater is found to be leachate impacted, it will be handled as leachate.

6.1.6 Housekeeping and Controls

6.1.6.1 Dust (Dust Management Plan)

The main source of dust will be on-Site access roads, particularly if unpaved, and from equipment movement around the landfill working area. To deal with dust, a number of best practice dust control measures are proposed:

- All roads in the north part of the Site will be paved, with the exception of the road running along the east side of the Site connecting the landfill to the maintenance garage. The landfill perimeter road and the temporary haul roads on the landfill will be gravel surfaced;
- Trucks using the Site will be restricted to a maximum speed of 20 kilometres per hour to avoid excess amounts of airborne dust or SPM. This is important on the unpaved roads;
- To avoid excessive dust generation, on-Site roads will be routinely maintained as part of the normal Site operations. During dry periods, water will be applied on a regular basis on unpaved roads. Calcium chloride or oil will not be used for dust control within the Site area because the chemicals could affect groundwater or surface water quality. Other MOECC approved dust suppressants could be used, when required; and,
- A tire wash area is available for trucks as they leave the landfill on their way to the exit.

6.1.6.2 Noise

Waste processing operations are sufficiently set-back from residential dwellings to minimize noise. In addition, the berms described in Section 5.3 will be constructed as noise mitigation.

Any complaints regarding the operations will be noted and receive a prompt response.

Landfill Operations Equipment

Table 5 below summarizes the primary sources of noise associated with the landfill operation.

Table 5: Sound Power Data for Landfilling Operations Noise Sources

Source	Quantity	Overall Sound Power Level (dBA)
Loader	1	109
Excavator	1	103
Backhoe	1	92
Grader	1	116
Dozer D6	1	110
Dozer D8	1	114
Compactor	1	108
Water Truck	1	107
Haul Trucks	35 (total peak hour in and out)	103

The noise prediction models have assumed that these pieces of equipment operate during the busiest hour of the day when the landfill will receive a maximum of 17 trucks bringing waste and impacted/surplus soil for use as daily cover or other uses within the landfill.

Ancillary Equipment

The Site will also include a MRF, C&D processing, organics processing, PHC contaminated soil treatment, surplus soil management, compost processing and storage, flare and power generation, maintenance facility, leachate pre-treatment facility, exhaust fans and heating, ventilation and air conditioning (HVAC) equipment.

The table below summarizes the primary sources of noise associated with the ancillary equipment operation.

Table 6: Sound Power Data for Ancillary Facilities Noise Sources

Source	Quantity	Overall Sound Power Level (dBA)
HVAC	17	83
Large Exhaust	19	87
Ventilation Openings	24	83
Dust Collector	2	102
Welding Fume Hood	1	91
Biofilter	2	90
Pump	1	106
Diesel Generator	1	117
Loader[3]	5	109
Chipper	1	118
Conveyor	2	94
Compost Turner	1	111
Screen	1	104
Air Classifier	1	111

Source	Quantity	Overall Sound Power Level (dBA)
Compost Aerator Fan[1]	4	95
Waste Truck Movements	47 (total peak hour in and out)	103
Truck Idling	5	98
Flare[1]	1	104
Dump Truck	1	108
Grader	1	116
Dozer	1	110
Leachate Truck Movements[1]	2	104
Leachate Truck Pumping[1]	1	111
Excavator[4]	2	103
Skid-Steer	1	92
Electrical Generator[1, 2]	7	105

Notes:
[1] Equipment operates 24 hours per day, 365 days per year.
[2] Generators will be equipped with silencers and they will be housed in containers. Generator containers designed not to exceed 55 dBA at 10 m.
[3] The number of loaders modelled is 5, though a total of 4 loaders are shared by ancillary facilities and may operate at one time.
[4] The number of excavators modelled is 2, though 1 excavator is shared by ancillary facilities and may operate at one time.

6.1.6.3 Litter

The proper containment of waste within the diversion facilities and the daily application of cover material to the working face of the landfill will be used as a means of litter control. Litter fencing at the active landfill face and other temporary fencing will be used as required. CRRRC staff will pick up litter from around the Site whenever required as a result of specific events such as high winds.

6.1.6.4 Vectors and Vermin

Animals may be attracted to a landfill or waste processing site because it provides a suitable foraging habitat. Consequently they could move onto the landfill or into a facility temporarily or permanently. Because the working area of a landfill is compacted and covered daily with soil, rodents and insects do not survive at modern landfills. If required, vermin will be controlled at the landfill or diversion facilities by trapping or a pest management company.

Birds such as gulls may become a nuisance by attending the Site and adjacent or nearby properties, creating noise and fouling those lands. It is best to deter birds from visiting the Site in the first place. The landfill will operate with a program to exclude/deter birds from the Site. The program will be based on habitat management. Other contingency measures will be discussed with the MOECC and the Site community liaison committee (CLC) as required.

Specific control measures include:

- Daily cover of waste;
- Minimize size of working face;
- Minimize areas of bare ground;
- Encourage growth of tall grass (discourage loafing);
- Vegetated banks at the stormwater management ponds;
- Obtaining a Canadian Wildlife Service – Scare Permit;
- When and if required, and in consultation with MOECC and Site CLC, use of scare pistols (bangers, crackers) to discourage gulls at the active faces, overhead, and in loafing areas; and,
- Observation and recording of approximate number of gulls. If necessary, depending on observations, a more formal gull monitoring program could be designed and implemented.

6.1.7 Complaints Procedure

A formal complaint reporting procedure will be employed at the CRRRC. When a complaint is received, a complaint report will be completed, which includes the following information:

- Date and time of complaint;
- Nature of complaint;
- Name and telephone number of complainant;
- Employee receiving complaint;
- Details and circumstances of complaint;
- Corrective action taken or planned; and,
- Follow-up with complainant.

The Site CLC will be advised of all complaints and resolution of same. Ottawa Public Health will be informed when complaints regarding significant noise, odour and air quality are received. The City of Ottawa General Manager of Environmental Services and the east end Councillors or their offices will be informed of all complaints received regarding odour, litter, noise and traffic within 24 hours.

6.1.8 Record Keeping

Records (either electronic or hardcopy) will be kept of all incoming and outgoing material at the Site, including:

- Itemized record of any rejected waste;
- Type, date, time of arrival, source and quantity of waste received;
- Company name of hauler delivering the waste;
- ECA number of hauler;
- Inspection reports and complaint reports;
- Type, date, time, destination, and quantity of material shipped off-Site;
- Date of each application of aggregate to unpaved roads; and,
- Date and time of each road watering and/or dust suppressant event.

An Annual Operations Report will be submitted to the District Office of the MOECC. Each report will include, as a minimum, the following information:

- Monthly summary of the type and quantity of all wastes received at the Site and the facility to which the waste was sent;
- Monthly summary of the type and quantity of all wastes disposed of in the on-Site Landfill;
- Monthly summary of the type and quantity of all wastes shipped from the Site and the location to which it was shipped;
- A description of any material operational issues encountered;
- Any recommendations for operational changes;
- Amount of recovered material sent to market;
- Amount of waste sent to landfill from processing facilities;
- Average daily amount of waste received;
- Maximum amount of waste that was received in one day in the past year;
- Amount of waste stored on-Site as of date of preparation of the Annual Operations Report;
- Any modifications that were made to the Site should operational flexibility be afforded by an ECA with limited operational flexibility; and,
- A summary of any complaints that were received regarding any facility operation and resolution of same.

6.1.9 Winter/Wet Weather Operational Considerations

For winter operations, advance planning will take place for snow removal, icy access roads and equipment maintenance. Sand will be applied to on-Site roads as required to ensure safe-driving conditions at all times. In very cold weather periods, start-up of equipment will be facilitated through the use of engine block heaters. During wet weather conditions, adequate drainage will be provided by the on-Site ditches and culverts.

6.1.10 Site Equipment

All motorized equipment will be kept in good repair and be fitted with standard operational exhaust mufflers. Idling vehicles and areas at which vehicles idle will conform with Ontario Ministry of Labour regulations. The following table outlines the equipment used throughout the Site at the various facilities and the landfill. The details regarding where each piece of equipment is anticipated to be used are contained in Appendices D to J.

Table 7: Site Equipment

Equipment	Quantity
Loader	8
Excavator	3
Backhoe	1
Grader	1
Dozer D6	1
Dozer D8	1
Compactor	1
Water Truck	1
Pick-Up Truck	4
Trailer	4
Shunt Tractor	1
Skidsteer	4
Forklift	1
Dump Truck	2
Conveyor	2
Eco Mixer	1
Compost Pasteurizer	1
Chipper/Shredder	1
Compost Turner	1
Screen	2
Air Classifier	1

6.1.11 Fencing

It is proposed that the perimeter of the Site will be fenced where appropriate. The primary and secondary Site access roads will have gates that can be locked.

6.1.12 Signage

A clearly visible sign will be posted at the Site entrance with the following information:

- MOECC ECA Number;
- Identification of the Site operator;
- Operating hours of the Site and diversion facilities;
- Accepted wastes;
- Prohibited wastes;
- Telephone number for emergencies; and,
- Health and safety requirements (e.g. restricted areas, required protective equipment, etc.).

Health and safety signage will be posted around the Site perimeter and work areas.

6.1.13 General Site Inspections and Maintenance

A designated competent operator will complete a daily inspection and prepare a Weekly Site Inspection Report, which will include the date and time of the inspection, and the name and signature of the person completing the inspection. If any problem areas are identified, the corrective action that is completed or planned will be noted on the inspection report. The inspection report will include the following:

- Is the Site entrance and exit clean of litter and dust?
- Is the fence line, inside and outside, clean of litter?
- Are the fence and gates in good condition?
- Is the Site clean of litter and scrap?
- Are there any unacceptable odours?
- Is the surface water drainage system functioning as intended?
- Are there any sections of the on-Site roads requiring maintenance?
- Has there been any environmentally significant event since the last inspection?
- Have there been any complaints since the last inspection?
- Is the amount of storage of waste within the allowed maximum weight?
- Are posted speed limits being complied with?
- Is dirt being tracked onto public roadways?
- How effective are the dust mitigation activities?

A copy of the Site inspection report will be kept on file at the Site.

6.1.14 Environmental Emergency and Contingency Plan

An Environmental Emergency and Contingency (E2C) Plan, specifically prepared for the Site, will be developed and provided to the local office of the MOECC for their information and comment, and a copy retained in a central location on the Site and will be accessible to all staff at all times. The E2C Plan will deal with the prevention of, preparedness for, response to and recovery from an environmental emergency. The E2C Plan will be reviewed annually by Taggart Miller and updated if needed. Copies of the E2C Plan will be provided to the MOECC District Manager, the City of Ottawa and the local fire department. The E2C Plan contains a notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the MOECC's District Office and Spills Action Centre, the local fire department, the City of Ottawa, the local Medical Officer of Health, the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response. The E2C Plan will also provide an organized set of procedures for responding to unexpected but possible problems at the CRRRC Site, including but not limited to: power failures, labour disruptions, fires and spills. Also, the E2C Plan will outline the schedule for the inspection of emergency response equipment.

6.1.14.1 Spills

All staff will be advised to notify their supervisor if they encounter a spill. A spill is defined as a discharge to the natural environment from a vessel or container that is abnormal in quality or quantity in light of all of the circumstances of the discharge. Such a spill would be immediately contained and cleaned up as appropriate. The E2C Plan outlines the reporting procedures and actions to be taken in the event of a spill or process upset, including specific cleanup methods. Staff will be trained on spill response procedures and reporting as required. Due to the nature of the waste accepted at the Site (i.e., solid non-hazardous wastes), spills of waste are not likely to cause any off-Site environmental harm as they are easily cleaned up.

6.1.14.2 Fire

The Site design includes a fire pond at the north end of the Site. Also, the buildings will be provided with fire extinguishers and the MRF and C&D processing facility will be equipped with sprinkler systems. The fire extinguishers will be placed at every person door exit and on every piece of mobile equipment. These fire extinguishers will be inspected monthly and recharged annually, if needed, as required by the Ontario *Fire Code* (MCSCS, 2007). Additionally, the Site will have an emergency evacuation and notification plan in the event that a fire in the building cannot be easily extinguished with available fire extinguishers, and evacuation/notification is warranted. Details about response to a landfill fire are included in Appendix I.

7.0 SITE MONITORING AND REPORTING PROGRAMS

An effective monitoring program provides results to indicate that the facility is working as expected, that mitigation measures are effective, and that unforeseen problems are identified and addressed in a timely manner. The proposed monitoring programs for groundwater, leachate, surface water and geotechnical and related trigger mechanisms during operations are described in detail in the Geology, Hydrogeology & Geotechnical Report accompanying this report. A brief summary of the various components is provided in the following subsections together with a discussion on the proposed monitoring programs related to noise and biology. Facility specific operational monitoring is discussed in the appropriate Appendix.

7.1 Groundwater and Leachate Monitoring

The proposed groundwater monitoring program for the Site has been split into the monitoring program for the processing and treatment facilities north of the Simpson Drain and a monitoring program for the landfill south of the Simpson Drain. The proposed groundwater monitoring program includes maintaining some of the existing monitoring wells, and adding some additional monitoring well locations and LDSCS manholes to supplement the monitoring program. The existing and proposed monitoring locations are shown on Figure 10. In addition to on-Site groundwater monitoring wells, water wells within 500 metres of the Site will be sampled, with consent from the owner, one time prior to starting operations at the facility.

Leachate sampling is proposed at the connection to the leachate pre-treatment facility and from three monitoring wells that will be completed within the leachate collection system. Leachate levels will be measured during each leachate sampling event in each leachate sump and leachate monitoring well in the landfill (as they are constructed in conjunction with the landfill development phasing plan). The leachate monitoring well locations are shown on shown on Figure 10.

The groundwater and leachate monitoring will generally occur three times per year, commencing a year prior to the start of operation, in the spring, summer and fall using the comprehensive list of parameters one time (plus hardness and a full VOC scan, including 1,4-dioxane) and the reduced list (plus manganese, TKN, potassium and hardness) the other two times as outlined in O.Reg. 232/98 (MOE, 1998a). The monitoring wells located along the downgradient side of the LDSCS will be sampled only during the spring and fall sessions.

Water levels in the LDSCS manholes will be checked quarterly. This information will used to gain an understanding of the rate of groundwater inflow to the system, and to determine an appropriate frequency of water level monitoring, sampling and pumping in subsequent years.

7.2 Surface Water Monitoring

Run-off from completed Site areas flow to stormwater management ponds, which is then directed to on-Site ditches or the Simpson Drain. There are three discharge points from the Site at the eastern property boundary. The surface water sampling stations are located at each of these discharge points as well as from the Simpson Drain as it enters the Site at the western property boundary. The sampling locations are shown on Figure 10. Surface water monitoring will include an estimate of flow, where appropriate, and the collection and analysis of surface water samples. The frequency of sampling is proposed to coincide with the groundwater monitoring program in the spring, summer and fall, with one additional sampling session to occur after a heavy rainfall event. Collected samples will be analyzed for the comprehensive list of parameters one time and the reduced list on the other two times as outlined in O.Reg. 232/98 (MOE, 1998a). Surface water monitoring will begin in

2014 to increase baseline data. Monitoring locations BSW10 and BSW11 will be removed from the program once the landfill becomes operational.

7.3 Biological Monitoring

Alteration of the surface water regime has the potential to affect streamflow in downstream sections of aquatic systems associated with watercourses and ditches with the Site. Changes in flow downstream could affect fish habitat by reducing the amount of habitat, increasing the deposition of fines and decreasing the amount of in-stream vegetation for cover. Although it is expected that these changes in flow will be minimal and not ecologically important, a surface water monitoring program should be implemented to confirm the surface water regime post-development and to make any appropriate adjustments to the operation of the stormwater control system.

Benthic invertebrate community samples will be collected every two years. To be able to compare the monitoring results to the baseline data, the samples will be collected and analysed in the same manner, and the descriptors of the benthic invertebrate community will include taxa presence/absence, taxa richness, and percent dominance at each sampling station. Because benthic invertebrates live their entire aquatic lives on, or in, the sediments, they tend to be relatively sensitive to changes in the sediments such as contaminant loadings. This sensitivity can result in changes in community composition, abundance, and tropic structure over time. These community changes can represent long-term trends in water quality. The need for continued monitoring during the post-closure period would be evaluated during the development of the detailed closure plan. Sediment samples at the same survey stations will also be collected and analysed. Benthic and sediment monitoring is recommended at sampling stations B5, B6, B8, B9, and downstream of B5 and B7.

Monitoring for barn swallow, following the creation of the new habitat, will be conducted for a period of three years and a mitigation and restoration record will be maintained for an additional two years, following the requirements of O. Reg. 323/13.

As part of the closure plan, and dependent of course on the final end use for the Site, a rehabilitation plan should be developed and implemented to re-establish vegetation communities in the project footprint. A mix of native species should be planted in order to establish a natural, native community post-closure. The vegetation cover will be surveyed to monitor its success. If there are deficiencies, such as weed encroachment, dead plants or evidence of erosion, the cover should be supplemented with additional plantings of the most successful species.

7.4 Noise Monitoring

As part of the application for approval under Part V of the EPA, Taggart Miller will carry out noise monitoring in accordance with MOECC procedures. Taggart Miller proposes to monitor noise levels annually during peak operations during the initial period of Site operations; modifications thereafter would be determined in consultation with MOECC. The noise monitors will log acoustic data every hour for the duration of the monitoring period. At a minimum, the data will include hourly L_{eq} and L_{90} sound levels. If possible, monitoring will be carried out at or near POR02 and POR03, as defined in Section 4.3.2 and shown on Figure 11. It is proposed that the monitoring period last for 48 hours.

At the completion of the monitoring period, a summary document will be prepared and provided to Taggart Miller. The document will summarize the noise monitoring results at each location. The noise monitoring program requirements will be reviewed annually and any modifications will be proposed to the MOECC for their consideration. The document will be included in the annual monitoring and operations report.

7.5 Dust Monitoring

To complement the Dust Management Plan for the CRRRC, a dust monitoring program was developed. The objective of the dust monitoring program is to:

- Verify effects predictions, and compare actual with predicted effects;
- Confirm effectiveness of mitigation measures, and in doing so determine if alternate mitigation strategies are required; and,
- Provide information for use in adaptive management to address potential unforeseen effects.

A one-time sampling of unpaved and paved road silt loadings will be collected to confirm emission estimates. Property line dust monitoring at the CRRRC will be conducted using dust fall monitors. A minimum of two monitoring stations (one located upwind and one located downwind of the CRRRC) will be established. The dust monitoring will occur after operational start up during the summer season (June to September) for two summer seasons.

The sampling will occur as per the National Air Pollution Surveillance Program (NAPs) schedule and performed following the guidance of the *Operations Manual for Air Quality Monitoring in Ontario* (Operations Manual) (MOE, 2008) by the MOECC Operations Division Technical Support Section (PIBS 6687e). If off-property adverse dust impacts are recorded, the need for more intensive monitoring will be assessed.

There are a number of factors that contribute to the generation of fugitive dust. Through the Dust Management Plan, preventive measures will be implemented to reduce the potential for dust generation and mitigative measures will be implemented to remedy concerns. In order to track the success of the preventive and mitigative measures, a log of the following aspects of Site operation will be maintained:

- Application of aggregate to unpaved roads – a record will be kept of the date of each application of aggregate to unpaved roads.
- Road watering or application of dust suppressants – a record will be kept of the date and time of each road watering event. This will help, in the event of off-property impacts, to determine if increased road watering is a feasible mitigation measure.
- Site inspection – once a week a site inspection will be conducted to monitor general site operations, including compliance with posted speed limits, track out of dust and dirt onto public roadways, the efficacy of dust mitigation activities and any potential concerns with regards to fugitive dust.
- Truck traffic – a record will be kept of the number of trucks coming on-Site each day. This record can tie into the daily waste receipt recording.
- Truck weights – a record will be kept of the weight of trucks coming on-Site each day and the weight upon leaving. This record can tie into the existing record keeping within the scale house.

These records will form the basis for any required refinement of the emission estimation for the Site.

7.6 Geotechnical Monitoring

A geotechnical monitoring program will be implemented for the purposes of:

- Confirming that the performance/behaviour of the underlying foundation soils is consistent with those expected based on the geotechnical investigation program and analyses, to thereby confirm the applicability of the design recommendations provided; and,
- Provide the information needed to optimize the design and/or operation of the landfill, as construction and filling progress.

The following monitoring components are recommended:

- Subgrade settlement monitoring;
- Unit weight of the as-placed waste; and,
- Lateral displacements of the silty clay beneath the perimeter berm of the landfill should be monitoring by means of inclinometers; and surface survey point/monuments.

It is also proposed that the rate of porewater pressure dissipation in the underlying clay be monitored by means of vibrating wire piezometers installed at the time of landfill cell construction at various depths in the upper portion of the silty clay deposit.

8.0 CONTINGENCY MEASURES AND TRIGGER MECHANISMS

The findings of the predictive modelling indicate that the CRRRC Site will not adversely affect groundwater and surface water. However, in the event that the results of the proposed monitoring program demonstrate unacceptable levels of contaminants in the groundwater at the points of compliance, or unexpected impacts to surface water, remedial actions will be implemented as required, in consultation with the MOECC. The contingency measures presented in this section are considered the most feasible options to mitigate unexpected Site impacts to groundwater and surface water resources.

8.1 Groundwater

In the event that monitoring results suggest leachate is unexpectedly getting into the groundwater system on-Site, the following contingency measures could be implemented. The intercepted leachate-impacted groundwater collected from the surficial silty sand layer in the LDSCS could be pumped for treatment and act as the secondary containment system for the landfill. At this time, additional groundwater monitoring wells could be installed between the sentinel monitoring wells (P1 series and P2 series) and the property boundary to evaluate site compliance.

Alternatively, or additionally, a series of purge wells through the cover of the landfill and into the granular blanket of the leachate collection system could be installed and leachate removal by pumping to leachate treatment. Typically, this type of a contingency is triggered by premature failure of the leachate collection system, such that a mound is formed within the landfill. The benefit of having purge wells installed into the leachate collection system is that leachate is contained within the landfill and collected prior to getting diluted with non-leachate-impacted groundwater. Details regarding purge well installation, such as the number and spacing, would be determined based on the area and level of leachate mound control required.

If, despite the presence of the LDSCS, it is necessary to cut off flow through any or all of the perimeter berm, surficial silty sand layer or silty layer, a low permeability cut-off barrier could be constructed. Options available for the barrier include a soil-bentonite wall constructed using the slurry trench method or an interlocking sheet pile wall (steel or PVC sheet piling). This would contain the leachate/groundwater within/close to the landfill on-Site, which would then continue to be removed from the leachate collection system.

MOECC approval to implement the proposed contingency measures would be obtained.

With regard to potential for failure of the liner systems associated with ponds in the leachate pre-treatment facility and primary reactor cells in the organics processing facility, materials would be removed and the liner repaired or replaced.

8.2 Surface Water

In the event that leachate-impacted water was to reach either stormwater management ponds or ditches, the source of the impact would be determined and then intercepted, as required. If necessary, the affected pond and/or ditches could then be emptied through a temporary pumping operation and the pumped water could be combined with the leachate and directed to the leachate pre-treatment facility.

8.3 Leachate Pre-Treatment Facility

The following table provides a summary of operational conditions that may be encountered at the leachate pre-treatment facility and contingency and/or maintenance options that could be undertaken.

Table 8: Leachate Pre-treatment Facility Contingencies

Operational Condition	Contingency Options
Higher Flows than Design	Treatment process can be operated at 1,200 m^3/day with minimal effect on effluent quality.
Lower Flows than Design	Treatment process can be operated with fewer leachate digestion tanks operating to reduce flows. Alternatively, leachate digestion tanks and mixed liquor holding tanks can be operated at approximately 25% of their design flow without affecting system performance.
Higher metals loading than assumed or toxic constituents	Provision within the treatment building will be made to direct raw leachate from the initial equalization tank to the chemical mixing tank and clarifier before flowing through the biological treatment processes to remove excess metals.
Disruption to hauling treated liquid effluent	During normal operations, the effluent storage ponds or tanks will be kept at a minimum volume so that in the event of a disruption to the hauled effluent program, the operator has approximately two weeks of storage at the design flows to fix the issue. If the operator chooses, the flow rate through the treatment system can be temporarily reduced and leachate stored in the leachate storage ponds or tanks in order to gain greater than two weeks storage in the effluent storage ponds or tanks. Pumping from the leachate collection system beneath the landfill can be temporarily reduced or suspended.

Further, all MOECC and Sewer Use orders and issues of non-compliance related to leachate will be reported to the offices of the Mayor of Ottawa, east end Councillors and the Ottawa General Manager of Environmental Services within 24 hours of identification.

9.0 SITE CLOSURE PLAN

9.1 General Site Closure Plan

Upon ceasing to use any of the diversion facilities, they will be decommissioned and closed prior to a change in use or sale of the property. The decommissioning and closure of the diversion facilities will include the following procedures:

- A closure plan will be completed six months prior to Site closure;
- All waste material storage areas will be emptied and the waste sent for disposal;
- All on-Site equipment will be removed from the Site and either sold or reused at another Taggart Miller facility;
- All floors will be swept and, if necessary, power washed and any wastewater would be collected and disposed in accordance with O. Reg. 347 (MOE, 1990); and,
- The exterior portions of the Site will be cleaned of any litter.

Prior to closure of the landfill a closure report will be submitted to the MOECC for approval. As long as the monitoring program continues to demonstrate acceptable landfill performance, both during the operating period and post-closure, then the contemplated approach to Site closure will be to cover the waste with a minimum thickness of earth material and vegetation. It is acknowledged that it can be beneficial at some natural attenuation sites to have a lower permeability final cover. However, at this Site the currently contemplated approach is to flush contaminant concentrations out of the waste as quickly as possible to reduce the period that reliance on engineered collection and treatment systems is required. In other words, allowing infiltration through the cover will promote the decomposition of the waste mass, thereby reducing the contaminating lifespan of the landfill, and allowing leachate collection to terminate at some period post-closure when residual leachate quality permits. Should a lower permeability cover be desired for any reason in the future, the MOECC will be consulted.

9.1.1 Landfill Final Cover and Seeding

The proposed final cover for the landfill will consist of a 600 millimetre thick layer of general earth material and a 150 millimetre thick layer of imported material capable of supporting vegetation growth (i.e., topsoil). The general earth material for the final cover can be permeable since there is a leachate collection system in place (MOE, 1998a). By increasing infiltration to the landfill, the contaminating lifespan of the landfill will be reduced. The landfill will then be hydroseeded with a grass seed mixture in order to minimize side slope erosion. Erosion and vegetation damage resulting from large storm events will be repaired as required.

In addition, it is proposed that PHC impacted soils could be used in the final cover within the 300 millimetres of cover immediately adjacent to the waste. The PHC impacted soils will have been tested at the source in order to verify that the waste is non-hazardous, in accordance with O.Reg. 558/00 (MOE, 2000), before they are accepted at the Site. The soils will be treated if deemed necessary to reduce PHC concentrations prior to use in the final cover.

9.1.2 Post-Closure Monitoring, Reporting and Maintenance Requirements

Monitoring and reporting of groundwater, surface water, LFG and leachate pre-treatment facility quality should continue after Site closure for a period dependent on the ongoing monitoring results. The Site will be maintained in order to prevent erosion and any undesirable off-Site environmental impacts.

9.1.3 End Use

Possible end uses for the closed Site will be considered as part of preparation of the closure plan.

10.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the use of Taggart Miller Environmental Services, and is intended to support applications under the *Environmental Assessment Act*, *Environmental Protection Act* and *Ontario Water Resources Act* for the proposed CRRRC project. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by Golder Associates Ltd. and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by Golder Associates Ltd. as described in this report. Each of these reports must be read and understood collectively, and can only be relied upon in their totality.

Golder Associates Ltd. has relied in good faith on all information provided and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the reports as a result of omissions, misinterpretation, or fraudulent acts of the persons contacted or errors or omissions in the reviewed documentation.

The assessment of environmental conditions at this Site has been made using the results of physical measurements and chemical analyses of liquids from a number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at borehole and monitoring well locations. Subsurface conditions may vary from these sampled locations.

The services performed, as described in this report, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practising under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

Noting the intended use of this report, any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

11.0 CLOSURE

GOLDER ASSOCIATES LTD.

M.K. Farnel, P.Eng. Environmental Engineer	P.A. Smolkin, P.Eng. Principal

ALC/MKF/PAS/sg

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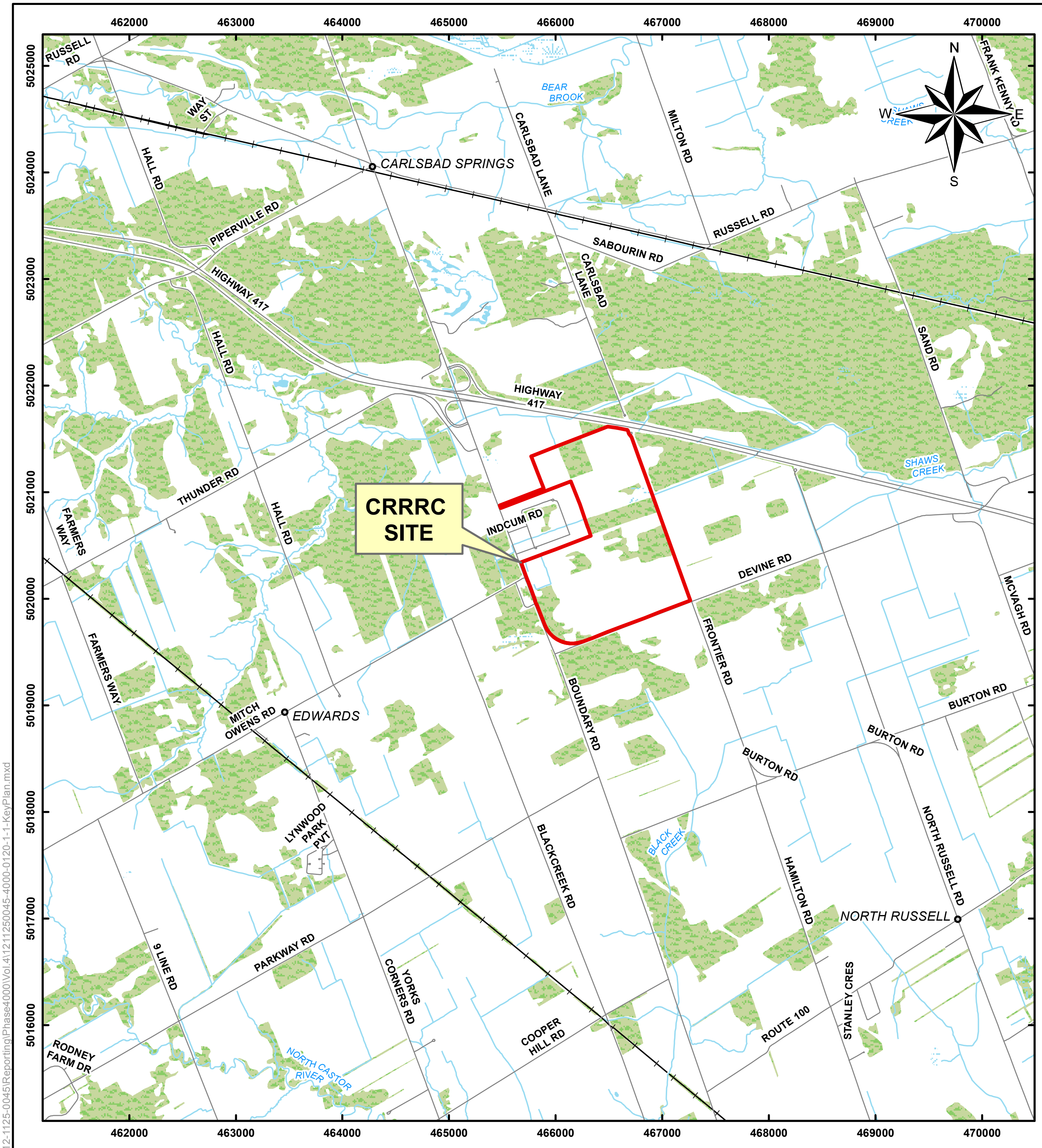

LEGEND

PROPERTY BOUNDARY

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCES

LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2011.
DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

KEY PLAN

Golder Associates

PROJECT No. 12-1125-0045			PHASE No. 4500	
DESIGN	JPAO	NOV. 2013	SCALE AS SHOWN	REV. 0.0
GIS	BR	DEC. 2013	FIGURE 1	
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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SKETCH OF
PART OF LOTS 22, 23, 24 AND 25 CONCESSION 11 GEOGRAPHIC TOWNSHIP OF CUMBERLAND CITY OF OTTAWA

STANTEC GEOMATICS LTD.
2013

Scale 1 : 7500

300 225 150 75 0 150 300Metres

BEARING NOTE

BEARINGS SHOWN HEREON ARE GRID AND ARE DERIVED FROM THE CAN–NET VRS NETWORK AND ARE REFERRED TO THE CENTRAL MERIDIAN 76°30'00" WEST LONGITUDE, ZONE 9 OF THE ONTARIO 3° M.T.M COORDINATE SYSTEM NORTH AMERICAN DATUM 1983 CSRS ADJUSTMENT.

DISTANCES ON THIS PLAN ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999977.

COORDINATES ARE IN METRES AND WERE DERIVED FROM GPS OBSERVATIONS USING THE CAN–NET NETWORK AND REFERRED TO THE ONTARIO COORDINATE SYSTEM M.T.M. NAD83 (ORIGINAL) ZONE 9.

COORDINATE VALUES ARE TO URBAN ACCURACY IN ACCORDANCE WITH O.REG 216/10.

- POINT A NORTHING 5021569.20, EASTING 388620.00
- POINT B NORTHING 5021982.43, EASTING 389642.85

CAUTION: COORDINATES CANNOT IN THEMSELVES BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THE PLAN.

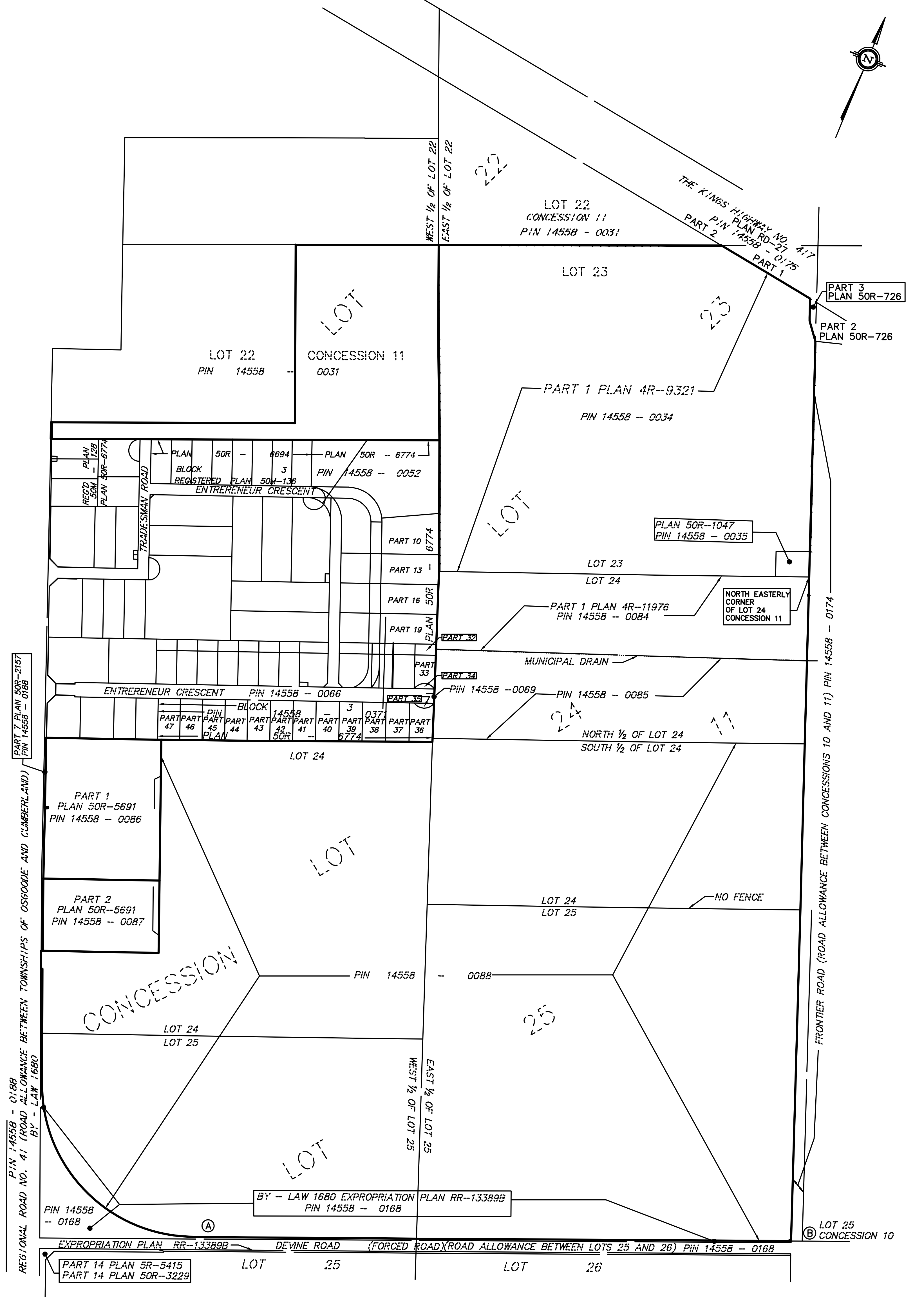


Figure 2 - Legal Survey

LEGEND & NOTES : (IF APPLICABLE)

■	DENOTES FOUND MONUMENTS	(1473)(SG)	DENOTES STANTEC GEOMATICS LTD.	P5	DENOTES EXPROPRIATION PLAN RR13389B
□	DENOTES SET MONUMENTS	OU	DENOTES ORIGIN UNKNOWN	P6	DENOTES PLAN 4R–9231
IB	DENOTES IRON BAR	MEAS.	DENOTES MEASURED	P7	DENOTES PLAN 4R–11976
SIB	DENOTES STANDARD IRON BAR	PL	DENOTES REGISTERED PLAN 50M–136	P8	DENOTES PLAN 50R–2623
SSIB	DENOTES SHORT STANDARD IRON BAR	PROP	DENOTES PROPORTIONED	HP	DENOTES HYDRO POLE
CC	DENOTES CUT CROSS	P2	DENOTES PLAN 50R–6694	HGUY	DENOTES HYDRO GUIDE WIRE
N&W	DENOTES NAIL & WASHER	P3	DENOTES PLAN 50R–5691	PO	DENOTES FENCE POST
WIT	DENOTES WITNESS	P4	DENOTES PLAN 50R–2157		

SURVEYOR'S CERTIFICATE:

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE ____ DAY OF __________, 2013.

DATED : ______________

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

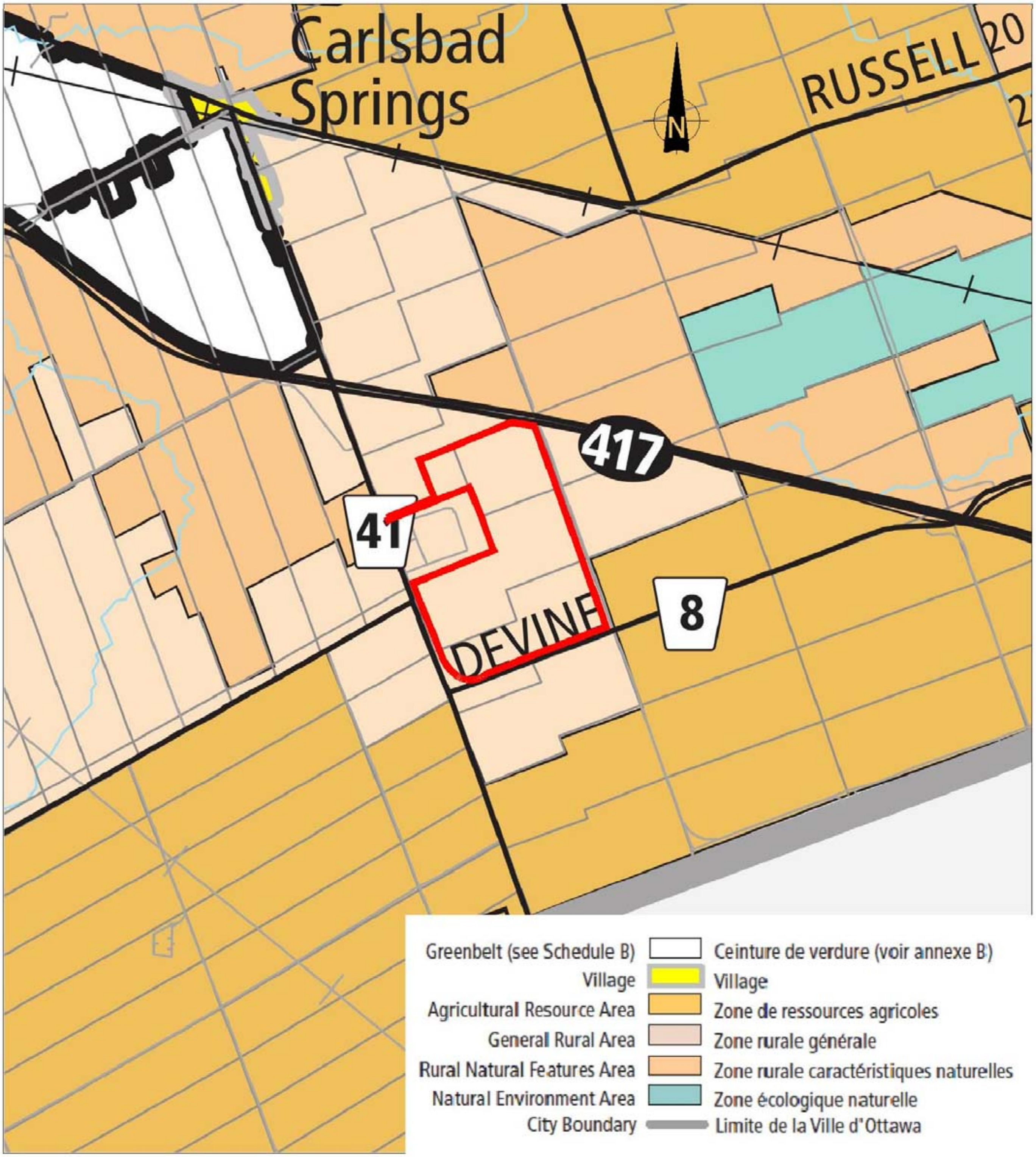
FROM THE OFFICE OF

STANTEC GEOMATICS LTD.

Ontario Land Surveyors
OTTAWA – ONTARIO
(613)722–4420 FAX (613)722–0769
"E"–Mail: brian.webster@stantec.com
Website: www.stantec.com

DRAWN: DM | CHECKED: BL | FIELD: SM | P.M.: BW | JOB NO.: 161612923–114

DRAWING: 161612923v–114–D1–11x17.dwg



Golder Associates
Ottawa, Ontario, Canada

SCALE	N.T.S.
DATE	10 Dec. 2013
DESIGN	
CAD	M.L.F.
CHECK	P.L.E.
REVIEW	P.A.S.

FILE No. 1211250045-V4-Fig 3-4.DWG

PROJECT No. 12-1125-0045 REV. 0

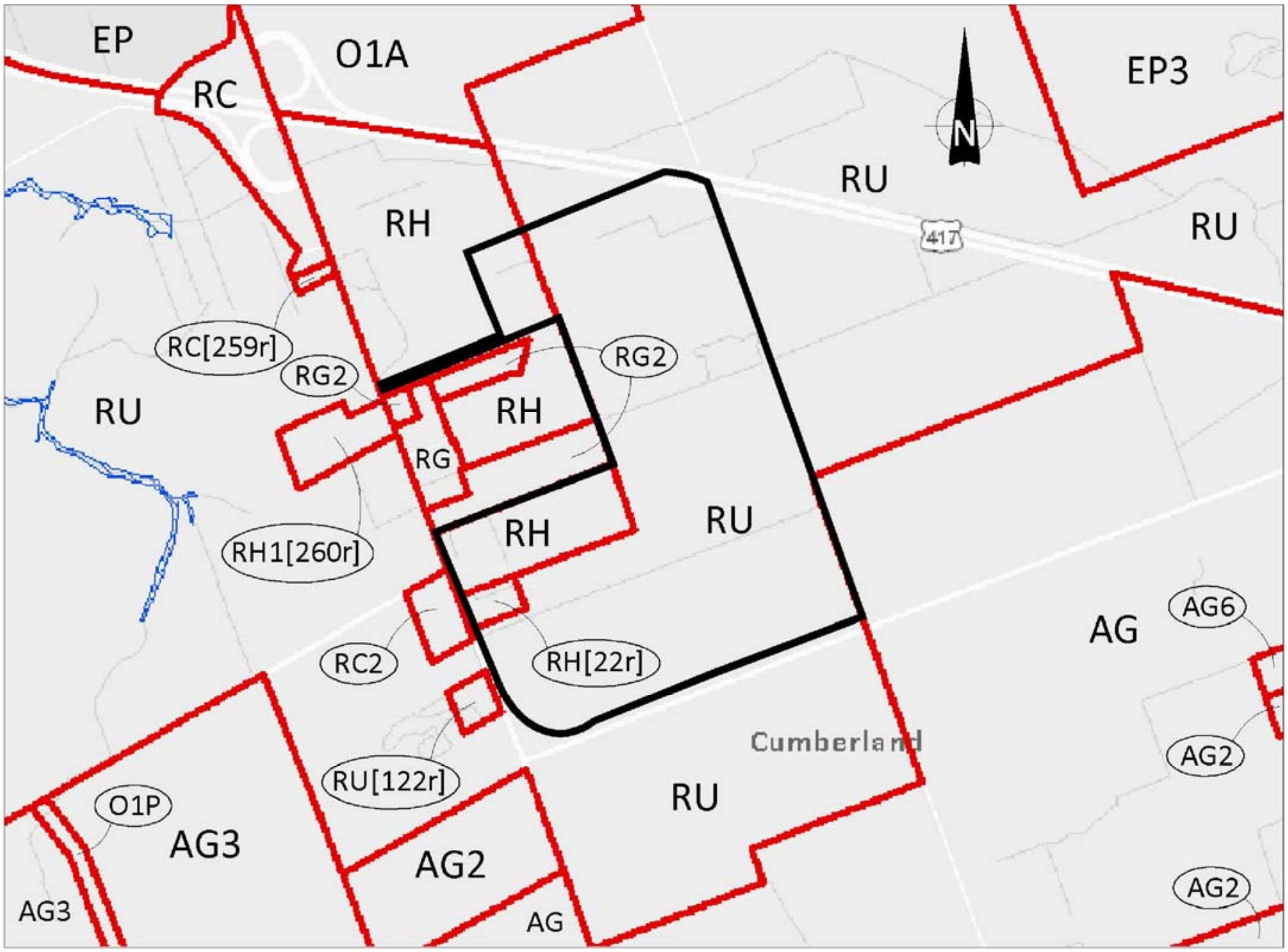
TITLE

LAND USE

CAPITAL REGION RESOURCE RECOVERY CENTRE

FIGURE 3

PLOT DATE: July 7, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\MAIN (D&O report)\1211250045-V4-Fig 3-4.DWG



LEGEND:

EP - Environmental Protection Zone
O1 - Parks and Open Space Zone
RC - Rural Commercial Zone
RH - Rural Heavy Industrial Zone
RU - Rural Countryside Zone
RG - Rural General Industrial Zone
AG - Agricultural Zone

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SCALE	N.T.S.	TITLE	CURRENT ZONING	
DATE	10 Dec. 2013			
DESIGN				
CAD	M.L.F.			
FILE No. 1211250045-V4-Fig 3-4.DWG	CHECK P.L.E.		CAPITAL REGION RESOURCE RECOVERY CENTRE	FIGURE 4
PROJECT No. 12-1125-0045 REV. 0	REVIEW P.A.S.			

PLOT DATE: July 7, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\MAIN (D&O report)\1211250045-V4-Fig 3-4.DWG

PLOT DATE: September 5, 2014
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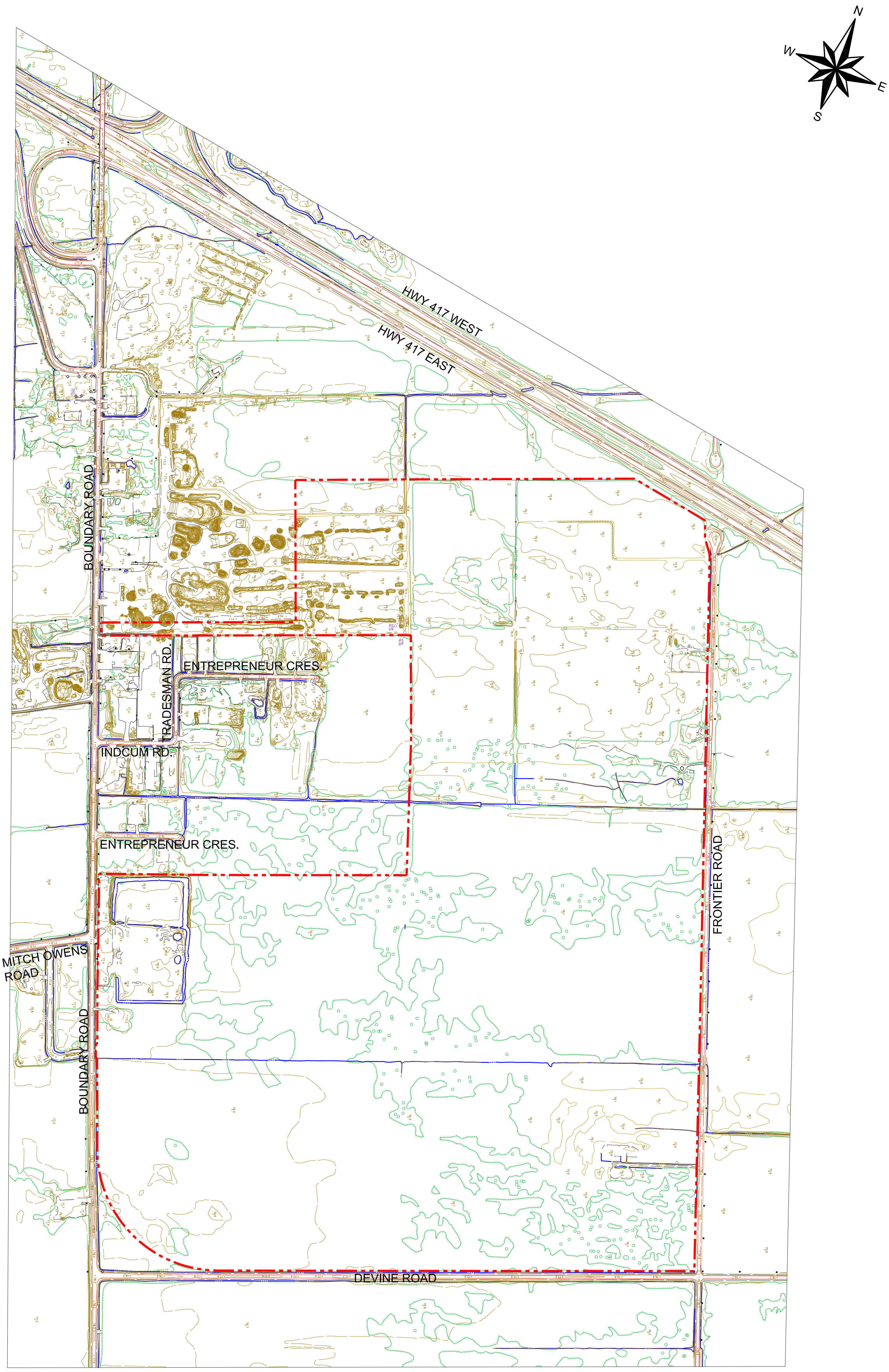

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SCALE 1:10,000 METRES

LEGEND:

- PROPERTY BOUNDARY
- VERTICAL / HORIZONTAL CONTROL
- INDEX / INTERMEDIATE CONTOUR
- OBSCURED GROUND CONTOURS
- SPOT / WATER ELEVATION
- HYDROGRAPHIC DRAINAGE LINE
- MARSH AREA
- WOODED AREA
- SINGLE TREE
- FENCE LINE
- PAVED / LOOSE ROAD
- PAVED / LOOSE DRIVE OR PARKING

REFERENCES:

1. EXISTING TOPOGRAPHY PROVIDED IN A DIGITAL FORMAT BY BASE MAPPING CO. LTD., CONTRACT No. 2517-12, PHOTO DATE NOVEMBER 7, 2012, CONTOURS INTERVAL 0.5 m, AT A HORIZONTAL DATUM UTM ZONE 18, NAD83 AND VERTICAL DATUN CGVD28.

2. PROPERTY LINE SURVEY PROVIDED IN A DIGITAL FORMAT BY STANTEC GEOMATICS LTD. JOB No. 161612923-114, DRAWING No. 161612923v-114-D1-ga01.DWG, DATE RECEIVED NOVEMBER 20, 2013.

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

TOPOGRAPHY

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-V4-Fig 5.DWG	
DESIGN			SCALE AS SHOWN	REV. 0
CAD	M.L.F.	09 Dec. 2013	DRAWING No.	
CHECK	P.L.E.	Aug. 2014	**Figure 5**	
REVIEW	P.A.S.	Aug. 2014		

PLOT DATE: October 9, 2014
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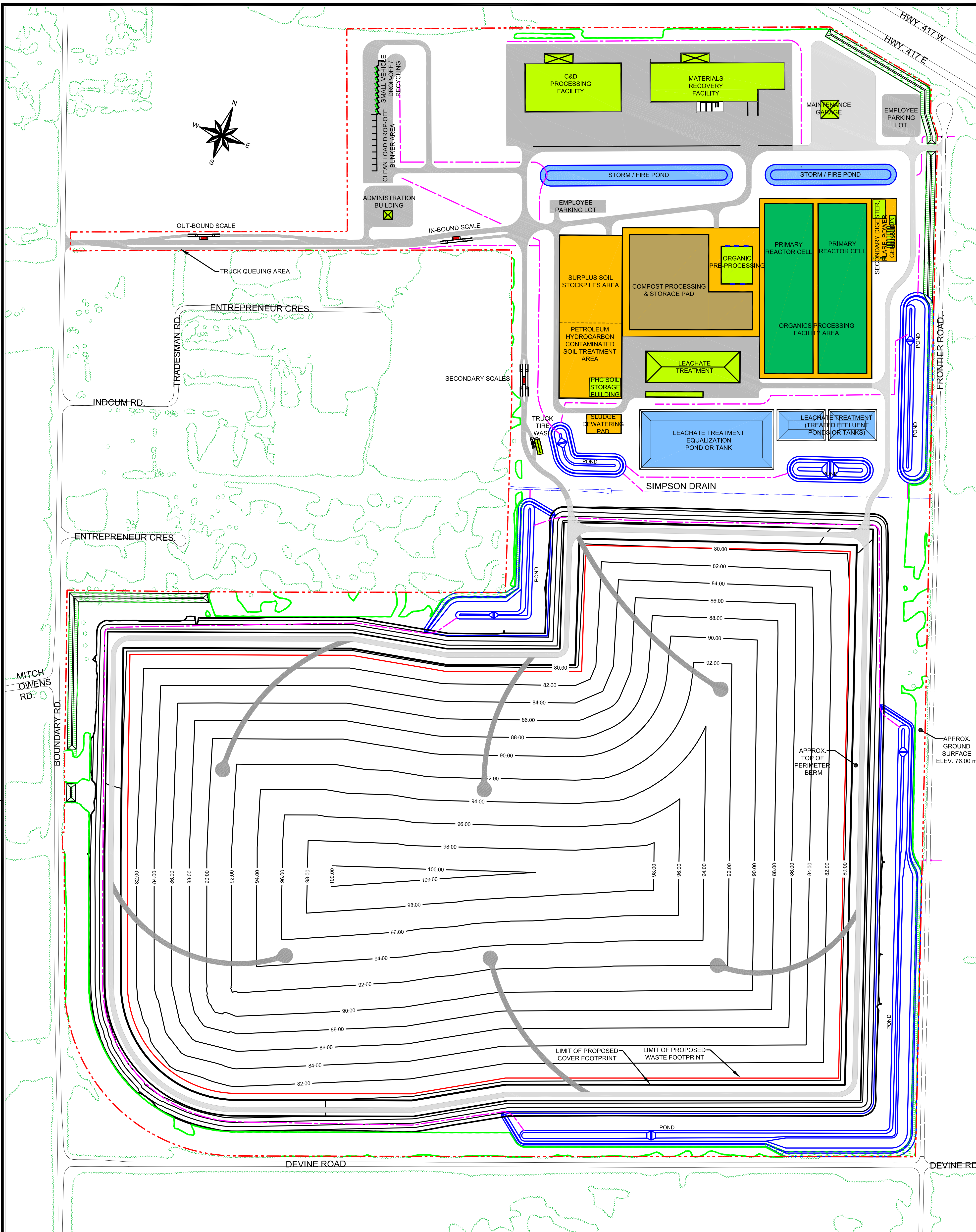
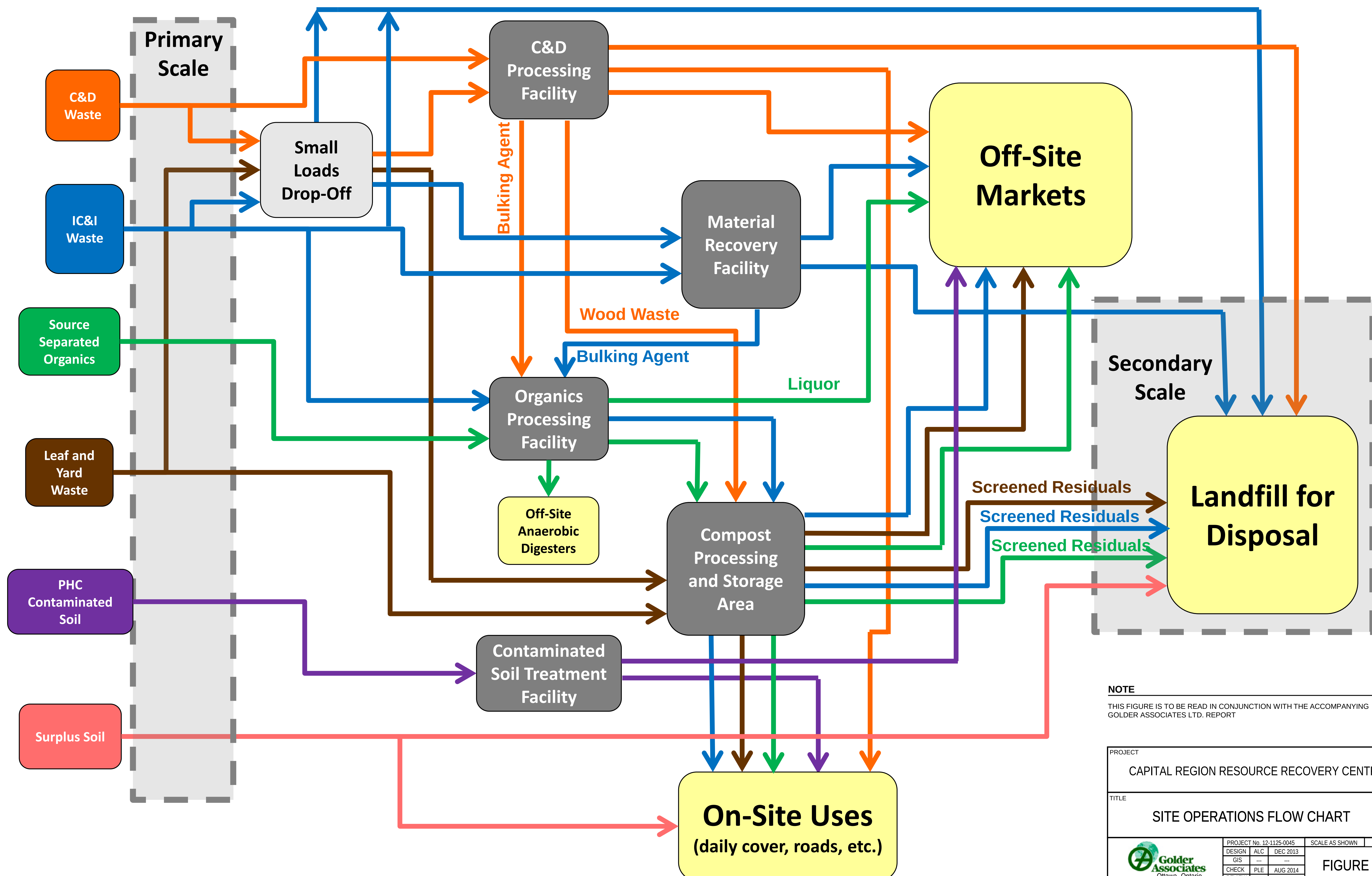


LEGEND

- PROPOSED FACILITY BUILDING
- OUTDOOR DIVERSION AREA
- PAVED ROAD (ASPHALT)
- GRAVEL ROAD
- PROPERTY BOUNDARY
- EXISTING VEGETATION SCREENING
- CONSTRUCTED SCREENING FEATURE
- PERIMETER BERM CONTOURS (interval 1 m)
- STORMWATER MANAGEMENT PONDS
- LANDFILL FINAL CONTOURS (interval 2 m)
- TEMPORARY ACCESS ROAD
- STORMWATER DITCH

120 0 120 240
SCALE 1:6,000 METRES

Golder Associates, Ottawa, Ontario, Canada	SCALE: AS SHOWN	TITLE
	DATE: 7 Nov. 2013	**SITE DEVELOPMENT PLAN**
	DESIGN: M.L.F.	
	CAD: M.L.F.	
FILE No. 1211250045-V4-Fig 6.dwg	CHECK: P.L.E.	CAPITAL REGION RESOURCE RECOVERY CENTRE
PROJECT No. 12-1125-0045 REV.	REVIEW: P.A.S.	FIGURE 6



NOTE

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PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

SITE OPERATIONS FLOW CHART

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV.0
DESIGN	ALC	DEC 2013	FIGURE 7	
GIS	---	---		
CHECK	PLE	AUG 2014		
REVIEW	PAS	AUG 2014		

PLOT DATE: October 9, 2014
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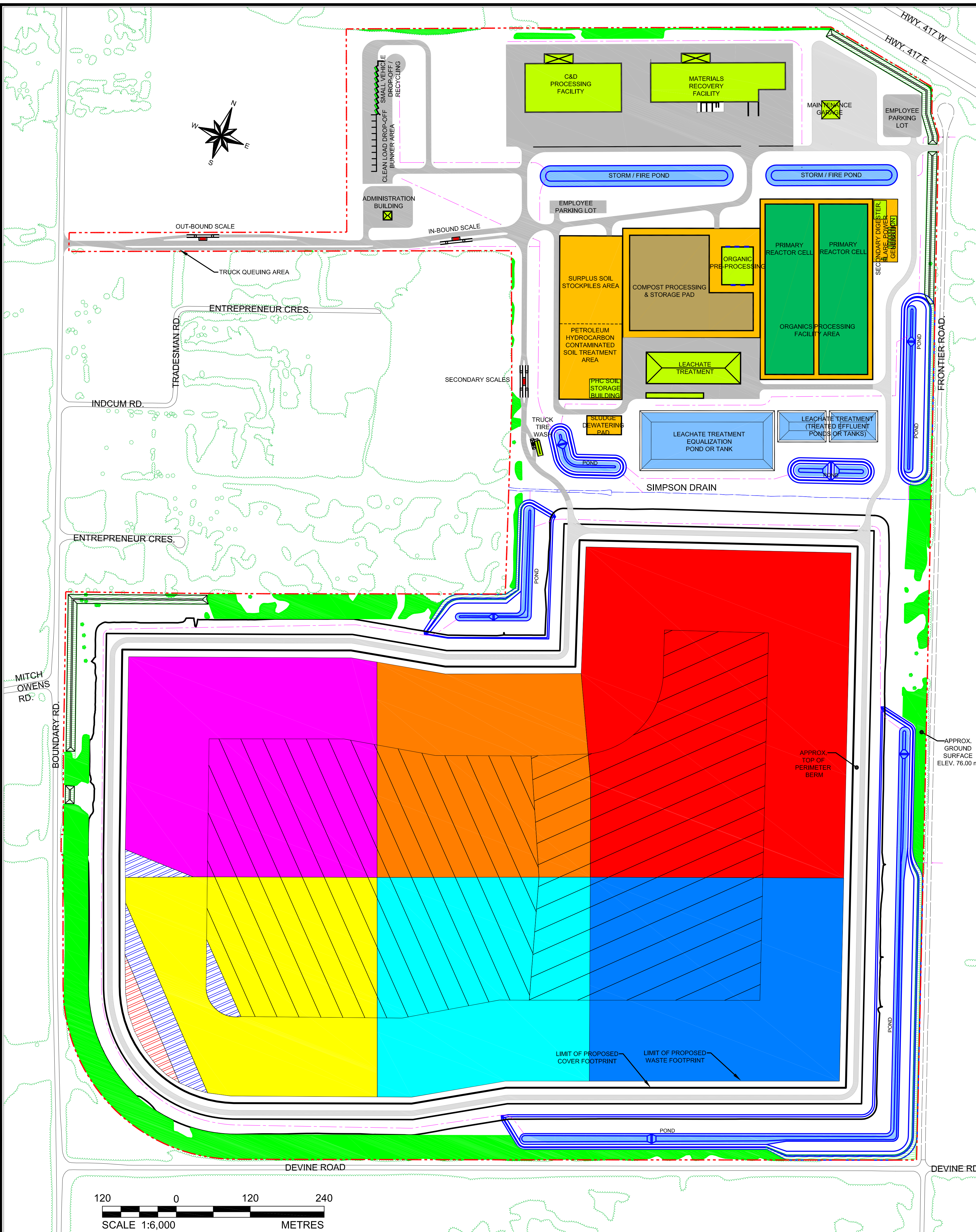


LEGEND

PROPOSED FACILITY BUILDING	EXISTING VEGETATION SCREENING
OUTDOOR DIVERSION AREA	CONSTRUCTED SCREENING FEATURE
PAVED ROAD (ASPHALT)	PERIMETER BERM CONTOURS (interval 1 m)
GRAVEL ROAD	STORMWATER MANAGEMENT PONDS
PROPERTY BOUNDARY	

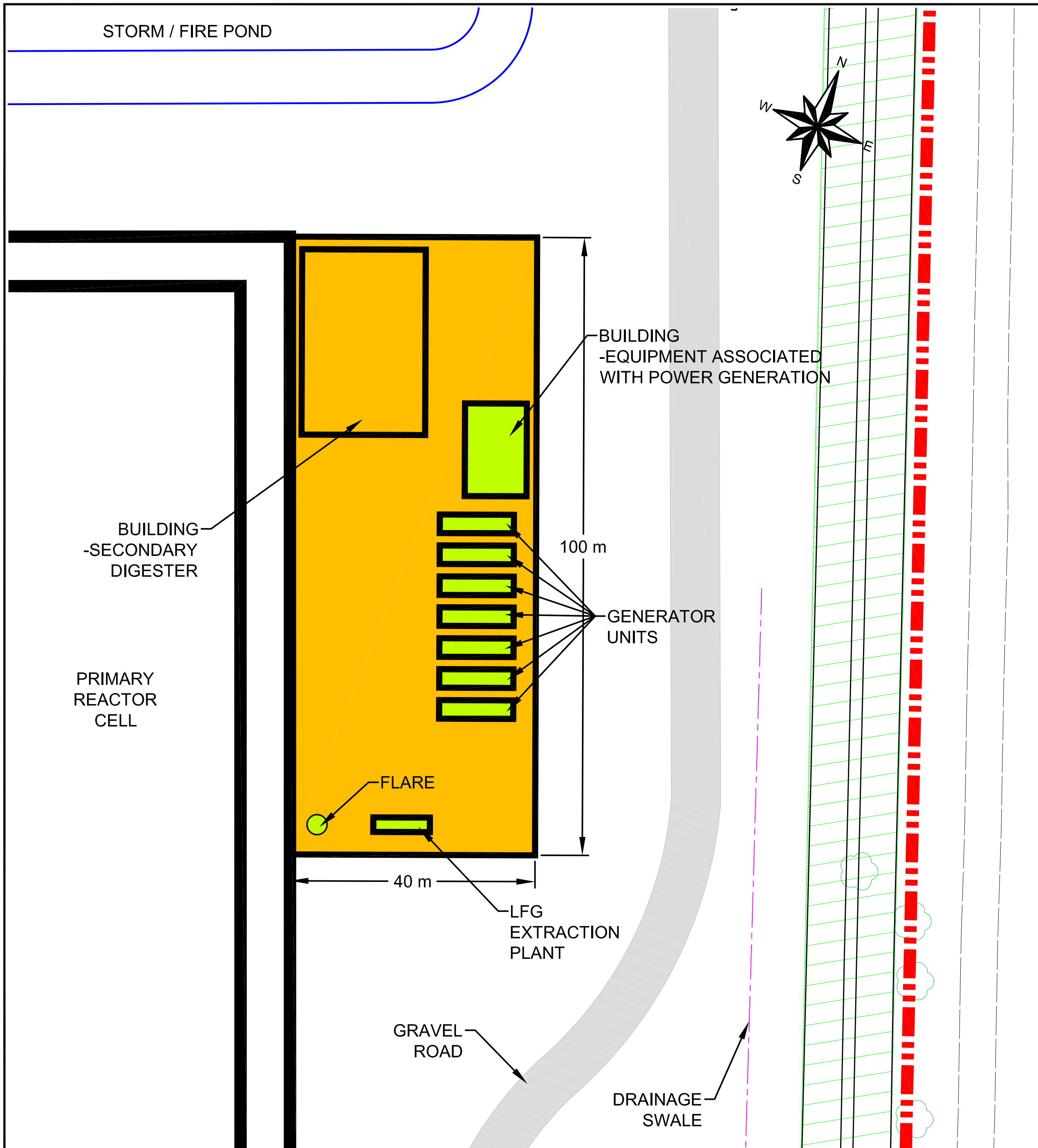
PHASE 1	PHASE 7
PHASE 2	PHASE 8
PHASE 3	LANDFILL OPERATING AREA REQUIRING 2.5 m NOISE BERM
PHASE 4	
PHASE 5	LANDFILL OPERATING AREA REQUIRING 3 m NOISE BERM
PHASE 6	

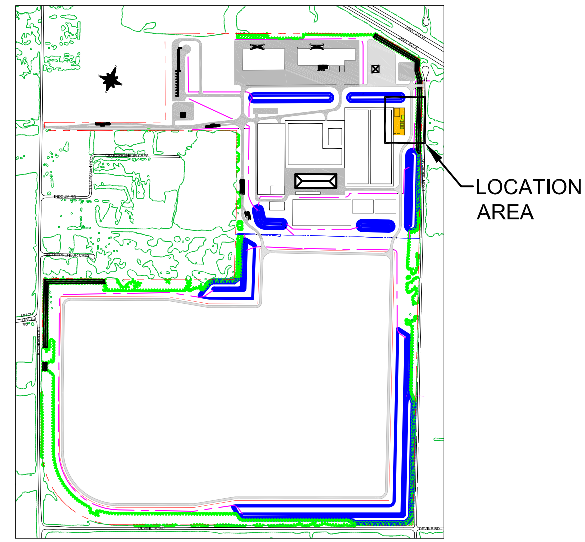
Golder Associates
Ottawa, Ontario, Canada

SCALE	AS SHOWN	TITLE	NOISE SCREENING BERM LOCATIONS
DATE	2013-11-29		
DESIGN	M.L.F.		
CAD	M.L.F./B.R.		
CHECK	P.L.E.		CAPITAL REGION RESOURCE RECOVERY CENTRE
REVIEW	P.A.S.	FIGURE	8

FILE No. 1211250045-V4-Fig 8.dwg
PROJECT No. 12-1125-0045 REV.

PLOT DATE: October 9, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\MAIN (D&O report)\1211250045-V4-Fig 9.dwg





SITE PLAN
SCALE: N.T.S.

LEGEND:

PROPERTY BOUNDARY

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SCALE 1:1,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

FLARE AND POWER GENERATION AREA PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	09 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-V4-Fig 9.dwg
SCALE AS SHOWN REV. 0
DRAWING No.

Figure 9

PLOT DATE: December 10, 2014
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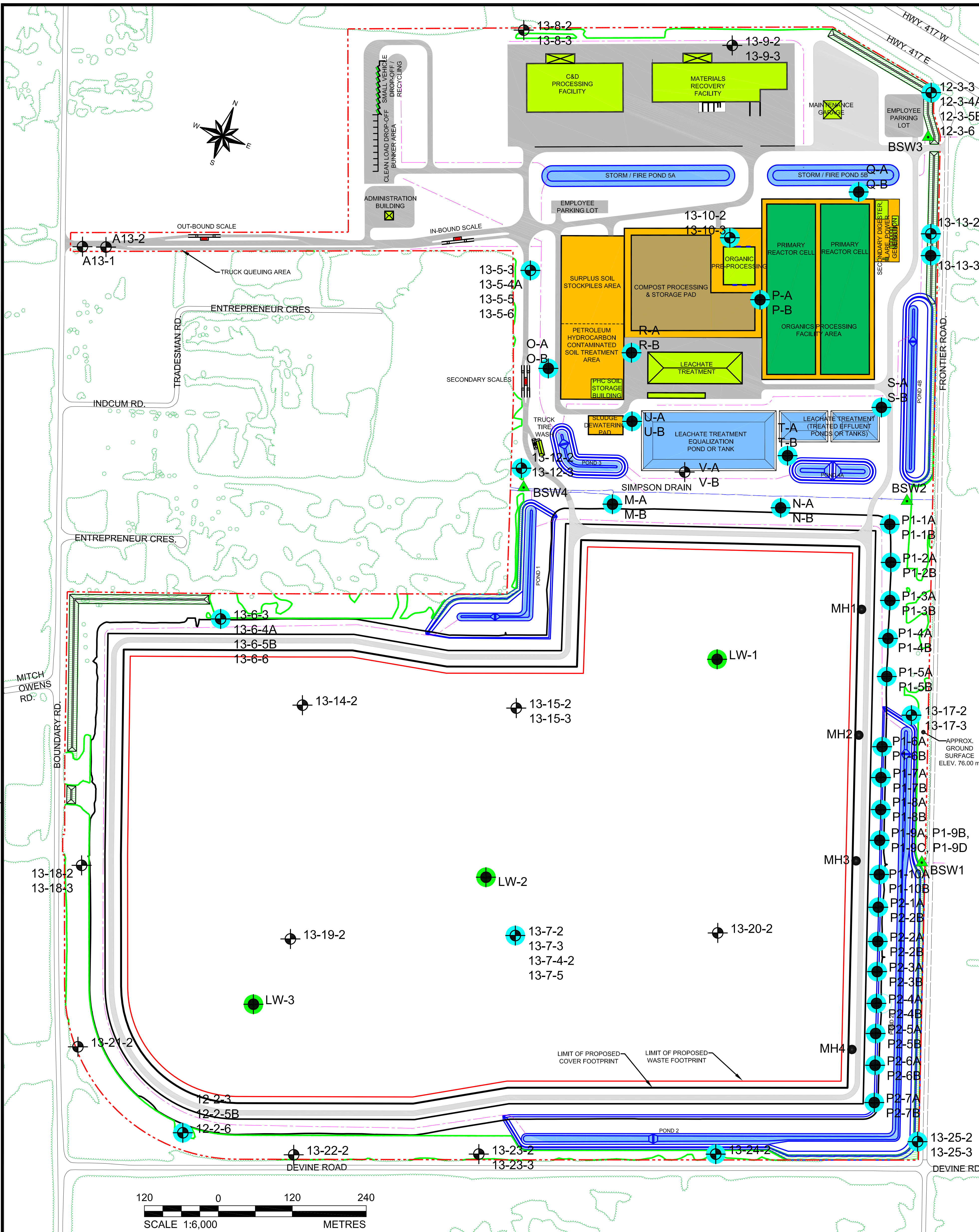


LEGEND

PROPOSED FACILITY BUILDING	CONSTRUCTED SCREENING FEATURE
OUTDOOR DIVERSION AREA	PERIMETER BERM CONTOURS (interval 1 m)
PAVED ROAD (ASPHALT)	STORMWATER MANAGEMENT PONDS
GRAVEL ROAD	EXISTING GROUNDWATER MONITORING WELL (SAMPLING PROGRAM)
PROPERTY BOUNDARY	EXISTING GROUNDWATER MONITORING WELL (WATER LEVELS ONLY)
EXISTING VEGETATION SCREENING	
PROPOSED GROUNDWATER MONITORING WELL	SURFACE WATER SAMPLING STATION
PROPOSED LEACHATE MONITORING WELL	LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM MANHOLE

Golder Associates
Ottawa, Ontario, Canada

SCALE	AS SHOWN
DATE	7 Nov. 2013
DESIGN	M.L.F.
CAD	M.L.F.
CHECK	P.L.E.
REVIEW	P.A.S.

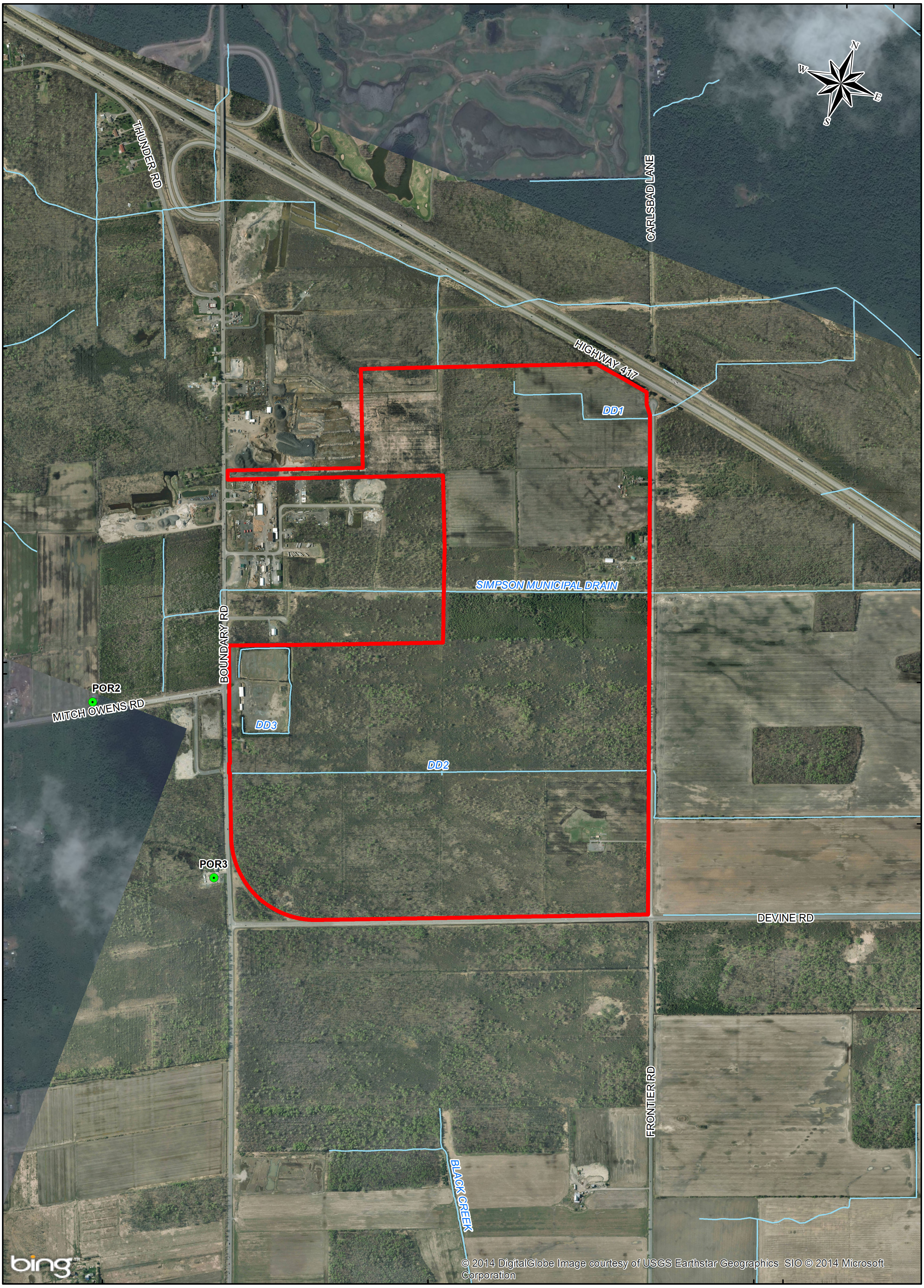
FILE No. 1211250045-V4-Fig 10.dwg
PROJECT No. 12-1125-0045 REV.

TITLE

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS

CAPITAL REGION RESOURCE RECOVERY CENTRE

FIGURE 10



LEGEND

APPROXIMATE NOISE MONITORING LOCATION

SURFACE WATER FEATURE

PROPERTY BOUNDARY

400 200 0 400

SCALE 1:12,000 METRES

NOTE

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REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
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PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

PROPOSED NOISE MONITORING LOCATIONS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	TG	DEC. 2013		
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

FIGURE 11

Path: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\GIS\MXDs\12-1125-0045\Reporting\Phase4000\Vol.4\1211250045-4000-V4-D_O-11.mxd

APPENDIX A

Stormwater Management System Design Report

December 2014

APPENDIX A

Stormwater Management System Design
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Golder Associates

Table of Contents

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

A new integrated waste management facility, the Capital Region Resource Recovery Centre (CRRRC), is proposed for the Capital Region of eastern Ontario. If approved, the CRRRC would provide facilities and capacity for the recovery of resources and diversion of materials from wastes that are generated by Industrial, Commercial and Institutional (IC&I) and Construction and Demolition (C&D) sectors in Ottawa and eastern Ontario. It would also provide landfill disposal capacity on the same Site for post-diversion residuals and materials that are not diverted.

This report has been prepared as an Appendix to the overall facility Design and Operations (D&O) report and should be read in conjunction with it and its other Appendices. The D&O report, and this Stormwater Management (SWM) System Design report and drawings will be used to support the Environmental Assessment (EA) and a subsequent application for an Environmental Compliance Approval (ECA) under the *Environmental Protection Act* (EPA) (MOE, 2010) and the *Ontario Water Resources Act* (OWRA) (MOE, 2011).

1.1 Background

The proposed CRRRC Site is located in the east part of the City of Ottawa just southeast of the Highway 417/ Boundary Road interchange. The property is located on the east side of Boundary Road, north of Devine Road and west of Frontier Road, and east of an existing industrial park, on Lots 22 to 25, Concession XI, Township of Cumberland.

The Boundary Road Site (the Site), totalling approximately 192 hectares (ha), is located in the Bear Brook Subwatershed in the Lower Ottawa – South Nation Watershed. The area surrounding the Site primarily consists of rural and agricultural land, an industrial park, residential properties and open spaces. Figure 1 shows the Site and surrounding area. The Site is generally flat, and slopes from local high point elevations at the western side of the Site at Boundary Road, towards the lowest portion of the Site found along the eastern edge at Frontier Road. The Mer Bleue bog is about 3.7 km to the north/northwest of the Site.

The property is adjacent to an existing Industrial Park with few existing immediate neighbours. It is underlain by a surficial silty sand layer followed by a thick deposit of silty clay soil.

2.0 PURPOSE AND METHODOLOGY

The purpose of the SWM system design report is to document the existing surface water conditions at the Site, and present the proposed Site drainage design and SWM system to mitigate potential impacts of the proposed CRRRC development on the surface water environment.

The process steps used to conduct the surface water assessment aspects of the EA/EPA study at the Boundary Road Site are described in the approved Terms of Reference (TOR) and are summarized below (from Appendix C-2.3, of the TOR, which is reprinted in Volume I, Appendix A of this document package). The sections of the design report also generally follow this order and are as follows:

1) Assess existing surface water conditions;

2) Assess potential environmental effects of the proposed CRRRC on surface water; and,

3) Complete EPA (MOE, 2010)/OWRA (MOE, 2011) level design activities for the proposed CRRRC.

The methodology used for the SWM system design was conducted within the general framework outlined above. The potential effects of the proposed CRRRC were considered based on full build out of the diversion/recovery facilities and post-closure landfill conditions since this is the time frame when there will be the greatest change to surface water conditions at the Site.

The following sections provide an overview of the tasks within each of the above steps.

2.1 Assess Existing Surface Water Conditions

Surface water testing

A field monitoring program was initiated to capture seasonal changes that exist at the Site and surrounding area. Surface water sampling was conducted at Site drainage points as well as downstream and background locations.

Data sources listed in Section 3.2, Appendix C-2.3 of the TOR (reprinted in Volume I, Appendix A of this submission) were reviewed to develop the monitoring program and collect data for surface water quality. Background sources, including municipal waterway monitoring reports, topographic mapping and aerial photography as well as published sources were used to delineate and identify characteristics of the study area. Characteristics of the study area include drainage watershed areas, flow paths, outfalls, discharge points, groundwater discharge areas and receiving water bodies. Watersheds in the Site-vicinity were also identified and characterized.

Grab surface water samples were collected and analyzed for target parameters selected at monitoring stations. The sampling station locations are shown on Figure 1. Flow measurements were collected following standard Provincial protocols where possible. Standard water quality parameters such as dissolved oxygen, pH, conductivity, and temperature were collected at each station using appropriate, calibrated instruments.

Existing conditions summary

Data regarding the existing surface water flow and quality representative of conditions upstream and downstream of the proposed CRRRC was collected and summarized from the field monitoring program, as well as other resources such as municipal waterway monitoring reports.

Hydrologic model

A hydrological model was used to calculate surface water runoff and peak flows in the area of the proposed CRRRC under existing conditions, using 2, 5, 25 and 100 year design storms as set out in *Ontario Regulation* (O.Reg.) 232/98 (MOE, 1998). To assist with the assessment and designs, Golder prepared a SWM model for the Site using the U.S. Environmental Protection Agency Stormwater Management Model Version 5.0.02 ('SWMM5') software program (US-EPA, 2008). The SWMM5 software was used to estimate the hydrologic pre-development conditions for the Site's sub catchment areas.

SWMM5 is widely used for single event and long-term (continuous) simulation of runoff quantity from urban and non-urban areas. In the runoff component, sub-catchment areas receive precipitation and generate runoff. The routing portion then transports this runoff through a system of pipes, channels and storage reservoirs that are user defined. SWMM5 tracks the quantity of runoff generated within each sub-catchment, and the flow rate and flow depth of water in each pipe and channel during a simulation period comprised of multiple time steps.

2.2 Assess Environmental Effects

The surface water aspects examined in the assessment are surface water quantity and surface water quality.

Based on the proposed Site development plan, the conceptual SWM model was developed to identify the preferred location of stormwater collection and conveyance features and SWM facilities. The hydrological model created to predict existing surface water runoff and peak flows was updated based on proposed post-development Site conditions. The post-development results of peak runoff using the 2, 5, 25 and 100 year design storms were compared against results of the pre-development conditions to assist in further refining the SWM designs. The assessment also considered potential impacts to surface water quality and proposed mitigation measures were incorporated into the designs.

The SWMM5 software was used to estimate the hydrologic post-development conditions for the Site's three Municipal Drain sub-catchment areas and to design effective post-development controls to meet pre-development runoff targets conveyed from the Site.

Additional mitigation measures, if required following the prediction of future environmental conditions, were identified and refined as necessary. The future surface water conditions were predicted, assuming all design and operational mitigation measures will be present.

2.3 EPA/OWRA Level Design

The SWM design report and drawings will be used to support the EA, and also to support approvals under the EPA (MOE, 2010) and OWRA (MOE, 2011). As such, the Site designs are to the required level of detail to include Site grading, drainage and conveyance aspects, and more defined SWM facilities. Site drainage has been designed in accordance with the Ministry of the Environment and Climate Change (MOECC) Landfill Standards (MOE, 1998).

3.0 ASSESSMENT OF EXISTING SURFACE WATER CONDITIONS

3.1 Drainage

A small portion of the northern section of the Site is currently used for agricultural purposes, but the majority of the Site is heavily vegetated and treed. The Site is known to have generally high groundwater levels, minimal relief and gradual slope of typically less than 1% draining west to east, with elevations ranging from approximately 78 metres to 76 metres above sea level (masl). Soils encountered in the Site area during the subsurface investigation program consisted of surficial silty sand to approximately 1.5 metres below ground surface (mbgs), underlain by an extensive and thick silty clay deposit. Based on these investigations, Site visits performed by the Golder team, aerial photography and available topography, the model hydrologic parameters, including Soil Conservation Service (SCS) Curve Number, depression storage, Manning's coefficient and land use were defined for the pre-development drainage areas. Other user-defined hydrologic parameters applied in SWMM5 are area, width, slope, and percentage impervious surfaces. All of the hydrologic input parameters for the modeling are summarized in Attachment A.1.

Drainage in the vicinity of the Site is mainly by means of a network of agricultural ditches and three municipal drains. Ditches that cross the Site, some of which are old farm field drainage, have not been maintained. There are roadside ditches along Boundary, Devine and Frontier Roads that eventually all drain eastward. At present, drainage on the Site is not well established and the land is poorly drained. Sub-catchment delineation is challenging due to the poorly drained land and many references, including municipal drainage plans, were used. Ultimately, delineations were based on those previously concluded by Stantec (Stantec, 2000). Delineated pre-development drainage catchments are presented in Figure 2.

The Site is in the headwaters of the Shaw's Creek sub-watershed of approximately 35 km^2, and the Bear Brook watershed of approximately 484 km^2. Bear Brook is a tributary to the South Nation River and the Site is therefore within the South Nation Conservation area. The Site contributes roughly 5% of the land area draining to the Shaw's Creek drainage area.

The Site is divided into three sub-catchment areas with discharge to the eastern boundaries of the Site. The discharge ditches of the three sub-catchments all eventually tie into municipal drains. Summaries for each of these Site drainage areas, including additional descriptions of off-Site downstream routing to Highway 417, are provided below. The SWMM5 schematic illustrating the existing drainage is provided in Attachment A.2, Figure A-1.

Regimbald Municipal Drain

The northern Site sub-catchment area primarily drains to two on-Site agricultural ditches. One ditch segment drains northerly from the Site while another drains easterly towards Frontier Road. Both ditch segments eventually become part of the Regimbald Drain, the first about 200 metres north of the northern property limit, while the second is on the east side of Frontier Road.

Drainage to the east is conveyed via a 600 millimetre diameter culvert under Frontier Road. Off-Site drainage from this sub-catchment area is then conveyed northeast via a ditch to a 1,000 millimetre diameter culvert under Highway 417, meeting up with the other branch of the Regimbald Drain approximately 800 metres northeast of Highway 417.

The Site drainage to the northern ditch segment appears to be relatively insignificant based on Site observations. For the purposes of the assessment it has been considered that the east discharge location is the outlet for the northern portion of the Site. The portion of the Site draining to the Regimbald Drain is about 21 ha, or about 11% of the Site.

Simpson Municipal Drain

The Simpson Municipal Drain bisects the Site, and drains from west to east. An upstream drainage area drains to the Simpson Drain segment through the Site, extending to the west of Boundary Road, along Mitch Owens Road to Black Creek Road.

The runoff from the central portions of the Site is directed to the Simpson Municipal Drain and is conveyed off-Site and then discharges through a 1,200 mm diameter culvert under Frontier Road. Downstream, the Simpson Drain continues to a culvert under Highway 417 approximately 1 km further east of the Site. Downstream of Highway 417, the Simpson Drain continues as Shaw's Creek, which eventually feeds Bear Brook Creek. The stream flow distance of the Simpson Municipal Drain from the east perimeter Site boundary to Bear Brook Creek is approximately 11 km.

The portion of the Site draining to the Simpson Drain is about 75.6 ha, or about 39% of the Site.

Wilson - Johnston Municipal Drain

The southern portion of the Site is primarily drained by a ditch flowing west to east across the entire width of the Site. This ditch extends west to Boundary Road but only receives runoff from the eastern half of the road allowance as the western portion connects to the Simpson Drain at Mitch Owens Road. This ditch continues to flow east and eventually becomes part of the Wilson-Johnston Municipal Drain.

Off-Site flows from the Site are routed under Frontier Road, via a 1,000 mm diameter culvert. The ditch then turns south and parallels Frontier Road for about 150 metres before turning back to the east. The Wilson-Johnston Drain crosses under Highway 417 via a culvert about 2.4 km east of the Site.

A second small ditch in the southeast corner of the Site drains east to Frontier Road and crosses under the road via a 600 mm culvert and ties into the main ditch at the location where it turns east.

Some drainage along the southern limits of the Site may drain to the roadside ditch along Devine Road. It doesn't appear that very much runoff follows this route and it is difficult to estimate how much due to the very flat topography. Since the Devine Road drainage also eventually connects into the Wilson-Johnston Drain, it has been assumed that no runoff from the Site discharges to Devine Road.

The portion of the Site draining to the Wilson-Johnston Drain is about 95.1 ha, or about 50% of the Site.

3.2 Water Quantity

Flow measurements were conducted at the surface water sampling station locations when possible. The conditions at the time of sampling resulted in very low or no flow conditions in many cases or unreliable information in others. This prevented successful determination of consistent flow quantities. As a result, this data was not used in preparation of the SWM model nor for calibration.

A hydrological model using SWMM5 was used to calculate surface water runoff and peak flows in the area of the proposed CRRRC under existing conditions, using 2, 5, 25 and 100 year design storms as set out in O.Reg. 232/98 (MOE, 1998).

Precipitation conditions on-Site are represented by the record from Environment Canada's Ottawa CDA RCS meteorological station. The station is located approximately 20 km northwest of the Site at 45°23'N 75°43'W and an elevation of 79 masl. Rainfall depths for 24-hour storms were extracted from the Ottawa short duration rainfall Intensity-Duration-Frequency (IDF) data. Total precipitation depths for 24-hour rainfall events used in the hydrologic assessment are provided in Attachment A.3.

The collection, conveyance and detention of runoff through the Site were modelled. The modelling data denotes the extent of knowledge on the quantity of surface runoff water from the Site. The values from the hydrological modelling are presented in Table 1.

Table 1: Estimated Pre-Development Peak Flow Rates

Peak Flow (L/s)				
24 Hour Design Storm				
Sub-Catchment Area	**1:2 Year**	**1:5 Year**	**1:25 Year**	**1:100 Year**
Regimbald (northern)	86	298	471	538
Simpson (central)	35	284	585	732
Wilson-Johnston (southern)	40	345	715	898

The Regimbald sub-catchment experiences the highest peak flows for the 1:2 year event, while the Wilson-Johnston Drain experiences the highest peak flows in all the other design storm events.

3.3 Water Quality

3.3.1 Monitoring Stations

Surface water monitoring stations for the CRRRC have been established since December 2012 and a number of monitoring events have been conducted to establish the existing surface water quality conditions on-Site and in the immediate downstream waterways. Originally there were seven stations (BSW1 to BSW7), with an eighth (BSW8) and ninth (BSW9) added in spring and fall 2013, respectively. Surface water monitoring station locations are shown on Figure 1. Water was not collected and sampled at all stations as some were dry at the time of sampling. A summary of the monitoring locations and sampling sessions is presented in Table 2, with an 'X' denoting when samples were collected.

Table 2: Summary of Surface Water Monitoring

Surface Water Monitoring Stations	Location	Dec-12	May-13	Jul-13	Oct-13	Nov-13	Dec-13
BSW-1	Southern Site discharge at Frontier Road	X	X	X	X	X	-
BSW-2	Discharge of Simpson Municipal Drain at Frontier Road	X	X	X	X	X	-
BSW-3	Northern Site discharge at Frontier Road	X	X	X	X	X	-
BSW-4	Simpson Municipal Drain at western limit of Site	X	X	X	X	X	-
BSW-5	Northern ditch upstream limit	Dry	X	X	X	X	-
BSW-6	Shaw's Creek at Sand Road	X	X	X	X	X	-

Surface Water Monitoring Stations	Location	Dec-12	May-13	Jul-13	Oct-13	Nov-13	Dec-13
BSW-7	Shaw's Creek at Frank Kenny Road	X	X	X	X	X	-
BSW-8	Drainage Ditch south of Highway 417, East of Site, North of Devine Road	-	X	X	X	X	-
BSW-9	417 Auto Parts property ditch	-	-	-	-	X	X

The purpose of each monitoring location is to provide a representative indication of the water quality for a reach of waterway.

BSW-1 is positioned to represent data of water conditions in the on-Site tributary eventually outletting to the Wilson-Johnston Municipal Drain section just before the ditch crosses the property boundary to the east. This data can be compared to downstream data to identify any differences between the water qualities. BSW-2 represents the discharge from the Simpson Municipal Drain at Frontier Road and has a similar purpose to BSW-1 for the Simpson Municipal Drain. BSW-3 also serves a similar purpose for the northern ditch that discharges to the Regimbald Municipal Drain. BSW-4 is located near the west entry point of the Simpson Municipal Drain and provides data of water quality entering the Site. BSW-5 is located at the west end of the on-Site ditch that discharges into the Wilson-Johnston Municipal Drain, and serves a similar purpose to BSW-4. BSW-6 and BSW-7 monitor segments of Shaw's Creek at Sand Road and Frank Kenny Road, respectively. BSW-8 represents water quality in the ditch that eventually discharges into the Wilson-Johnston Municipal Drain before it is joined by discharge from the Regimbald and Simpson Municipal Drains. BSW-9 is used to establish baseline water quality in the ditch (moat) around the 417 Auto Parts Yard.

Surface water characteristics for the greater watershed area were also obtained from the City of Ottawa, Water Environmental Protection Program (WEPP) study (City of Ottawa, 2014)for the area. Bear Brook water quality data is used to characterize the larger downstream watercourse for which the sub-watershed is named.

3.3.2 Historical Trends

Historical trends for the region were inferred from the City of Ottawa WEPP (City of Ottawa, 2014).

Water quality monitoring information for Bear Brook Creek is available from the City of Ottawa WEPP (City of Ottawa, 2014). Water level information is available from the HYDAT (HYDAT: Environment Canada, 2010).

The City of Ottawa WEPP (City of Ottawa, 2014) sampled in various locations of the Bear Brook Creek Watershed, including a location near Carlsbad Springs, just north of the Site.

The water quality in the Bear Brook Creek is reflective of the rural, agricultural population in its vicinity. According to the 2008 to 2014 data from the City of Ottawa WEPP (City of Ottawa, 2014), 0% to 44% of the phosphorus, E. coli and copper water quality samples meet provincial and federal targets and 95% to 100% of the zinc samples meet provincial and federal targets.

3.3.3 Existing Conditions

Surface water monitoring was conducted in December 2012, May 2013, July 2013, October 2013, November 2013 and December 2013. Samples were analyzed for a comprehensive list of parameters. A summary table containing the sample results and analyzed parameters is provided in Attachment B.

Many samples were found to have elevated levels of phosphorus and iron. A single sample, BSW-3 in December 2012 detected elevated copper levels (6.9 µg/L), which was not detected in subsequent sampling sessions. An exceedance of the chromium PWQO occurred one time at location BSW4 during the November 2013 sampling session. Elevated phosphorus levels (observed between 17 µg/L and 140 µg/L), were relatively consistent for all stations. This is expected due to the mainly agricultural land use in the area and the accompanying fertilizer use. Iron levels were observed within the range of 110 µg/L and 3,100 µg/L for the majority of the stations. Phenolics were detected at elevated levels in the fall 2013 sampling session for each station (with the exception of BSW-8). An additional winter 2013 sampling session was added to the monitoring program to confirm these results. Concentrations of phenols exceeded the PWQO at locations BSW1, BSW2, BSW3, BSW5, BSW8 and BSW9 only during the winter 2013 session.

Two reaches can be analyzed based on the locations of the stations. Ordered from upstream to downstream, BSW-4, BSW-2, BSW-6, and BSW-7 are located along the Simpson Municipal Drain and Shaw's Creek watercourse reach. BSW-5, BSW-1, and BSW-8 are located along the ditch discharging to the Wilson-Johnston Municipal Drain and Shaw's Creek.

A comparison of stations upstream and downstream of drainage ditches that cross the Site reveals decreases of phosphorus levels, and improving dissolved oxygen levels downstream of the Site. Iron levels were observed to decrease along the Wilson-Johnston Municipal Drain to Shaw's Creek reach, but they also increased along the Simpson Municipal Drain and Shaw's Creek reach.

The existing conditions established from the surface water monitoring are intended to act as a baseline for future monitoring, but were also used to assist with the consideration of leachate treatment options, including on-Site treatment and discharge to surface water.

4.0 ASSESSMENT OF POTENTIAL EFFECTS ON SURFACE WATER

The aspects of surface water examined in the assessment are surface water quantity and surface water quality. The post-development model results were compared to the pre-development results, with consideration of proposed mitigation systems, to determine the "net effects" of the proposed CRRRC.

The objectives of the SWM design are to:

1) Control post-development stormwater discharges from the Site to the three Municipal Drains at or below pre-development rates, for the 1 in 2 year to 1 in 100 year design storm events;

2) Minimize sediment loading in runoff leaving the Site during and post-construction, to adhere to the MOECC Guidelines for Enhanced Level of treatment (80% Total Suspended Solids (TSS) removal) or greater (MOE, 2003); and,

3) Maintain Site runoff water quality at or above Site water quality standards.

The SWM design criteria for the Site to meet the above objectives are set out in following:

- The City of Ottawa, Stormwater Control Quantity and Surface Water Quality Policies (City of Ottawa, 2009).
- O.Reg. 232/98 for Landfilling Sites (MOE, 1998).
- The Ontario MOECC SWM Pond sizing guidelines for impervious area percentages to achieve TSS removal objectives (MOE, 2003).

Table 3 below summarizes the SWM criteria presented in this design report.

Table 3: Site SWM Design Criteria

Criterion	Description	Target
Peak Runoff Control	1 in 2 year to 1 in 100 year runoff events	Post-development peak flows at/below pre-development
Conveyance Capacity	Internal drainage ditches, storm sewers and conveyance structures Continuous overland flow route	Design Capacity to accommodate 1 in 25 year design storm Convey the peak flow from the 1 in 100 year design storm
Stormwater Water Quality	Total Suspended Solids (TSS)	Enhanced level of treatment (80% TSS removal) (MOE, 2003)

4.1 Surface Water Quantity

Since the proposed project has the potential for effects on surface water management, predicted impacts were assessed with consideration of mitigation measures. Several mitigation measures are incorporated into the conceptual Site design to manage surface water quantity and minimize potential off-Site impacts. Mitigation options were explored by routing runoff to different outlets in the SWMM5 model, and used to predict changes in water quantity.

As previously discussed, there are three main drainage areas on-Site that convey drainage off-Site.

4.1.1 Predicted Changes in Drainage Areas

The post-development conditions scenario considers the Site layout for the ultimate build-out of the CRRRC facilities, the landfill final cover, and the SWM controls shown on Figure 3.

The three Site sub-catchment drainage areas and corresponding land uses for the proposed ultimate build-out state of the Site, and the technical details of the proposed SWM controls for each sub-catchment are described below in more detail. Figure 4 shows individual sub-catchments for each SWM Pond.

The SWMM5 schematic illustrating the proposed routing of post-development Site drainage is provided in Attachment A.2, Figure A-2. The sub-catchment areas on Figure A-2 are shown on Figure 4.

Regimbald Municipal Drain

The proposed northern Regimbald Municipal Drain, sub-catchment area will increase by 3.3 ha, to a total sub-catchment area of 24.3 ha. The proposed grading and servicing plans route the drainage from this part of the CRRRC facility area to the two cell SWM/Fire Ponds. This post-development Site sub-catchment area includes buildings, parking areas, roadways, stockpile areas, preserved existing and/or landscaped green space, and the two SWM/Fire Pond cells (Ponds 5a and 5b) located in the central area of this sub-catchment.

Simpson Municipal Drain

The proposed Simpson Municipal Drain post-development total sub-catchment area of approximately 83.8 ha increases from existing conditions by approximately 8.2 ha.

This post-development drainage area is proposed to control runoff via a pond northwest and northeast of the Simpson Drain (Ponds 3, 4a and 4b), and one pond southwest of the drain (Pond 1). The area north of the Drain will include pads for the composting operations and soil treatment facilities, buildings, roadways and leachate storage ponds. The area south of the Simpson Drain will include the northwest segment of the landfill.

Wilson - Johnston Municipal Drain

The post-development final build-out sub-catchment area to the Wilson-Johnston Drain will decrease by approximately 11.5 ha, from 95.1 ha to 83.6 ha. This area will include approximately two-thirds of the landfill area and will include one long pond located along the southern and eastern sides of the Site.

A summary of existing and proposed drainage areas is presented in Table 4.

Table 4: Existing and Proposed Drainage Areas

Site Municipal Drain Sub-catchment	Area (ha)	
	Existing	Proposed
Regimbald	21.0	24.3
Simpson	75.6	83.8
Wilson-Johnston	95.1	83.6
Total Site	***191.7***	***191.7***

The total drainage area is not expected to change. The Regimbald Municipal Drain still has the smallest drainage area, and the Simpson and Wilson-Johnston Municipal Drains will have identically sized drainage areas.

4.1.2 Predicted Effects on On-Site Flows

The ditches within the Site are designed to convey stormwater to the SWM Ponds, or eastern Site boundary culverts directly, as shown on Figures GD1 and GD2 in Attachment C. Three types of channels (ditch, SWM Pond inlet, or outfall channels and spillways) have been designed considering the slope along with the peak flow and corresponding velocity computed for a 1 in 25 year design storm. Based on the functionality of the channels, with consideration of peak velocity results, these conveyance features have been designed with two types of surface treatment: rip-rap lined, or vegetated ditches. Conveyance channel design details are outlined in Section 5.2.

Post-closure conditions are used for the surface water quantity assessment as the entire Site will be contributing to Site runoff when the landfill component has been capped. In order to minimize potential for nuisance flooding during minor storm events, and property damage during major events, the ponds have been designed for the 1:100 year storm event.

Peak flow rates were extracted from the SWMM5 model for pre- and post-development conditions. Under the post-development scenario, the increase in respective impervious land use and average slopes for the sub-catchment areas are expected to generate increased runoff conditions.

The model identified that the calculated post-development peak flows at all Site outlet locations exceeded pre-development peak flow conditions. The model was then updated to include SWM Ponds (storage reservoirs). Table 5 below compares the pre-development and controlled, post-development peak flows for each Site sub-catchment area.

Table 5: Pre- and Post-Development Peak Flow Rates Comparison

Municipal Drain Sub-Catchment		Drainage Areas (ha)		Peak Discharge to Municipal Drains (L/s)							
				1:2yr		1:5yr		1:25yr		1:100yr	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Regimbald	21	24.3	86	38	298	195	471	336	538	455
2	Simpson	75.6	83.8	35	13	284	251	585	549	732	617
3	Wilson-Johnston	95.1	83.6	40	25	345	338	715	580	898	675

These SWMM5 peak flows, generated from local IDF curves over a 24 hour period using the SCS type II distribution, are conservative for the purposes of recommending the approximate SWM Pond sizes to meet storage volume requirements to manage peak flows without flooding (James, 2003).

4.1.3 Predicted On-Site Runoff Flow Volumes

Climate normals were used to estimate annual water budget comparisons for the existing and proposed Site conditions. Results from the existing Site condition water budget are provided in Table 6. Results from the post-development Site condition water budget are provided in Table 7. The values in both Tables 6 and 7 represent the average annual water budget values for the Site, based on the Environment Canada (1940-2011) record from Ottawa International Airport meteorological station No. DC20492 (located 24 km northwest of the Site (Environment Canada, 1940-2011).

Table 6: Existing Conditions Water Budget

Municipal Drain Sub-catchment	Average Annual Volumes			
	Area (ha)	Surplus (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
Regimbald	21.0	81,340	63,000	18,340
Simpson	75.6	270,430	196,790	73,640
Wilson-Johnston	95.1	334,850	245,940	88,910
Total	***191.7***	***686,620***	***505,730***	***180,890***

Table 7: Proposed Conditions Water Budget

Municipal Drain Sub-catchment	Average Annual Volumes			
	Area (ha)	Surplus (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
Regimbald	24.3	100,510	94,660	5,850
Simpson	83.8	308,170	254,030	54,140
Wilson-Johnston	83.6	273,450	194,470	78,980
Total	***191.7***	***682,130***	***543,160***	***138,970***

Due to the proposed changes in land use, the overall Site is expected to see a decrease in annual infiltration and a corresponding increase in annual runoff. Also, shifting of drainage area boundaries at the sub-catchment levels is expected to result in larger changes when compared to pre-development conditions. The Regimbald sub-catchment area is increased, which results in an increase in runoff and a decrease in infiltration. A similar scenario is expected for the Simpson sub-catchment area with an expected increase of approximately 30%. Since the Wilson-Johnson sub-catchment is proposed to be reduced in area, the runoff is expected to decrease by approximately 20%; the expected annual infiltration will also decrease.

Since all drainage originating from the CRRRC Site combine at Shaw's Creek, any impacts associated with post-development drainage will be primarily limited to the sections of ditches immediately downstream of the Site.

4.1.4 Predicted SWM Pond Water Levels

The proposed SWM Ponds are typically set to have a permanent pool elevation at approximately 0.5 metres below existing grade so that the water level is similar to the existing Site groundwater elevations. The ponds typically include 1.5 metres of permanent pool and 1.5 – 2.0 metres of active retention capacity. Drawings of the proposed ponds are provided in Attachment C. The predicted maximum water elevations in the proposed SWM Ponds under the design storm events are shown in Table 8.

Table 8: Predicted SWM Pond Water Levels

SWM Pond	Pond Level	Maximum Water Level (m)							
		1-2yr		1-5yr		1-25yr		1-100yr	
	NWL (masl)	Depth (m)	Water Level (masl)	Depth (m)	Water Level (masl)	Depth (m)	Water Level (masl)	Depth (m)	Water Level (masl)
1	76.00	1.99	76.14	2.45	76.6	2.89	77.04	3.12	77.27
2	75.35	1.62	75.47	2.08	75.93	2.19	76.04	2.22	76.07
3	75.50	1.96	75.96	2.64	76.64	2.8	76.80	2.86	76.86
4a	varies	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4b	75.25	1.95	75.7	2.42	76.17	2.66	76.41	2.78	76.53
5a	75.75	1.61	76.06	2.01	76.46	2.19	76.64	2.22	76.67
5b	75.75	1.39	75.84	1.48	75.93	1.55	76.00	1.59	76.04

Notes:
1. NWL – Normal Water Level, at lowest hydraulic control outlet invert.
2. Water Level is water surface above the normal water level

4.2 Surface Water Quality

Stormwater quality control will be provided for the Site to remove a minimum of 80% TSS loading (Enhanced Level Treatment (MOE, 2003)) for each of the three sub-catchment systems. Table 9 presented in Section 4.2.1 outlines the extended detention requirements and storage volumes provided for each sub-catchment, to meet the MOECC Enhanced 80% TSS long-term removal efficiency target based on the prescribed extended detention volume per ha for impervious land use area from the Stormwater Planning and Design Manual (MOE, 2003). Figure A-7 in Attachment A.4 shows that the extended detention drawdown time for SWM Ponds 1 to 5 is approximately 24 hours, considering the 25 millimetre City of Ottawa design storm event.

To improve the settling of TSS within the permanent pool, SWM Ponds 1, 2, 3, and 4b will be constructed with a forebay equal to approximately 1/5 of the width and length of the pond bottom. Due to the long, linear nature of most of the SWM Ponds, some of the runoff entering the ponds will bypass the forebays. To assist with removal of TSS, it is proposed that much of the runoff for these areas be promoted to enter the ponds as sheet flow across vegetated buffer areas adjacent to the ponds. To avoid re-suspension of accumulated sediments and flushing of the ponds during major storm events exceeding the 1 in 100 year event, a pond bypass/overflow would convey excess flow to the outlet.

4.2.1 Predicted Effect on Surface Water Quality

During the operational/construction phase of the project, ditches and swales at the perimeter of unvegetated portions of the Site will be protected from potential runoff containing suspended solids through the use of temporary berms and silt fences. Perimeter ditches along the completed and capped areas will divert runoff through grass lined swales to the SWM Ponds.

The ponds and the swales will serve to remove suspended sediment from the runoff, and prevent significant outflows that could potentially impair the water quality in downstream watercourses in extreme events.

In the post-closure phase of the Site, finalized perimeter ditches along the outer berm of the landfill footprint will capture and direct runoff from the landfill surface and will continue to direct the water via grass lined swales or ditches to the SWM Ponds. As described earlier, the SWM Ponds on-Site are designed for Enhanced protection levels (MOE, 2003).

During operational phases of the northern diversion facilities or the landfill, drainage features will be implemented to keep potentially contaminated runoff separate. Drainage around the active face of the landfill will be directed to the landfill leachate collection system. Pond 4a will be a two celled storage pond dedicated to receive runoff from the proposed compost pad area. One cell will be dedicated to receive runoff from final curing areas of the pad while the other will be for runoff from the remainder. This pond is sized to contain runoff equivalent to 110% of a 1:25 year, 24 hour event for the pad area, without discharge to off-Site surface water. The stored water within the pond cells will be managed to maintain adequate capacity by re-using the water from the appropriate cell for compost pile spraying and Site irrigation. To ensure Site irrigation is a viable option, water quality samples from both cells of Pond 4a will be collected for analysis during the demonstration phase of the organics processing facility. Should water quality be such that Site irrigation is not possible, surplus water from Pond 4a would be taken to the City of Ottawa wastewater treatment plant with the pre-treated wastewater from the Site.

The proposed works are predicted to result in surface water quality conditions that are comparable to existing conditions and meet MOECC Provincial Water Quality Objective (PWQO) (MOE, 1994). Post-closure, the ponds will continue to operate to ensure surface water quality downstream of the Site remains protected.

Table 9 outlines the permanent pool storage volumes required and provided for each SWM Pond and the corresponding Site sub-catchment area. The volumes provided for Ponds 5a and 5b far exceed the volumes required as these ponds will also provide storage for firefighting, assuming ice cover of 0.6 metres.

Table 9: Permanent Pool SWM Pond Volumes for Enhanced Level Treatment

Storage	Required Storage Volume per unit Area (m^3/ha)	Required Storage Volume of SWM Pond (m^3)	Volume Provided by SWM Pond (m^3)
Regimbald Municipal Drain Sub-Catchment			
SWM/Fire Pond 5a (contributing sub-catchment area = 14.74 ha)			
Permanent Pool	185	2,730	13,020
SWM/Fire Pond 5b (contributing sub-catchment area = 9.48 ha)			
Permanent Pool	185	1,760	8,680
Simpson Municipal Drain Sub-Catchment			
SWM Pond 1 (contributing sub-catchment area = 48.18 ha)			
Permanent Pool	100	4,280	4,420
*SWM Pond 3 (contributing s*ub-catchment area = 11.30 ha)			
Permanent Pool	150	1,700	1,730
SWM Pond 4b (contributing sub-catchment area = 16.3 ha)			
Permanent Pool	173	2,830	2,910
Wilson-Johnston Municipal Drain Sub-Catchment			
SWM Pond 2 (contributing sub-catchment area = 83.62 ha)			
Permanent Pool	100	8,360	10,650

Notes:

1. Additional 40m^3/ha provided as active pond storage.
2. Impervious Levels: 70% considered for SWM Ponds 5a & 5b; 65% for SWM Ponds 4a and 4b; 55% for SWMP 3; and 35% for SWM Ponds 1 and 2.s

5.0 STORMWATER MANAGEMENT DESIGN

Design drawings for the Site grading and proposed stormwater control works are required to support EPA (MOE, 2010)/OWRA (MOE, 2011) approvals. The stormwater infrastructure consists of:

- SWM Ponds;
- Conveyance Channels (Ditches, Spillways, Outfall Channels); and,
- Culverts.

The drawing set is attached in Attachment C and includes drawings of the SWM Ponds, typical sections of the conveyance features, and typical details of berms, along with a grading plan, and erosion and sediment control information. The following sections summarize the detailed design of the SWM and conveyance features for the Site.

Throughout the course of the Site development, the phased construction of the landfill area will be conducted such that any contact-runoff is contained within the limit of the proposed waste footprint, through a series of berms. Buffer zones of existing and constructed vegetation screening will be maintained. Erosion and Sediment Control (E&SC) measures, including perimeter silt fencing, will also be installed and maintained between the vegetation screening area and the perimeter road during the phased construction of the landfill.

5.1 SWM Pond Design

The SWM Pond design plans, sections and details are included in Attachment C. A summary of the SWM Pond dimensions and capacities for each feature is outlined in Table 10 below.

Table 10: SWM Pond Design Information

SWM Pond	Perm. Pool Volume (m^3)	Extended Detention Storage Volume (m^3)	Total Pond Volume[1] (m^3)	Pond Bottom Invert[2] (masl)	Top of Berm Elev. (masl)	Depth of Pond[2] (m)	Outlet Control		
							Type	Dia. (mm)	Invert Elev. (masl)
1	4,420	10,420	14,840	74.15	77.15	3.0	Culvert	1,000	75.65
2	10,650	48,560	59,210	73.85	76.85	3.0	Orifice; Culvert	500; 1,000	75.35; 75.85
3	1,730	3,400	5,130	74.0	77.0	3.0	Culvert	600	75.50
4a	N/A	N/A	4,530	73.85	76.75	2.9	N/A	N/A	N/A
4b	2,910	9,220	12,130	73.75	76.75	3.0	Culvert	750	75.25
5a	13,020	22,940	35,960	74.20	77.25	3.05	Culvert	600	75.75
5b	8,680	15,980	24,660	73.85	77.25	3.4	Culvert	600	75.75

Notes:
1. Total pond volume does not include additional freeboard volume to top of berm.
2. Depth of pond includes additional 0.25 m of freeboard between the outfall spillway weir and the top of berm.

5.2 Conveyance Channels

The ditches within the Site are designed to convey stormwater to the SWM Ponds, or eastern Site boundary culverts directly, as shown on Grading and Drainage Plans GD1 and GD2.

The three types of channels (ditch, SWM Pond inlet or outfall channels, and spillways) have been designed, considering the slope, along with the peak flow and corresponding velocity computed for a 1 in 25 year design storm. Based on the functionality of the channels, with consideration of peak velocity results, these conveyance features have been prescribed with two types of surface treatment: rip-rap lined, or vegetated ditches.

Summaries of both types of ditches, along with the rip-rap lining and associated geotextile fabric specifications for a few prescribed locations at the outlets of the conveyance features are outlined below. Typical details and slopes for channels are provided on Design Drawings GD1, GD2 and P1 (Attachment C).

Perimeter Vegetated Ditches

The perimeter ditches around the landfill boundaries are proposed to be grass lined. These perimeter ditches will be trapezoidal with a 0.5 metre bottom width, a 7H:1V sideslope on the landfill side and a 3H:1V sideslope on the outer side. Slopes will be approximately 0.30%, respecting the proposed topography, and will have a minimum depth of 0.5 metres.

Interior Ditches – Facility Operations Area

Most of the interior ditches will be trapezoidal with a 1.0 metre bottom width, 4H:1V side slopes, and will have a maximum depth of 0.5 metres. The longitudinal slopes of these ditches vary with a minimum of 0.15%, respecting the existing topography.

Inlet, Outlet and Spillway Channels with Rip-Rap Lining

Pond inlet conveyance channels, overflow spillways or outfall channels experience high erosive forces. To provide effective energy dissipation and minimize erosion potential from the 1 in 25 year design storm, and any larger major events (e.g. 1 in 100 year storm), it is proposed these channels be lined with rip-rap and annual maintenance and repair practices be followed.

The thickness of the rip-rap layer is to be a minimum of 1.5 times the rip-rap nominal diameter. The mean diameter for the rip-rap stone was selected to have nominal diameter of 200 millimetres.

Reversed slope outlet pipes will be used for stormwater management ponds that receive drainage from vehicle parking areas. Geotextile Fabric

A geotextile fabric will be required beneath rip-rap areas, and is recommended to be extended three to five channel widths downstream to mitigate any scour potential. The fabric is required to be “keyed in” 200 mm from the crest of the ditch as indicated in the Ontario Provincial Standard Drawing 219.211 (MTO, 2006).

5.3 Culvert Design

All of the culverts on-Site have been designed to convey the 1 in 25 year, 24 hour storm event and will be located beneath existing roadways. The culvert structural design and cover depths will be confirmed prior to procurement. Minimum culvert diameter will be 600 millimetres.

6.0 MONITORING, OPERATION AND MAINTENANCE

The inspection of E&SC measures during construction should occur on a weekly basis, at minimum. E&SC inspection during construction should also occur after significant rainfall events (e.g., greater than approximately 10 mm). An inspection report, highlighting any E&SC deficiencies, should be prepared for each inspection and kept on-Site for reference and reporting purposes, if needed (GGHA CAs, 2006).

Visual inspections of SWM or water conveyance features should be performed post-construction on a quarterly (seasonal) basis to ensure sediment build-up has not caused any conveyance capacity issues or potential for an increase in TSS loadings transported downstream. During rainfall-runoff events, visual observations will continue to support the post-development runoff assessment and the successful performance of the SWM Ponds in meeting Enhanced Level of treatment (MOE, 2003).

At minimum, the following should be observed during inspections:

- Signs of erosion of the SWM structures. This is important particularly before the re-vegetation cover has been established;
- Sediment build-up in the swales. For any retention controls (i.e., rock check dams, sediment traps), sediment build-up can be expected at the upstream end of these structures and therefore the stormwater conveyance channels should be inspected on a regular basis and cleaned out periodically to avoid sediment deposits being transported off-Site. Clean-out is recommended to occur once sediment accumulation is clearly visible (GGHA CAs, 2006). In practical terms, clean-out of the rock check dams is recommended if the build-up is greater than one-half the height, from the toe to the spillway. Sediment should be removed in a matter that avoids escape of the sediment downstream and that avoids damage to the control structure. Sediment should be removed to the level of the grade existing at the time the control structure was constructed;
- Ponding in the swales or sediment traps; and,
- Silt fencing. All silt fences used for E&SC should meet required minimum height of 0.6 m. They should be repaired or replaced if damaged.

Environmental monitoring related to surface water at the CRRRC will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to surface water, sediment and biology.

7.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

Steve Auger, M.Sc., P.Eng., C.P.E.S.C.
Water Resources Engineer, Technical Advisor

Douglas V. Kerr, P.Eng.
Civil Engineer, Associate

DLKH/DVK/PAS/sg

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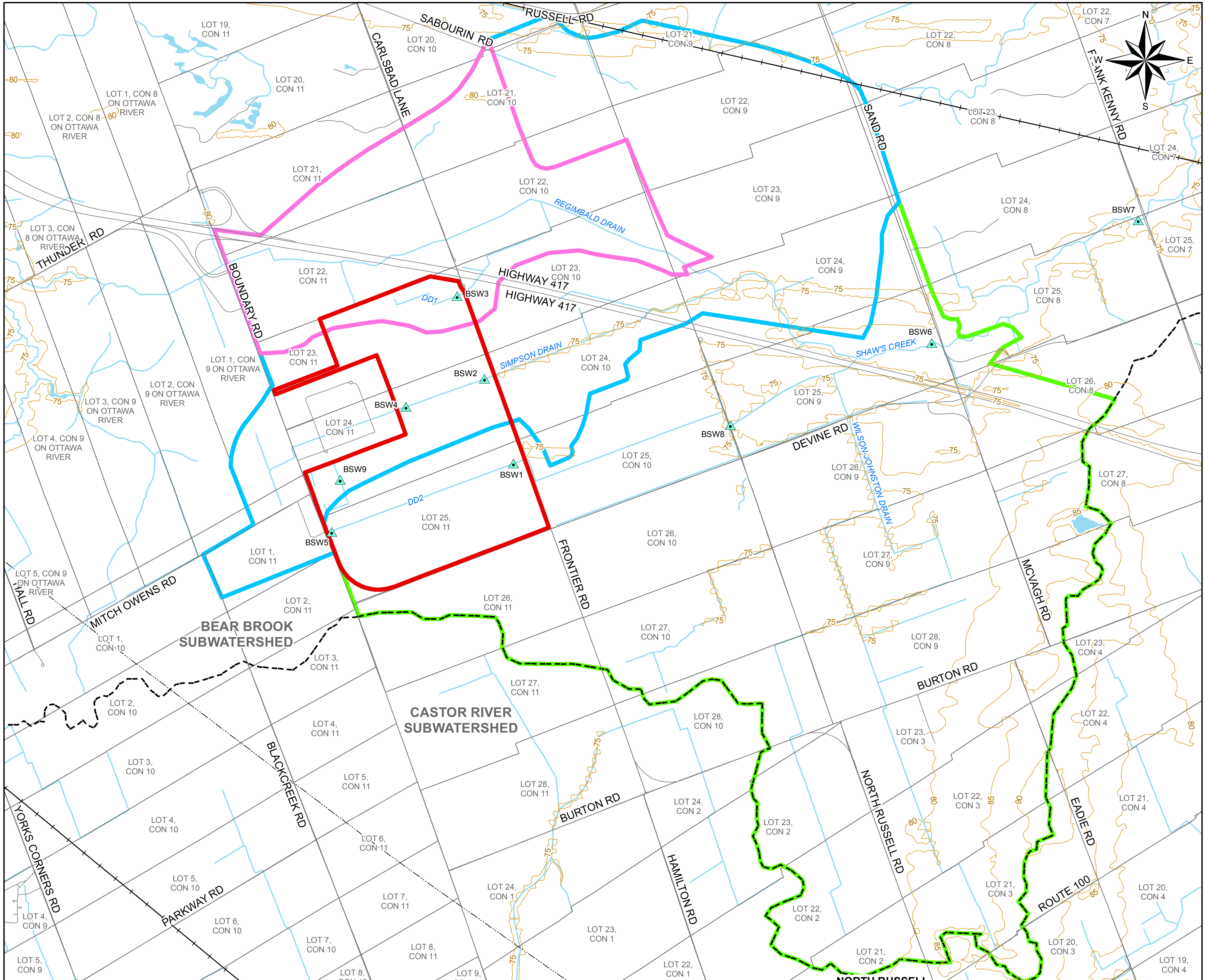

LEGEND

- POPULATED PLACENAME
- SURFACE WATER SAMPLING STATION
- ROAD
- RAIL ROAD
- CONTOUR LINE, (5m)
- UTILITY LINE
- REGIMBALD MUNICIPAL DRAIN BOUNDARY
- SIMPSON MUNICIPAL DRAIN BOUNDARY
- WILSON-JOHNSTON MUNICIPAL DRAIN BOUNDARY
- SURFACE WATER FEATURE
- WATER AREA
- SUBWATERSHED DIVIDE
- LOT/CONCESSION
- PROPERTY BOUNDARY

500 250 0 500

SCALE 1:25,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

SURFACE WATER SAMPLING STATIONS AND SURFACE WATER FEATURES

Golder Associates

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0
DESIGN	JPAO	NOV. 2013		
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

FIGURE 1

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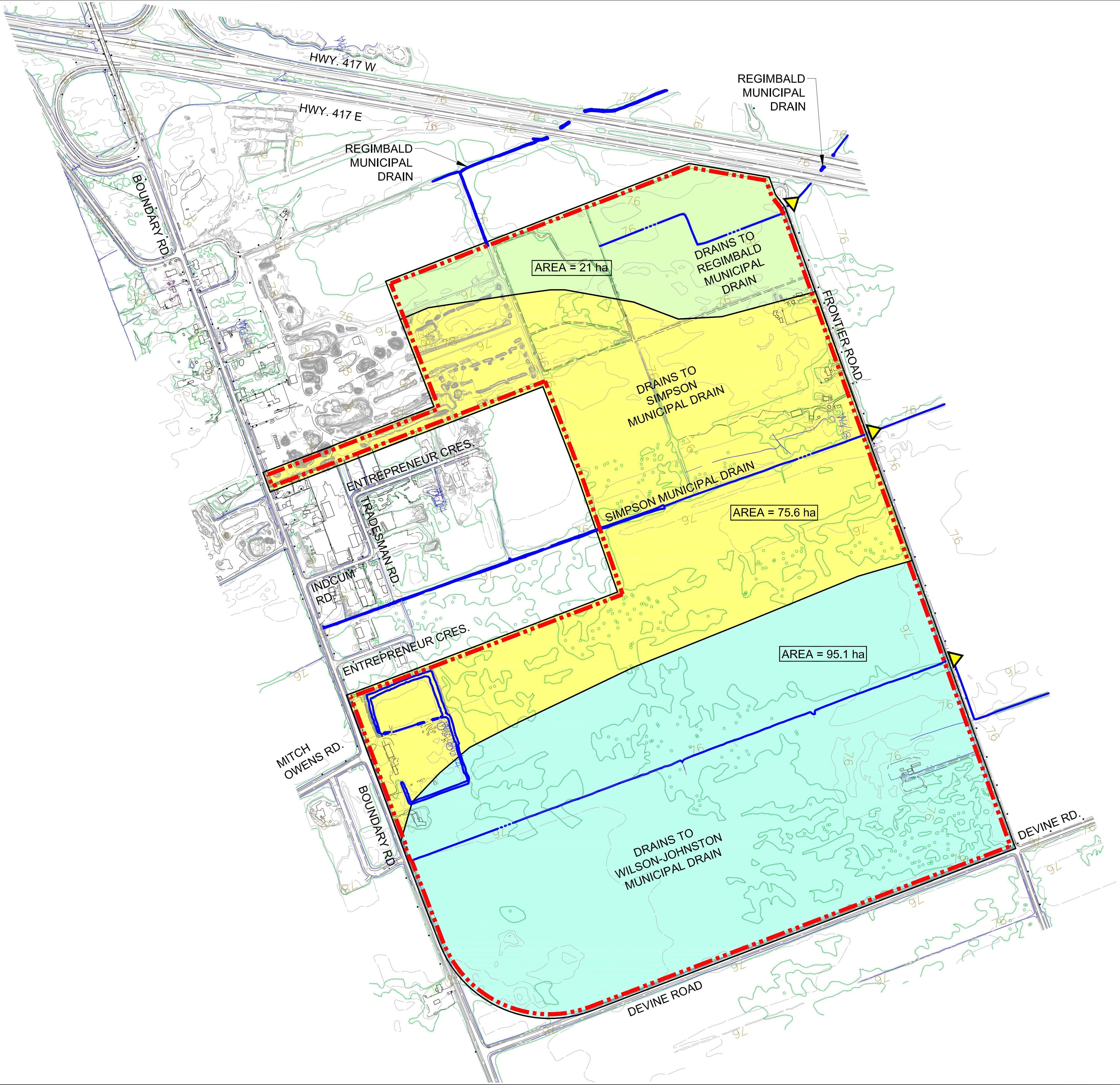

LEGEND:

PROPERTY BOUNDARY

SURFACE WATER

OUTLET

DRAINAGE AREA BOUNDARY

NOTE

1. THIS FIGURE SHOULD BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCES:

1. BASE DRAWING PROVIDED IN A DIGITAL FORMAT BY BASE MAPPING CO. LTD., CONTRACT No. 2517-12, PHOTO DATE: NOVEMBER 7, 2012, DATE RECEIVED: JANUARY 9, 2013.
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3. MUNICIPAL DRAIN BOUNDARIES FROM TOWNSHIP OF CUMBERLAND MUNICIPAL DRAIN & MUTUAL AGREEMENT PREPARED BY STANTEC, REVISED MARCH 2000.

200 0 200 400

SCALE 1:10,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

PRE-DEVELOPMENT DRAINAGE AREAS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	D.H.	Nov. 2013
CAD	M.L.F.	Nov. 2013
CHECK	D.V.K.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No.1211250045-V4-Storm-Fig 2.dwg

SCALE AS SHOWN REV. 0

FIGURE No. 2

PLOT DATE: September 5, 2014
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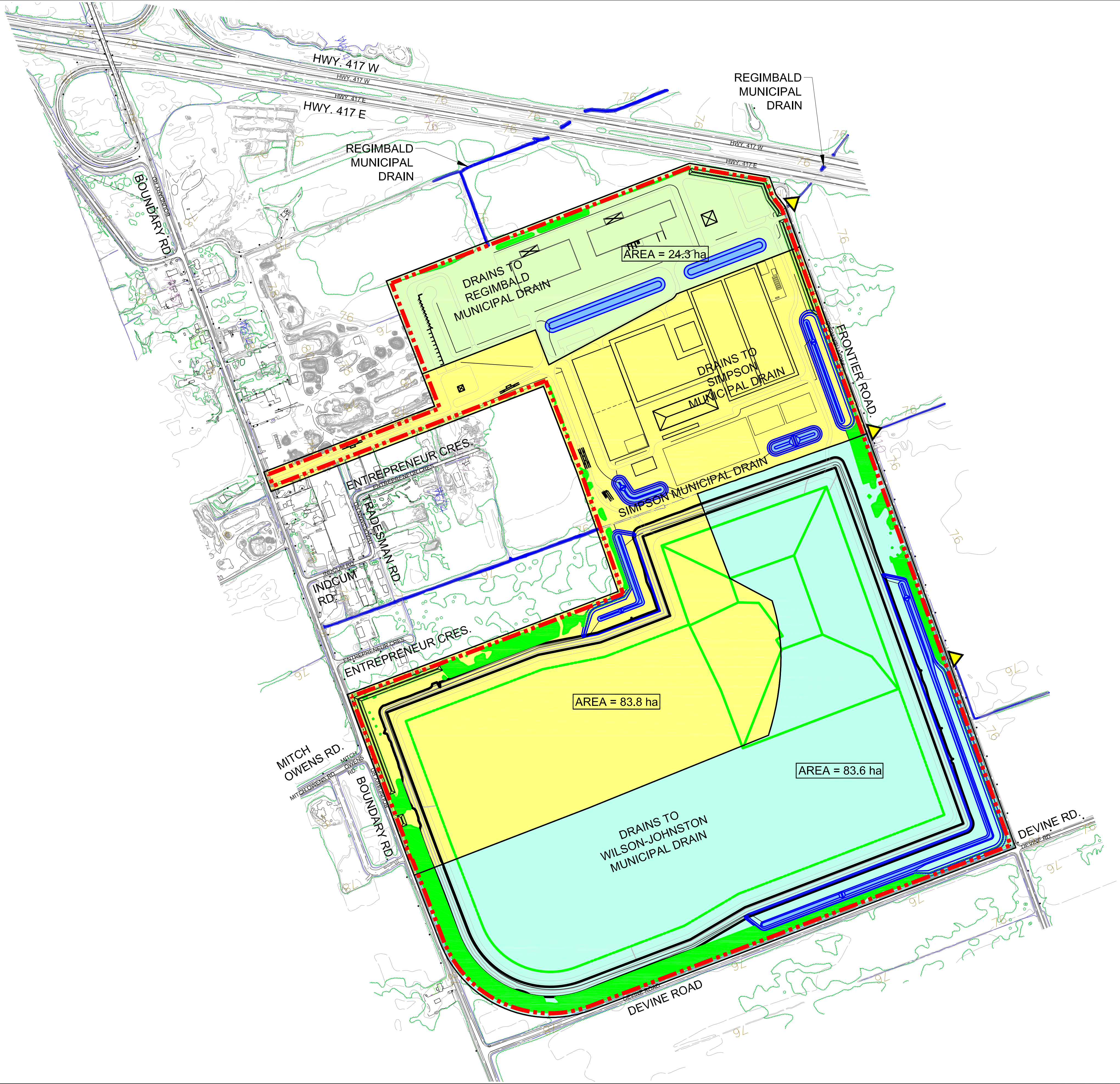

LEGEND:

- PROPERTY BOUNDARY
- SURFACE WATER
- OUTLET
- DRAINAGE AREA BOUNDARY

NOTE

1. THIS FIGURE SHOULD BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCES:

1. BASE DRAWING PROVIDED IN A DIGITAL FORMAT BY BASE MAPPING CO. LTD., CONTRACT No. 2517-12, PHOTO DATE: NOVEMBER 7, 2012, DATE RECEIVED: JANUARY 9, 2013.
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

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SCALE 1:10,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

POST-DEVELOPMENT DRAINAGE AREAS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	D.H.	22 Nov. 2013
CAD	M.L.F.	23 Nov. 2013
CHECK	D.V.K.	Aug, 2014
REVIEW	P.A.S.	Aug. 2014

FILE No.1211250045-V4-Storm-Fig 3.dwg

SCALE AS SHOWN REV. 0

FIGURE No.

3

PLOT DATE: October 9, 2014
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PLOT DATE: October 9, 2014
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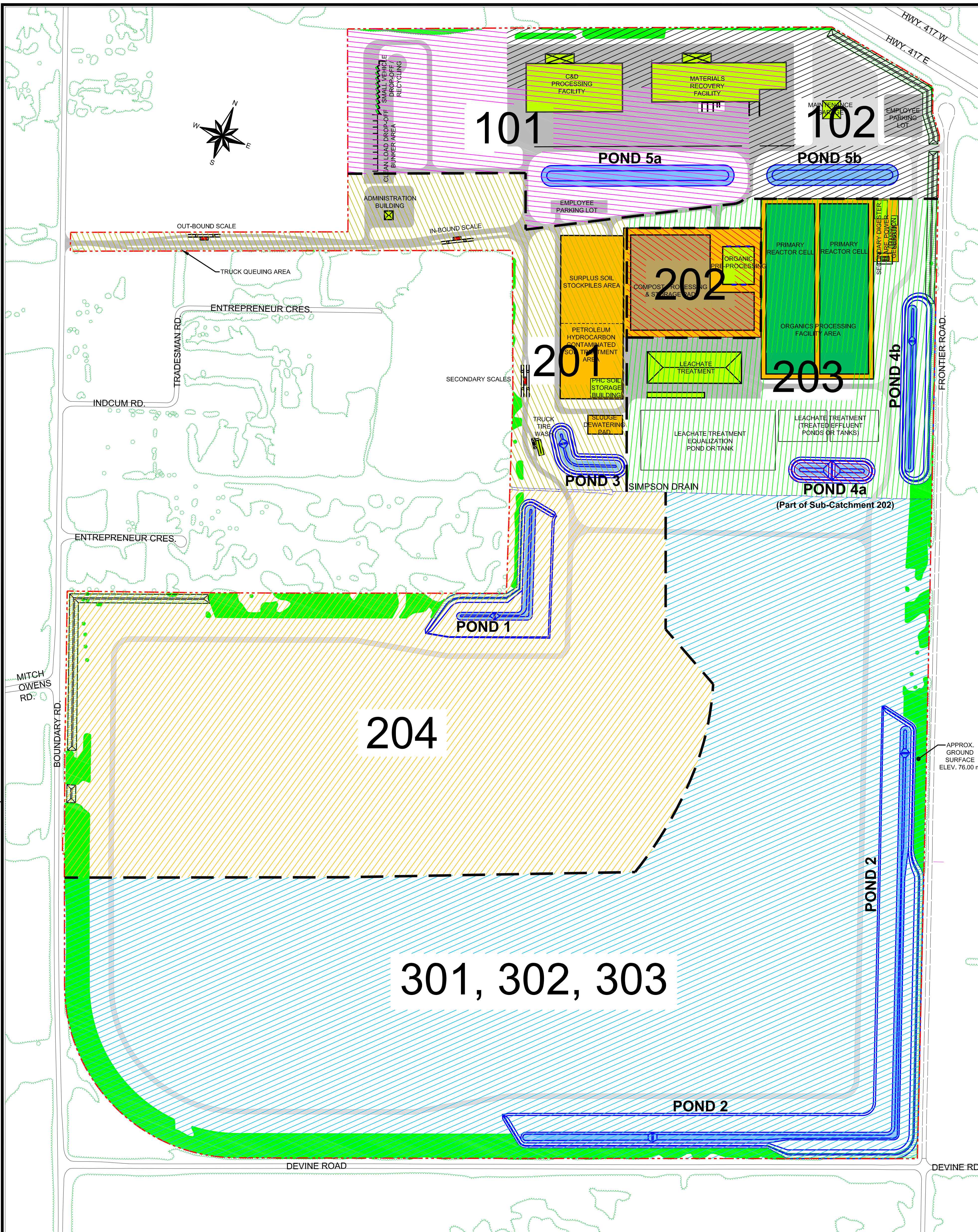

LEGEND

- FACILITY BUILDINGS
- OUTDOOR DIVERSION AREA
- PAVED ROAD (ASPHALT)
- GRAVEL ROAD
- PROPERTY BOUNDARY
- EXISTING VEGETATION SCREENING
- CONSTRUCTED SCREENING FEATURE
- PERIMETER BERM CONTOURS (interval 1 m)
- STORMWATER MANAGEMENT PONDS
- 203 SUB-CATCHMENT AREA NUMBER

120 0 120 240
SCALE 1:6,000 METRES

Golder Associates
Ottawa, Ontario, Canada

SCALE	AS SHOWN	TITLE: SUB-CATCHMENT PLAN
DATE	Nov. 2013	
DESIGN	M.L.F.	
CAD	M.L.F.	
FILE No. 1211250045-V4-Storm-Fig 4.dwg	CHECK D.V.K.	CAPITAL REGION RESOURCE RECOVERY CENTRE
PROJECT No. 12-1125-0045 REV.	REVIEW P.A.S.	FIGURE 4

ATTACHMENT A.1

SWM Model Development

A.1 Hydrologic Model Input Summary Tables

Hydrological Parameter Selection

The existing Site conditions were determined to have five significant land use types: Scrubland; Woods; Pavement; Gravel; and Grasslands. The Manning's n coefficient, depression storage depth and SCS Curve Number values assigned for each of these land use types are summarized in Table A.1.2.

In addition to the five significant land use types identified for the pre-development scenario, Vegetated Slope, and Gravel land use types have also been incorporated into the post-development hydrologic parameter selection for the Site sub-catchment Municipal Drain areas and recommended stormwater conveyance channels, respectively, in SWMM5. Table A.1.3 identifies post-development input parameters identified for each land use type.

Tables A1.2 to A.1.5 summarize the pre-development and post development hydrological input parameters for representing the Site conditions. Subsurface investigations performed by Golder were also utilized to identify the general silty sand soil type for the Site. The Site visit, aerial photography and GIS topography were also utilized to define the hydrological parameters such as the curve number, depression storage, Manning's n coefficient and the land use. These parameters were defined based on published literature values and Site investigations.

Hydrologic Model Input Summary Tables

Table A.1. 1: 24-Hour Rainfall at City of Ottawa, CDA RCS Weather Station

Return Period (yrs)	Rainfall Depth (mm)
2	33.0
5	72.1
25	103.9
100	115.8

Note: The total depths were distributed over a 24-hour time period using 15-minute intensity intervals and a SCS Type II rainfall distribution.

Table A.1. 2: Pre-Development Land Use Hydrologic Input Parameters

	Scrubland	Woods	Paved Road	Gravel	Grassland
Manning's n	0.15	0.4	0.012	0.024	0.035
Depression Storage (mm)	5	8	2	2	4
SCS Curve Number	77	70	98	89	71

Table A.1. 3: Post-Development Land Use Hydrologic Input Parameters

	Scrubland	Woods	Paved Road	Gravel	Grassland	Landfill Slope
Manning's n	0.15	0.4	0.012	0.024	0.035	0.013
Depression Storage (mm)	5	8	2	2	4	5
Curve Number	77	70	98	89	71	82

Table A.1. 4: Pre-Development Sub-Catchment Hydrologic Input Parameters

Sub Catchment	Area (ha)	Width (m)	Slope (%)	Impervious (%)	N Pervious	Dep. Stor. Pervious (mm)	Curve Number
E101	21.0	200	0.1	10	0.133	4	86.8
E201	42.3	330	0.125	7.5	0.165	4	85.1
E202	33.3	150	0.343	0	0.213	6	76.7
E301	95.1	250	0.167	7.5	0.184	5	80.6

Table A.1. 5: Post-Development Sub-Catchment Hydrologic Input Parameters

Sub Catchment	Area (ha)	Width (m)	Slope (%)	Impervious (%)	N Pervious	Dep. Stor. Pervious (mm)	Curve Number
P101	14.74	125	0.05	70	0.012	5	88.9
P102	9.51	125	0.076	70	0.012	5	88.9
P201	12.6	250	0.4	75	0.012	4	91.9
P202	4.2	100	0.5	90	0.012	4	95.3
P203 [1.]	16.34	250	0.4	75	0.012	4	91.9
P204	48.2	640	4.3	0	0.012	5	72.6
P301	41.8	670	4.2	0	0.012	5	72.6
P302	27.9	430	4.2	0	0.012	5	72.6
P303	13.94	300	5.4	0	0.012	5	72.6

Note: Leachate Treatment Ponds (1.9 ha Equalization Pond and 0.66 ha Effluent Pond) are not included in the P203 Drainage Area.

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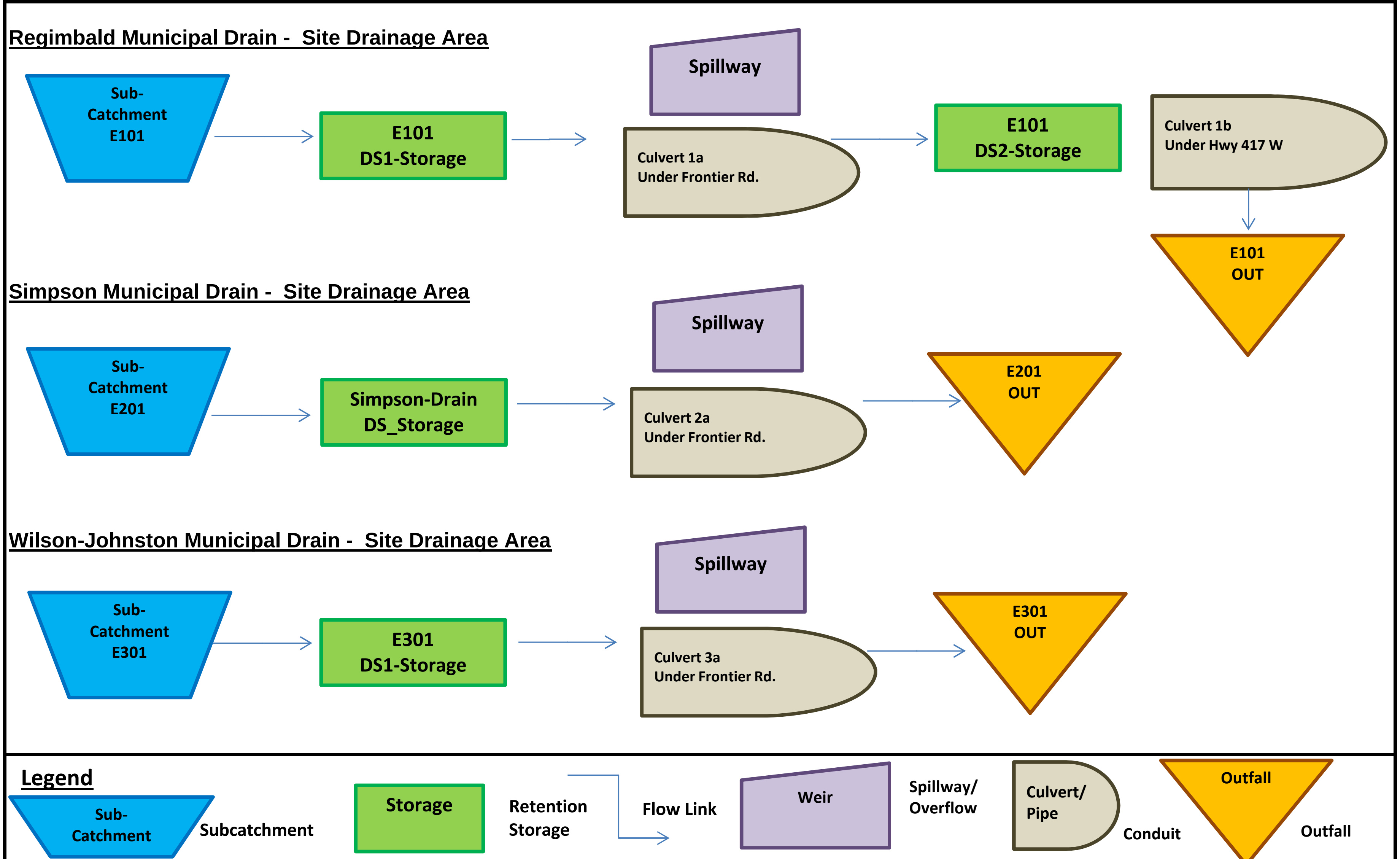
ATTACHMENT A.2

Existing and Proposed SWMM5 Schematics

Figures:

Figure A-1: Existing Scenario SWMM5 Schematic



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DATE: December 2013

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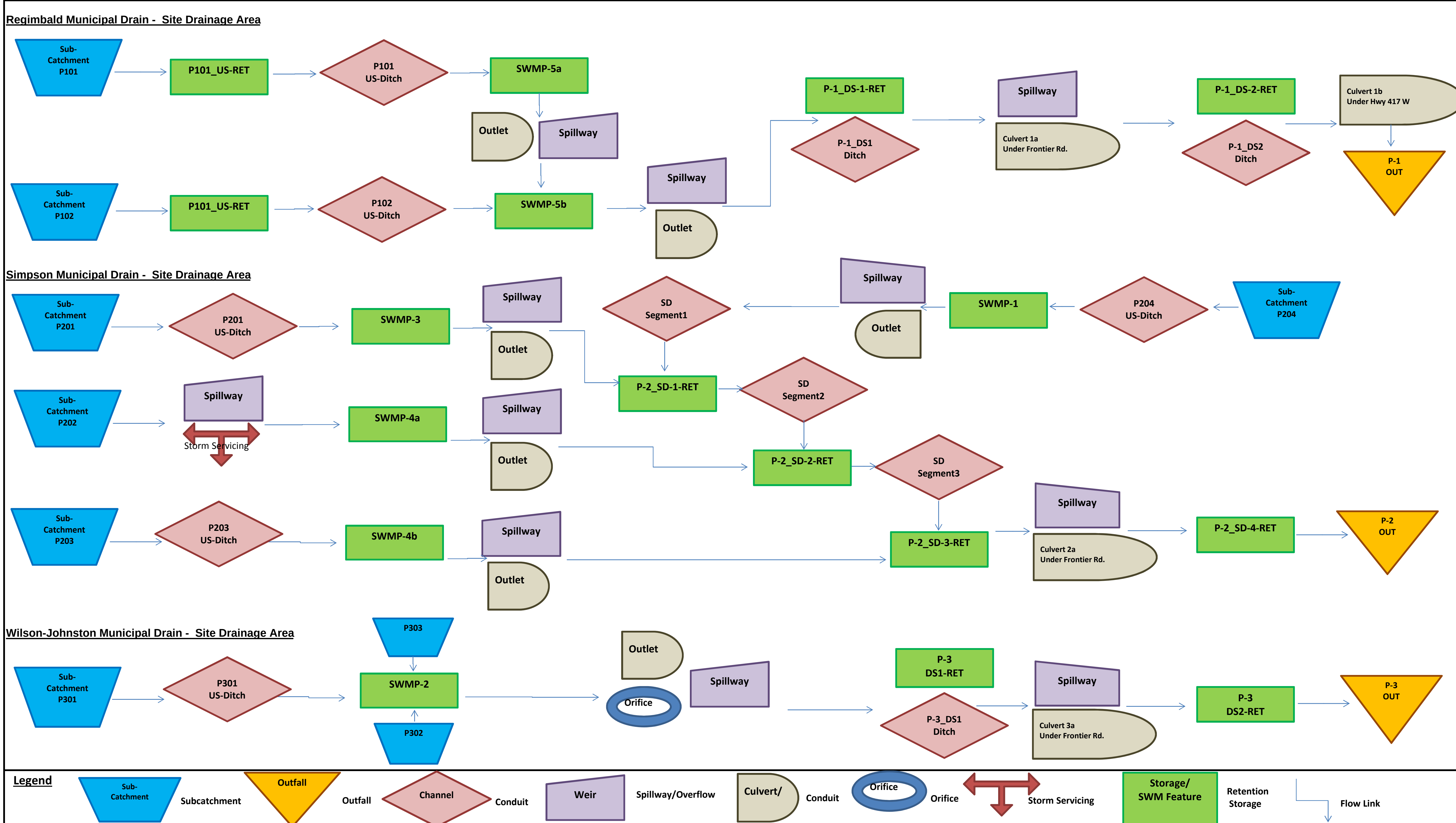
CHECK: DVK

Figure A-2: Proposed Scenario SWMM5 Schematic



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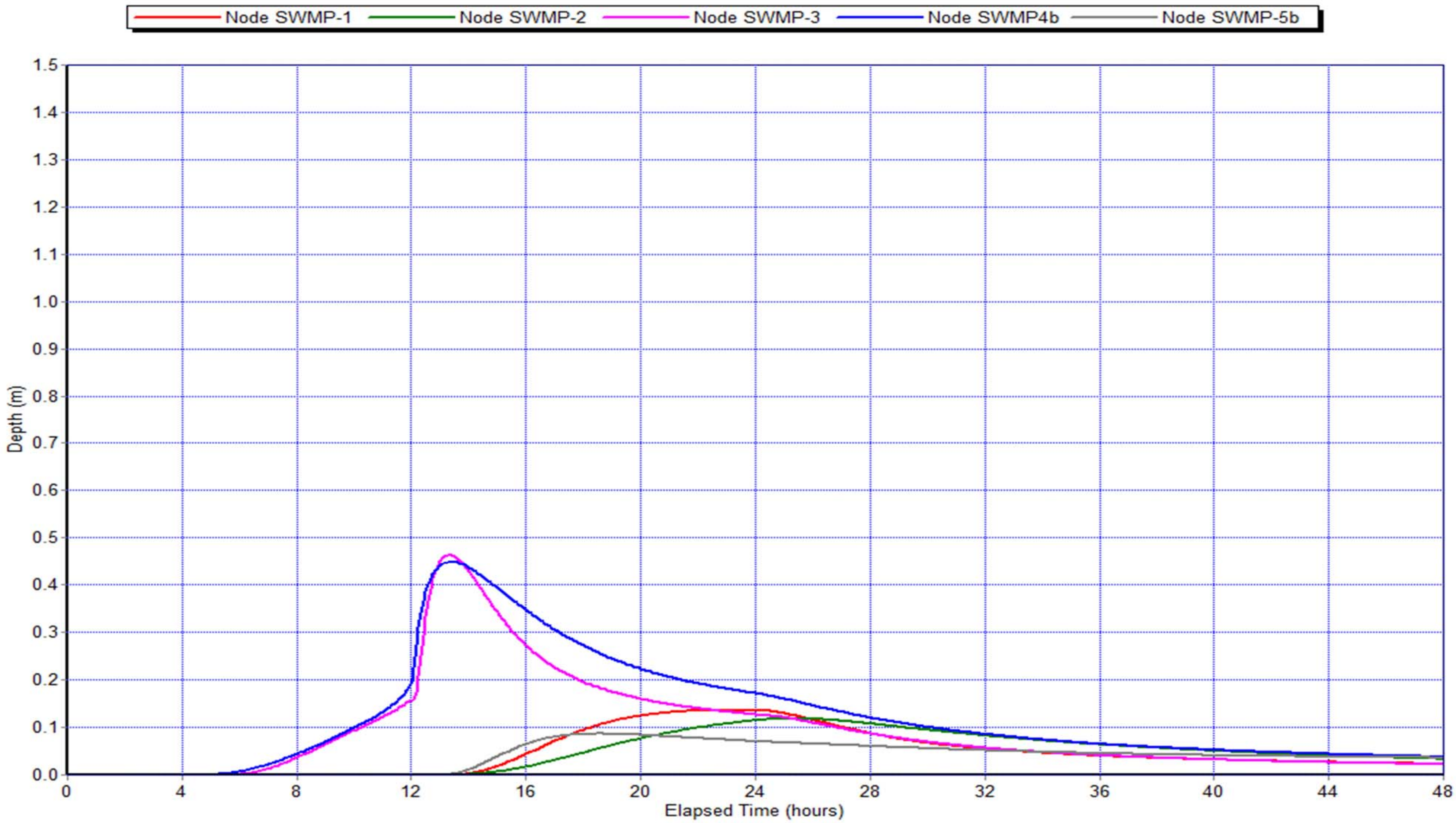
ATTACHMENT A.3

Proposed CRRRC SWMPs Hydrographs

Figures:

1 in 2 yr, City of Ottawa Design Storm Hydrographs for CRRRC SWMPs	Figure A-3



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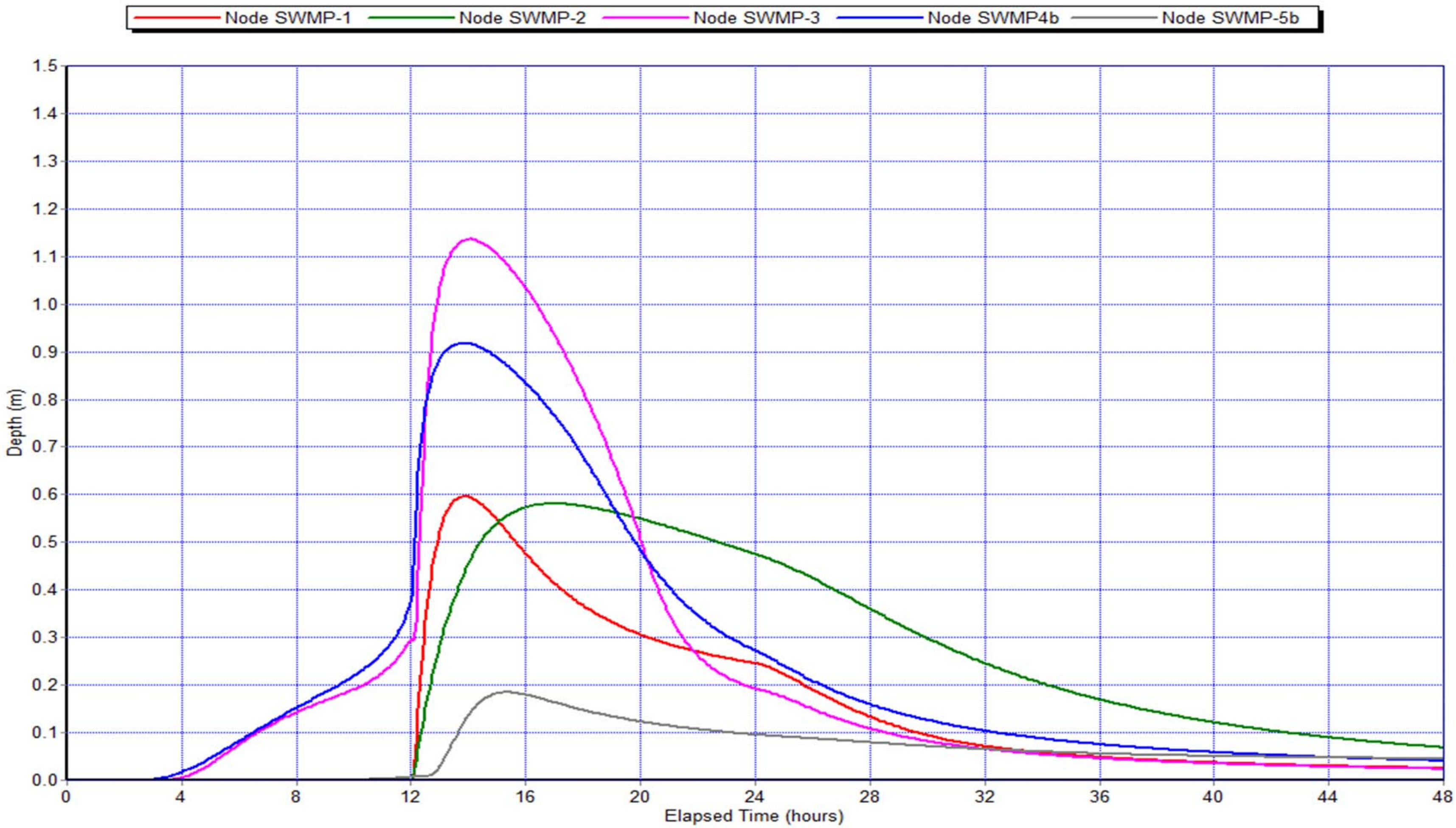
1 in 5 yr, City of Ottawa Design Storm Hydrographs for CRRRC SWMPs | **Figure A-4**



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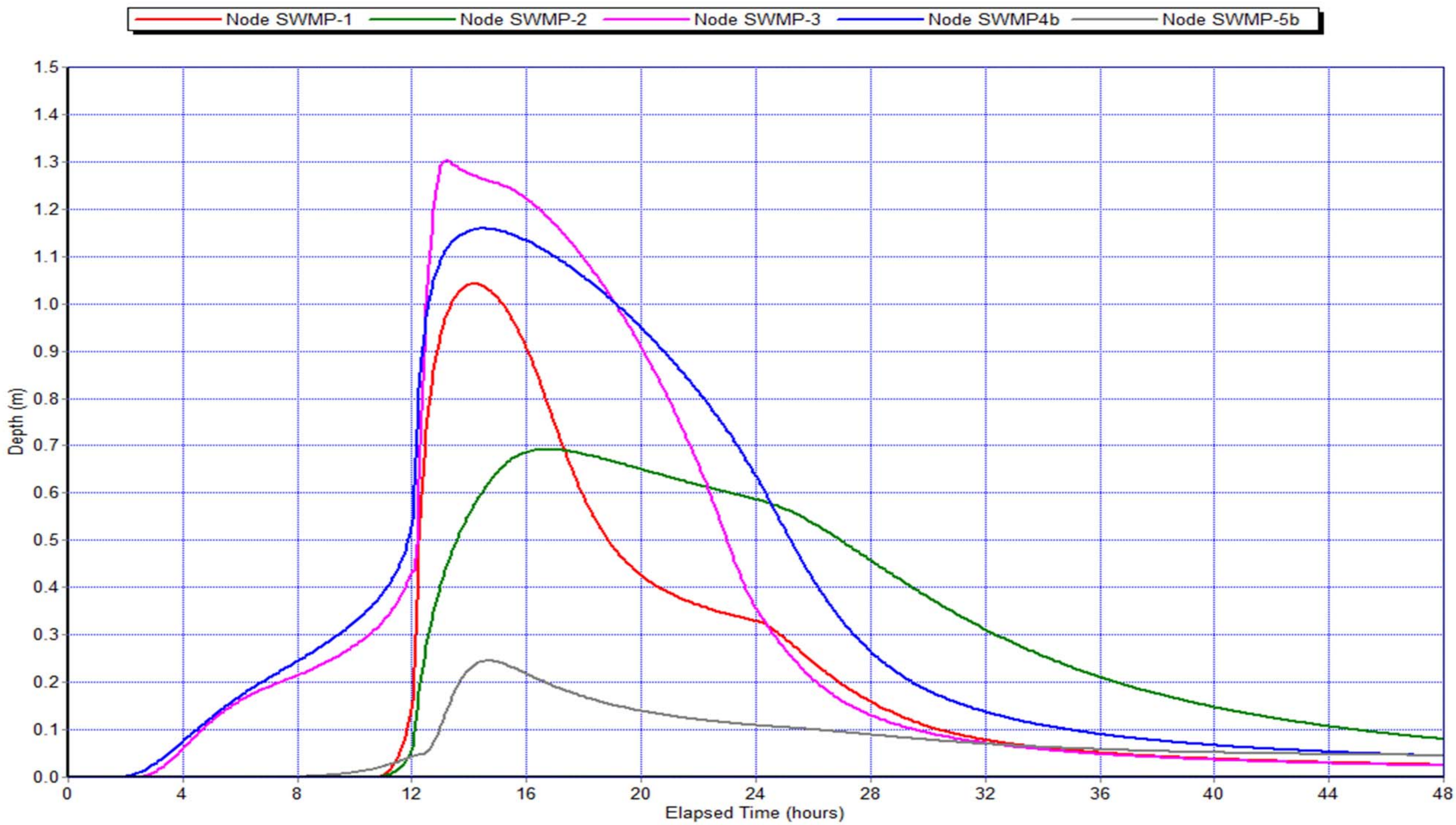
1 in 25 yr, City of Ottawa Design Storm Hydrographs for CRRRC SWMPs	Figure A-5



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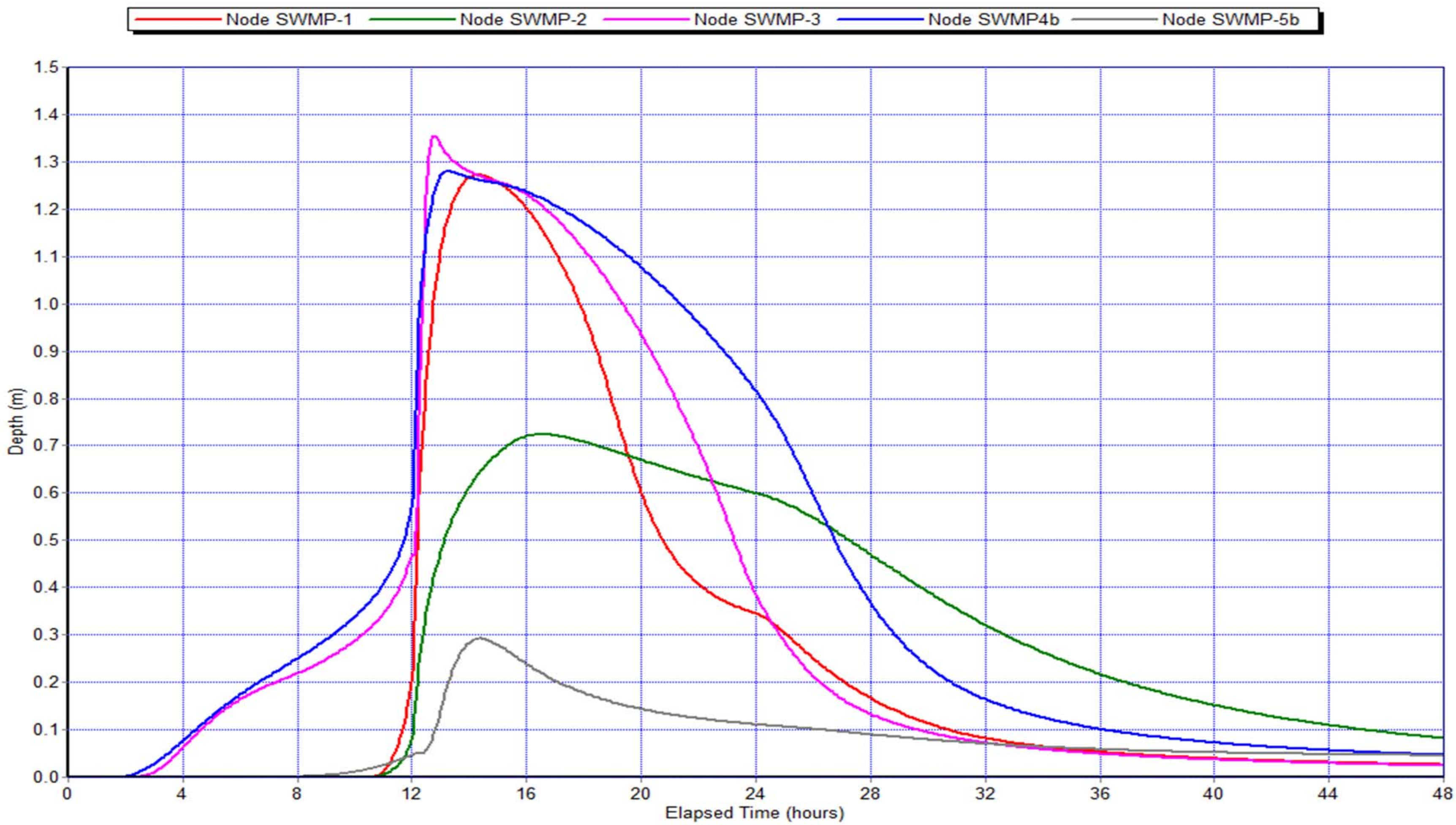
1 in 100 yr, City of Ottawa Design Storm Hydrographs for CRRRC SWMPs	Figure A-6



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DATE: December 2013

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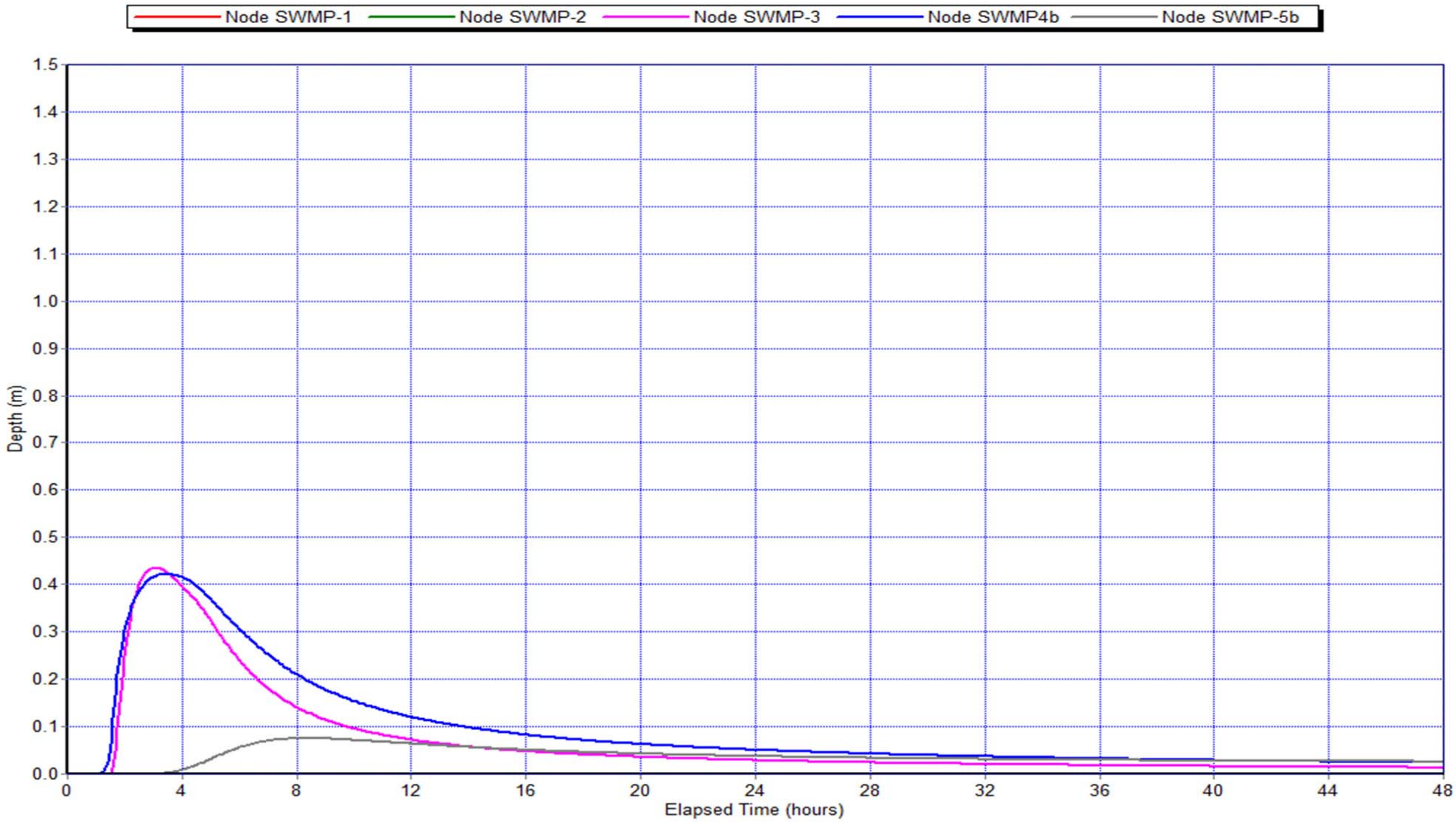
ATTACHMENT A.4

24 hr Detention Time Assessment / Verification Hydrographs

Figure:

Figure A-7 – 25mm – 4 hr, City of Ottawa Design Storm Hydrographs for CRRRC SWMPs

25 mm - 4 hr, City of Ottawa Design Storm Hydrographs for CRRRC SWMPs	Figure A-7



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DATE: December 2013

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ATTACHMENT B

Surface Water Quality Monitoring Results

Comprehensive Landfill Standards (Schedule 5)
Surface Water Sampling Parameters

- Alkalinity
- Biochemical Oxygen Demand (BOD)
- Chloride
- Chemical Oxygen Demand (COD)
- Conductivity
- Mercury
- Total Metals Analysis
- Total Ammonia – N
- Nitrate (NO_3) and Nitrite (NO_2)
- pH
- Phenols (4AAP)
- Sulphates
- Total Dissolved Solids (TDS)
- Total Kjeldahl Nitrogen (TKN)
- Total Phosphorus (TP)
- Low Level Total Suspended Solids (TSS)

CRRRC Site
Flow Measurements

	BSW-1					BSW-2					BSW-3				
	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes
December 5, 2012	-	0.3	2	no flow		3	0.1	1.75	0.06		low flow	0.1	0.5	flow present, but not measurable	could not measure flow due to obstruction from vegetation
May 9, 2013	-	0.11	1.04	no flow		low flow	0.18	1.64	flow present, but not measurable		no flow				

	BSW-4					BSW-5					BSW-6				
	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes
December 5, 2012	frozen	N/A	3	N/A		Dry					7	0.4	3	0.17	
May 9, 2013	low flow	0.14	0.98	flow present, but not measurable		no flow	0.11	2.23	no flow		5	0.25	3.3	0.17	

	BSW-7					BSW-8				
	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes	Flow (s/m)	Depth (m)	Width (m)	Flow(m^3/s)	Notes
December 5, 2012	8	0.4	4	0.20		monitoring location not yet established				
May 9, 2013	3	0.29	1.88	0.18		9	too deep to measure	-	-	

Parameter	Unit	PWQO [2] [1]	BSW1 05-Dec-2012 BSW1	BSW1 09-May-2013 W-5	BSW1 24-Jul-2013 W-5	BSW1 15-Oct-2013 [4] W-4	BSW1 29-Nov-2013 S-3	BSW2 05-Dec-2012 BSW2	BSW2 09-May-2013 W-3	BSW2 24-Jul-2013 W-4	BSW2 15-Oct-2013 W-1	BSW2 29-Nov-2013 S-2
General Chemistry												
Alkalinity (Total as CaCO3)	ug/l	-- [3]	120000	70000	54000	65000	83000	250000	230000	180000	180000	70000
Ammonia Nitrogen	ug/l	--	240	310	110	54	54	54	69	73	<50	55
Biologic Oxygen Demand, Five Day	ug/l	--	4000	4000	<2000	6000	<2000	5000	3000	<2000	<2000	<2000
Chemical Oxygen Demand	ug/l	--	45000	170000	90000	150000	150000	31000	60000	43000	51000	160000
Chloride, dissolved	ug/l	--	47000	48000 [5]	34000 [5]	39000	34000	250000	130000	96000	110000	26000
Conductivity	uS/cm	--	430	310	250	270	300	1800	1100	770	910	240
Conductivity (Field)	uS/cm	--	485	666	445	520	395	1696	1010	1005	980	1005
Dissolved Oxygen (Field)	ug/l	-- [6]	**2300**	**4770**	**3680**	**4110**	**3010**	8810	**5210**	5080	**5400**	**3220**
Nitrate as N	ug/l	--	1200	<100	<500	<1000	<100	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	58	<10	<50	<100	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	1100	3100	1500	3400	2500	1200	970	980	1000	2600
pH	-	8.5	7.06	7.36	7.33	7.26	7.08	7.76	8.07	8.21	7.95	6.98
pH (Field)	-	8.5	7.32	7.8	7.6	7.7	7.5	6.86	7.7	7.5	7.4	7.7
Phosphorus	ug/l	30 [7]	61	130	89	90	48	37	69	38	29	54
Sulfate, dissolved	ug/l	--	17000	<5000 [5]	<5000 [5]	<5000 [5]	<5000 [8]	200000	85000	68000	99000	<5000 [8]
Temperature (Field)	deg c	-- [9]	1.2	19	22	5	0	0	16	24	6	1
Total Dissolved Solids	ug/l	--	246000	170000	236000	260000	256000	966000	616000	448000	538000	224000
Total Suspended Solids	ug/l	--	1000	6000	4000	5000	2000	7000	7000	2000	2000	1000
Metals												
Arsenic	ug/l	5	<1.0	1.2	<1.0	<1	<1	<1.0	<1.0	<1.0	<1	<1
Barium	ug/l	--	18	20	18	20	18	68	47	24	46	18
Boron	ug/l	200 [10]	17	11	17	13	<10	63	32	34	33	<10
Cadmium	ug/l	0.5 [10]	<0.10	<0.10	<0.10	<0.1	0.1	<0.10	<0.10	<0.10	0.1	0.2
Chromium	ug/l	- [11]	<5.0	<5.0	<5.0	<5	<5	<5.0	<5.0	<5.0	<5	<5
Copper	ug/l	5	2.5	2	1.7	1	2	3.1	2.5	1.7	<1	3
Iron	ug/l	300	790	2400	2200	2600	1100	680	830	110	210	1000
Lead	ug/l	25 [12]	<0.50	0.79	<0.50	0.8	1.2	0.63	<0.50	<0.50	<0.5	1.4
Mercury, dissolved	ug/l	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	ug/l	30	16	11	<5.0	7	17	11	5	<5.0	6	19
Phenols												
Phenolics, Total Recoverable	ug/l	1 [13]	<1.0	<1.0	<1.0	27	3.8	<1.0	<1.0	<1.0	5.9	3.1

Parameter	Unit	PWQO (2) (1)	BSW3 05-Dec-2012 BSW3	BSW3 09-May-2013 W-2	BSW3 24-Jul-2013 W-2	BSW3 15-Oct-2013 W-3	BSW3 29-Nov-2013 S-1	BSW4 05-Dec-2012 BSW4	BSW4 09-May-2013 W-4	BSW4 24-Jul-2013 W-9	BSW4 15-Oct-2013 W-5	BSW4 29-Nov-2013 S-7
General Chemistry												
Alkalinity (Total as CaCO3)	ug/l	-- (3)	83000	130000	230000	92000	150000	200000	240000	170000	180000	240000
Ammonia Nitrogen	ug/l	--	<50	69	83	<50	56	50	52	85	<50	150
Biologic Oxygen Demand, Five Day	ug/l	--	4000	3000	2000	4000	<2000	3000	3000	<2000	2000	<2000
Chemical Oxygen Demand	ug/l	--	70000	99000	44000	81000	90000	18000	58000	43000	45000	44000
Chloride, dissolved	ug/l	--	270000	210000	440000	140000	84000	210000	140000	95000	110000	110000
Conductivity	uS/cm	--	1300	1100	2000	830	620	1500	1100	770	910	900
Conductivity (Field)	uS/cm	--	1175	1015	1075	985	1495	1420	1070	995	1020	1015
Dissolved Oxygen (Field)	ug/l	-- (6)	9290	5840	**3880**	**4010**	**2040**	**5520**	**5110**	**4440**	**4600**	**2990**
Nitrate as N	ug/l	--	<100	<100	<100	<100	100	220	<100	<100	<100	3200
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	2200	1500	1000	940	2400	770	790	810	930	1400
pH	-	8.5	6.94	7.76	7.98	7.44	7.23	7.66	8.1	8.31	7.99	7.74
pH (Field)	-	8.5	7.04	7.6	7.7	7.5	7.7	6.85	7.6	7.6	7.4	7.6
Phosphorus	ug/l	30 (7)	130	93	61	110	200	26	65	39	28	110
Sulfate, dissolved	ug/l	--	63000	18000	63000	52000	32000	170000	93000	68000	99000	42000
Temperature (Field)	deg c	-- (9)	1.5	17	23	6	1	0.5	17	20	5	0
Total Dissolved Solids	ug/l	--	750000	596000	1070000	524000	376000	796000	646000	462000	532000	492000
Total Suspended Solids	ug/l	--	8000	4000	2000	8000	19000	6000	7000	<1000	3000	61000
Metals												
Arsenic	ug/l	5	<1.0	1.1	<1.0	<1	<1	<1.0	<1.0	<1.0	<1	<1
Barium	ug/l	--	61	68	83	47	53	51	48	22	45	110
Boron	ug/l	200 (10)	<10	15	19	13	15	65	35	32	31	35
Cadmium	ug/l	0.5 (10)	<0.10	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.10	<0.1	<0.1
Chromium	ug/l	- (11)	<5.0	<5.0	<5.0	<5	<5	<5.0	<5.0	<5.0	<5	6
Copper	ug/l	5	6.9	2.4	2.2	2	2	3.4	2.7	1.4	1	4
Iron	ug/l	300	310	610	450	540	1300	640	840	<100	210	2900
Lead	ug/l	25 (12)	<0.50	<0.50	<0.50	<0.5	<0.5	0.61	<0.50	<0.50	<0.5	1.3
Mercury, dissolved	ug/l	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	ug/l	30	13	26	<5.0	27	23	17	9.5	<5.0	8	20
Phenols												
Phenolics, Total Recoverable	ug/l	1 (13)	<1.0	<1.0	<1.0	28	3.6	<1.0	<1.0	<1.0	8	<1.0

Parameter	Unit	PWQO [2] [1]	BSW5 05-Dec-2012 [14] 5	BSW5 09-May-2013 W-1	BSW5 24-Jul-2013 W-1	BSW5 15-Oct-2013 [4] W-9	BSW5 29-Nov-2013 S-8	BSW6 05-Dec-2012 BSW6	BSW6 09-May-2013 W-7	BSW6 24-Jul-2013 W-7	BSW6 15-Oct-2013 W-7	BSW6 29-Nov-2013 S-5
General Chemistry												
Alkalinity (Total as CaCO3)	ug/l	-- [3]	--	180000	140000	150000	350000	230000	180000	250000	220000	280000
Ammonia Nitrogen	ug/l	--	--	<50	100	<50	<50	<50	72	110	<50	<50
Biologic Oxygen Demand, Five Day	ug/l	--	--	2000	<2000	38000	<2000	3000	<2000	<2000	<2000	<2000
Chemical Oxygen Demand	ug/l	--	--	75000	47000	150000	42000	14000	38000	17000	41000	8100
Chloride, dissolved	ug/l	--	--	440000	170000	87000	430000	160000	68000	90000	90000	57000
Conductivity	uS/cm	--	--	1900	1000	630	2200	1200	650	850	800	830
Conductivity (Field)	uS/cm	--	--	1800	720	810	870	1190	596	970	995	825
Dissolved Oxygen (Field)	ug/l	-- [6]	--	6290	**3110**	**3490**	**2740**	8540	11020	5910	**6200**	**5600**
Nitrate as N	ug/l	--	--	<100	<100	<1000	<100	3500	3500	3500	2700	8400
Nitrite as N	ug/l	--	--	<10	<10	<100	<10	<10	39	58	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	--	1400	1000	2200	1100	790	900	1100	160	610
pH	-	8.5	--	7.9	7.74	7.65	7.56	7.97	8.24	8.09	8.15	7.89
pH (Field)	-	8.5	--	7.5	7.8	7.7	7.6	7.17	8.1	7.8	7.6	7.8
Phosphorus	ug/l	30 [7]	--	71	45	140	38	42	38	52	24	29
Sulfate, dissolved	ug/l	--	--	42000	55000	11000	110000	75000	26000	36000	35000	34000
Temperature (Field)	deg c	-- [9]	--	18	22	7	0	0.3	19	20	6	1
Total Dissolved Solids	ug/l	--	--	1070000	558000	420000	1210000	670000	316000	502000	462000	460000
Total Suspended Solids	ug/l	--	--	3000	8000	5000	9000	4000	3000	7000	5000	24000
Metals												
Arsenic	ug/l	5	--	<1.0	<1.0	<1	<1	<1.0	<1.0	<1.0	<1	<1
Barium	ug/l	--	--	62	39	37	65	100	120	120	79	210
Boron	ug/l	200 [10]	--	13	19	22	<10	54	36	59	46	68
Cadmium	ug/l	0.5 [10]	--	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.10	<0.1	<0.1
Chromium	ug/l	- [11]	--	<5.0	<5.0	<5	<5	<5.0	<5.0	<5.0	<5	<5
Copper	ug/l	5	--	1.3	2.1	1	1	4.5	1.8	2	2	3
Iron	ug/l	300	--	1100	910	3100	1600	740	840	240	1700	610
Lead	ug/l	25 [12]	--	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5
Mercury, dissolved	ug/l	0.2	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	ug/l	30	--	5.4	<5.0	6	9	<5.0	<5.0	<5.0	6	7
Phenols												
Phenolics, Total Recoverable	ug/l	1 [13]	--	<1.0	<1.0	55	2.1	<1.0	<1.0	<1.0	4.9	<1.0

Parameter	Unit	PWQO [2] [1]	BSW7 05-Dec-2012 BSW7	BSW7 09-May-2013 W-8	BSW7 24-Jul-2013 W-8	BSW7 15-Oct-2013 W-8	BSW7 29-Nov-2013 S-6	BSW8 09-May-2013 W-6	BSW8 24-Jul-2013 W-6	BSW8 15-Oct-2013 W-6	BSW8 29-Nov-2013 S-4	BSW9 08-Nov-2013 M-1	BSW9 29-Nov-2013 [16] s9	BSW9 11-Dec-2013 BSW-9
General Chemistry														
Alkalinity (Total as CaCO3)	ug/l	-- [3]	220000	190000	250000	220000	220000	190000	230000	290000	98000	170000	--	220000
Ammonia Nitrogen	ug/l	--	66	<50	110	<50	210	75	160	<50	190	<50	--	<50
Biologic Oxygen Demand, Five Day	ug/l	--	3000	<2000	<2000	<2000	<2000	<2000	2000	<2000	2000	3000	--	2000
Chemical Oxygen Demand	ug/l	--	17000	26000	16000	42000	56000	13000	<4000	6600	120000	45000	--	40000
Chloride, dissolved	ug/l	--	220000	86000	92000	98000	87000	48000	61000	67000	45000	30000	--	37000
Conductivity	uS/cm	--	1400	750	870	810	790	650	740	840	360	490	--	630
Conductivity (Field)	uS/cm	--	1325	700	895	915	860	700	895	1010	920	474	--	479
Dissolved Oxygen (Field)	ug/l	-- [6]	12350	11490	6880	6940	**5840**	9890	5250	**5420**	**4290**	9620	--	-- [15]
Nitrate as N	ug/l	--	3000	3500	2800	1900	2800	6300	6100	4600	<100	<100	--	<100
Nitrite as N	ug/l	--	<10	74	27	<10	26	38	100	<10	<10	<10	--	<10
Nitrogen, Total Kjeldahl	ug/l	--	810	800	970	550	2000	610	860	1100	2200	660	--	1300
pH	-	8.5	7.93	8.14	8.11	8.12	7.69	8.28	8.02	8.12	6.97	7.64	--	7.85
pH (Field)	-	8.5	7.13	7.8	7.9	7.7	7.9	8.2	7.9	7.7	7.9	7.83	--	7.63
Phosphorus	ug/l	30 [7]	42	21	37	47	110	38	69	17	55	17	--	56
Sulfate, dissolved	ug/l	--	83000	32000	39000	39000	37000	26000	28000	32000	<5000 [8]	41000	--	44000
Temperature (Field)	deg c	-- [9]	0.6	18	22	6	1	16	23	7	0	5.6	--	0.1
Total Dissolved Solids	ug/l	--	736000	416000	510000	474000	456000	360000	468000	476000	264000	284000	--	328000
Total Suspended Solids	ug/l	--	12000	3000	3000	3000	51000	4000	6000	2000	3000	3000	--	4000
Metals														
Arsenic	ug/l	5	<1.0	<1.0	<1.0	<1	<1	<1.0	<1.0	<1	<1	<1	--	<1
Barium	ug/l	--	120	110	110	80	93	190	200	180	20	24	--	29
Boron	ug/l	200 [10]	41	42	62	47	32	47	60	86	<10	50	--	52
Cadmium	ug/l	0.5 [10]	<0.10	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1	<0.1	--	<0.1
Chromium	ug/l	- [11]	<5.0	<5.0	<5.0	<5	<5	<5.0	<5.0	<5	<5	<5	--	<5
Copper	ug/l	5	3.4	1.8	2.1	1	3	1.4	1.9	1	2	2	--	3
Iron	ug/l	300	860	310	130	770	2300	160	120	<100	1800	210	--	370
Lead	ug/l	25 [12]	<0.50	<0.50	<0.50	<0.5	1	<0.50	<0.50	<0.5	1	<0.5	--	<0.5
Mercury, dissolved	ug/l	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10
Zinc	ug/l	30	<5.0	<5.0	<5.0	6	16	<5.0	<5.0	<5	18	<5	--	11
Phenols														
Phenolics, Total Recoverable	ug/l	1 [13]	<1.0	<1.0	<1.0	3.2	1	<1.0	<1.0	<1.0	3.2	3.6	--	3.9

Footnotes:
Tables should be read in conjunction with the accompanying document.
< value = Indicates parameter not detected above laboratory method detection limit.
> value = Indicates parameter detected above equipment analytical range.
-- Chemical not analyzed or criteria not defined.
Grey background indicates exceedances.
(1) Provincial Water Quality Objectives
(2) Underlined Font = Parameter concentration greater than PWQO
(3) Alkalinity should not be decreased by more than 25% of the natural concentration.
(4) Nitrite/Nitrate: Due to the colour interferences, sample required dilution. Detection limits were adjusted accordingly.
(5) Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.
(6) Objective depends on water temperature and biota. Dissolved oxygen concentrations should not be less than the values specified in the PWQO document for cold water biota (e.g. salmonid fish communities) and warm water biota (e.g. centrarchid fish communities).
(7) Current scientific evidence is insufficient to develop a firm Objective at this time. Accordingly, the following phosphorus concentrations should be considered as general guidelines which should be supplemented by site-specific studies: To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 20 ug/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 ug/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 30 ug/L.
(8) Detection Limit was raised due to matrix interferences.
(9) (1) General: The natural thermal regime of any body of water shall not be altered so as to impair the quality of the natural environment. In particular, the diversity, distribution and abundance of plant and animal life shall not be significantly changed. (2) Waste Heat Discharge: (a) Ambient Temperature Changes: The temperature at the edge of a mixing zone shall not exceed the natural ambient water temperature at a representative control location by more than 10°C (18°F). However, in special circumstances, local conditions may require a significantly lower temperature difference than 10°C (18°F). Potential dischargers are to apply to the MOEE for guidance as to the allowable temperature rise for each thermal discharge. This ministry will also specify the nature of the mixing zone and the procedure for the establishment of a representative control location for temperature recording on a case-by-case basis. (b) Discharge Temperature Permitted: The maximum temperature of the receiving body of water, at any point in the thermal plume outside a mixing zone, shall not exceed 30°C (86°F) or the temperature of a representative control location plus 10°C (18°F) or the allowed temperature difference, which ever is the lesser temperature. These maximum temperatures are to be measured on a mean daily basis from continuous records. (c) Taking and Discharging of Cooling Water: Users of cooling water shall meet both the Objectives for temperature outlined above and the "Procedures for the Taking and Discharge of Cooling Water" as outlined in the MOEE publication Deriving Receiving-Water Based, Point-Source Effluent Requirements for Ontario Waters(1994).
(10) See Section 1.2.3. of PWQO. This Interim PWQO was set for emergency purposes based on the best information readily available. Employ due caution when applying this value.
(11) PWQO values exist for Cr(III) and Cr(VI).
(12) If Alkalinity as CaCO3 < 20 mg/L, PWQO = 5 µg/L; if alkalinity as CaCO3 from 20 to 40 mg/L, PWQO = 10 µg/L; if alkalinity as CaCO3 from 40 to 80 mg/L, PWQO = 20 µg/L; if alkalinity as CaCO3 > 80 mg/L, PWQO = 25 ug/L.
(13) Determined by the total reactive phenols test - the 4-AAP (4-amino-antipyrine) test. This objective should be used primarily as a screening tool. The isomer specific PWQOs for various phenolics should be employed where possible.
(14) Monitoring location was dry during this sampling event. No sample was collected.
(15) Parameter was not measured.
(16) Monitoring location was not accessible.

ATTACHMENT C

Drawings

GD1 Grading and Drainage Plan North Part of Site

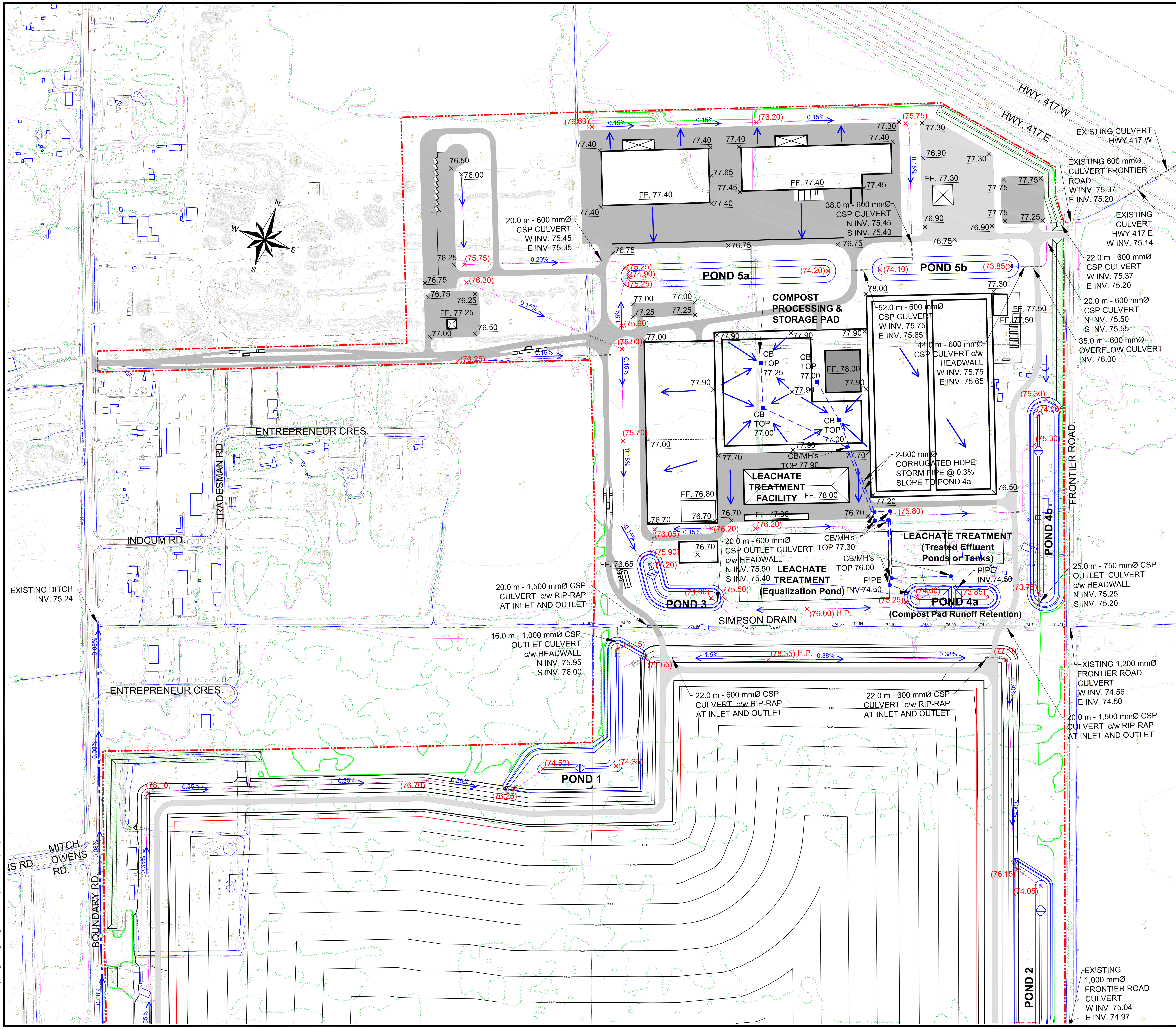
GD2 Grading and Drainage Plan South Part of Site

P1 Plan View of Pond 1 and Details

P2 Plan View of Pond 2 and Details

P3 Plan View of Pond 3, 4a and 4b and Details

P4 Plan View of Storm/Fire Pond 5a and 5b and Details



LEGEND:

- PROPERTY BOUNDARY
- × (74.50) PROPOSED SWALE GRADE
- × 77.00 PROPOSED GRADE
- EXISTING GRADE
- EXISTING CONTOUR (0.25m INTERVAL)
- TERRACING (SLOPE AS INDICATED)
- DRAINAGE DIRECTION
- RIP-RAP 200 mmØ, 300 m THICK (NOMINAL) AS PER OPSD 810.010 TYPE 'B
- DITCH
- CATCH BASIN (OPSD 705.010 c/w 600 mm SUMP)
- MAINTENANCE HOLE (OPSD 707.020)
- 600 mmØ CULVERT OR AS NOTED
- EXISTING CULVERT AS NOTED
- × 74.95 EXISTING SIMPSON DRAIN GRADE (SURVEY BY GOLDER ASSOCIATES LTD JULY 5, 2012)

ALL GRADES ARE METRES ABOVE SEA LEVEL (masl)

GENERAL NOTES:

1. CONTRACTOR TO VERIFY EXISTING UTILITY LOCATIONS PRIOR TO START OF CONSTRUCTION.
2. ALL SERVICES TO BE INSTALLED AS PER OPSS AND OPSD STANDARDS. EMBEDMENT AND BACKFILL SHALL CONFORM TO OPSD 802.010, 802.013, OR 802.014 AS APPLICABLE (FOR FLEXIBLE PIPE) USING GRANULAR 'A' FOR EMBEDMENT MATERIAL.
3. RIP-RAP TO BE INSTALLED AS PER OPSS 511 AND OPSD 810.010 TO A NOMINAL SIZE OF 200 mm, 300 mm THICK UNDERLAID WITH GEOTEXTILE INCLUDING DITCH SIDESLOPES.
4. ALL MANHOLES SHALL BE INSTALLED WITH FROST STRAPPING AS PER OPSD 701.100.
5. ALL SANITARY AND STORM MANHOLES SHALL BE PARGED AND MADE WATER TIGHT WITHIN THE INSIDE WALLS AT THE STRUCTURE USING NON-SHRINK GROUT.
6. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE RECEIVING WATERCOURSE DURING CONSTRUCTION ACTIVITIES. THESE PRACTICES ARE REQUIRED TO ENSURE NO SEDIMENT AND/OR ASSOCIATED POLLUTANTS ARE RELEASED TO THE RECEIVING WATERCOURSE AND INCLUDES INSTALLATION OF SEDIMENT BARRIERS ON ALL CATCH BASIN AND MAINTENANCE HOLES AND A SILT FENCE BARRIER (AS PER OPSD 219.110 AND ASSOCIATED SPECIFICATIONS) ALONG ALL OTHER AREAS THAT SHEET DRAIN OFF SITE. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

NOTE:

TO BE READ IN CONJUNCTION WITH PLAN VIEW OF POND AND DETAILS NO. P1, P2, P3 AND P4.

NOT FOR CONSTRUCTION

50 0 50 100
SCALE 1:2,500 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

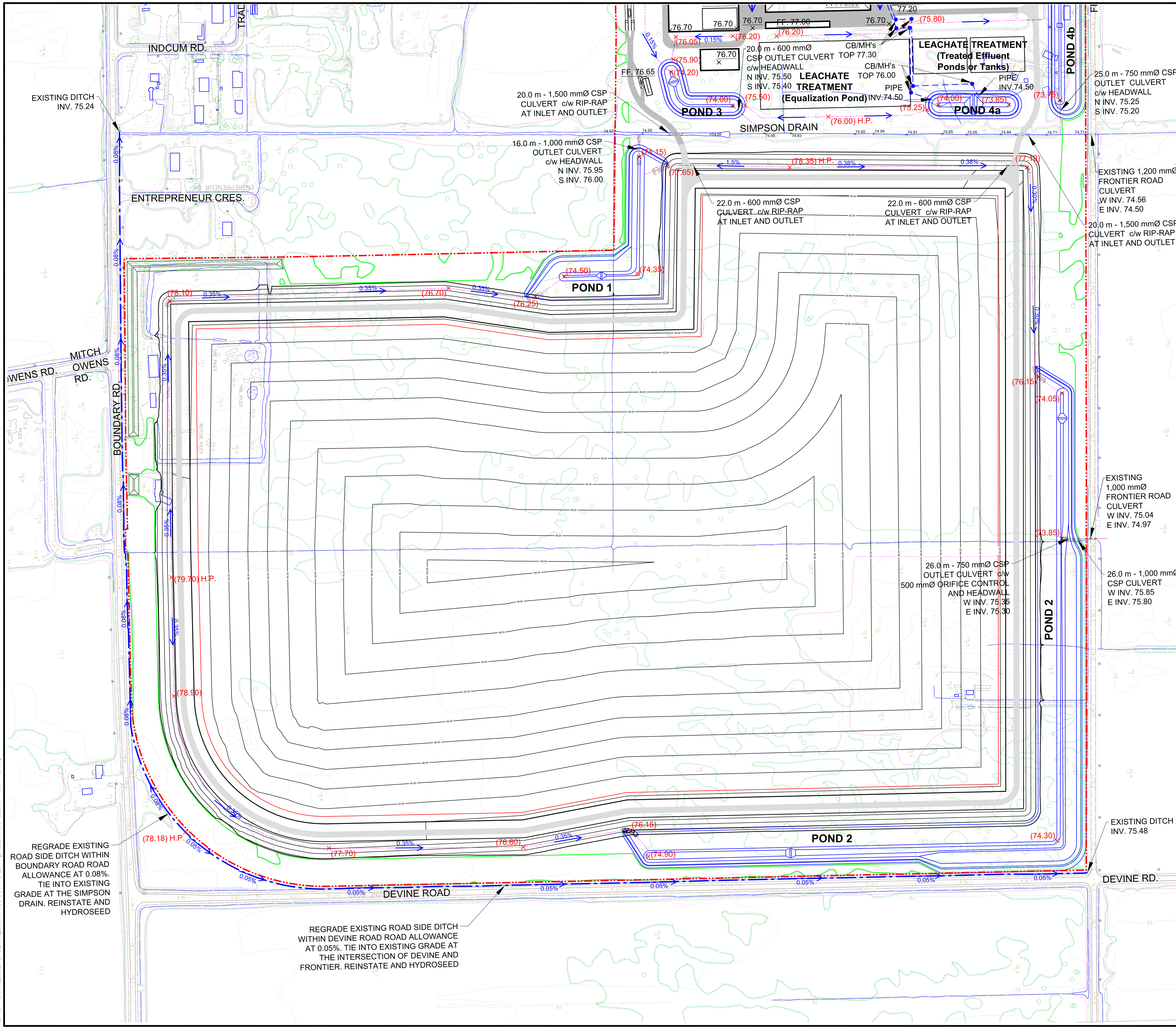
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

GRADING AND DRAINAGE PLAN NORTH PART OF SITE

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No.1211250045-V4-Storm-GDP.dwg
DESIGN	D.V.K.	20 Nov. 2013	SCALE AS SHOWN REV. 0
CAD	M.L.F.	28 Nov. 2013	DRAWING No.
CHECK	P.L.E.	Aug. 2014	GD1
REVIEW	P.A.S.	Aug. 2014	



LEGEND:

- PROPERTY BOUNDARY
- (74.50) PROPOSED SWALE GRADE
- 77.00 PROPOSED GRADE
- EXISTING GRADE
- EXISTING CONTOUR (0.25m INTERVAL)
- TERRACING (SLOPE AS INDICATED)
- DRAINAGE DIRECTION
- RIP-RAP 200 mmØ, 300 m THICK (NOMINAL) AS PER OPSD 810.010 TYPE 'B
- DITCH
- CATCH BASIN (OPSD 705.010 c/w 600 mm SUMP)
- MAINTENANCE HOLE (OPSD 707.020)
- 600 mmØ CULVERT OR AS NOTED
- EXISTING CULVERT AS NOTED
- EXISTING SIMPSON DRAIN GRADE (SURVEY BY GOLDER ASSOCIATES LTD JULY 5, 2012)

ALL GRADES ARE METRES ABOVE SEA LEVEL (masl)

GENERAL NOTES:

1. CONTRACTOR TO VERIFY EXISTING UTILITY LOCATIONS PRIOR TO START OF CONSTRUCTION.
2. ALL SERVICES TO BE INSTALLED AS PER OPSS AND OPSD STANDARDS. EMBEDMENT AND BACKFILL SHALL CONFORM TO OPSD 802.010, 802.013, OR 802.014 AS APPLICABLE (FOR FLEXIBLE PIPE) USING GRANULAR 'A' FOR EMBEDMENT MATERIAL.
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4. ALL MANHOLES SHALL BE INSTALLED WITH FROST STRAPPING AS PER OPSD 701.100.
5. ALL SANITARY AND STORM MANHOLES SHALL BE PARGED AND MADE WATER TIGHT WITHIN THE INSIDE WALLS AT THE STRUCTURE USING NON-SHRINK GROUT.
6. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE RECEIVING WATERCOURSE DURING CONSTRUCTION ACTIVITIES. THESE PRACTICES ARE REQUIRED TO ENSURE NO SEDIMENT AND/OR ASSOCIATED POLLUTANTS ARE RELEASED TO THE RECEIVING WATERCOURSE AND INCLUDES INSTALLATION OF SEDIMENT BARRIERS ON ALL CATCH BASIN AND MAINTENANCE HOLES AND A SILT FENCE BARRIER (AS PER OPSD 219.110 AND ASSOCIATED SPECIFICATIONS) ALONG ALL OTHER AREAS THAT SHEET DRAIN OFF SITE. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

NOTE:

TO BE READ IN CONJUNCTION WITH PLAN VIEW OF POND AND DETAILS NO. P1, P2, P3 AND P4.

NOT FOR CONSTRUCTION

SCALE 1:2,500 — 50 0 50 100 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

GRADING AND DRAINAGE PLAN
SOUTH PART OF SITE

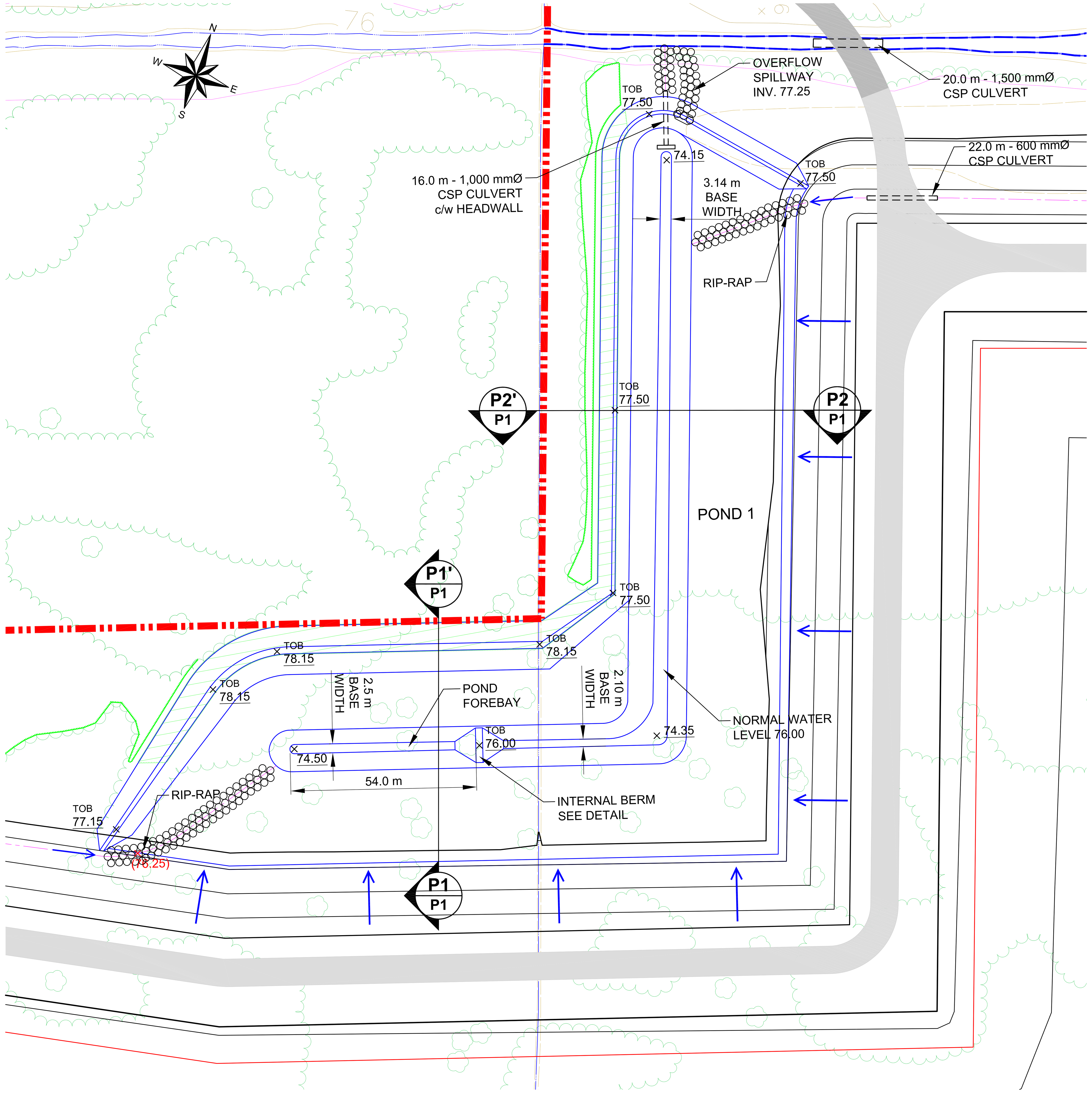
Golder Associates, Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	D.V.K.	20 Nov. 2013
CAD	M.L.F.	28 Nov. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No.1211250045-V4-Storm-GDP.dwg

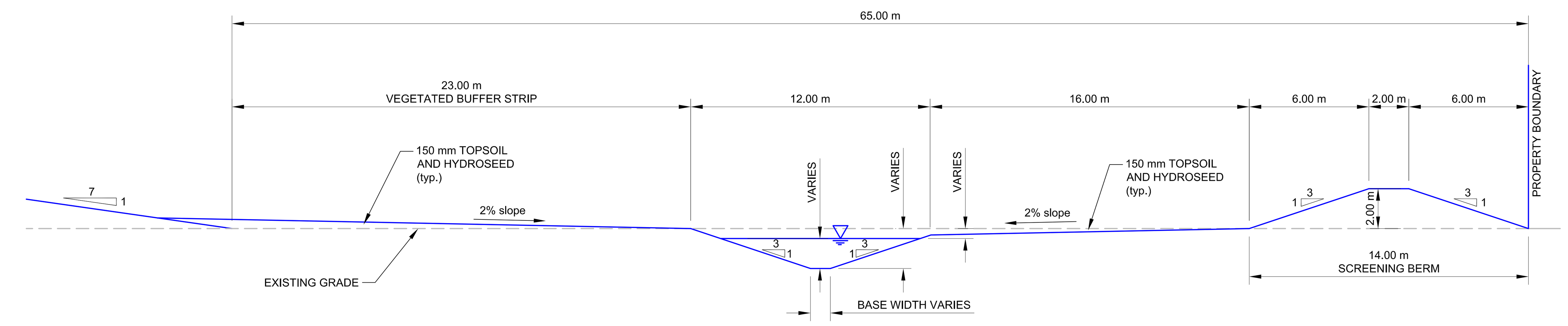
SCALE AS SHOWN REV. 0

DRAWING No. GD2



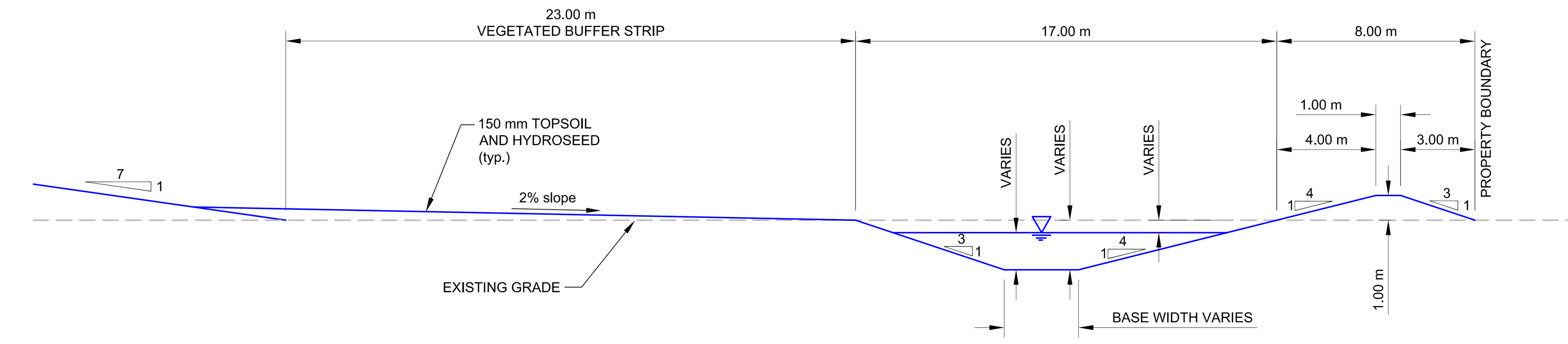
PLAN VIEW OF POND 1

SCALE 1:750 METRES



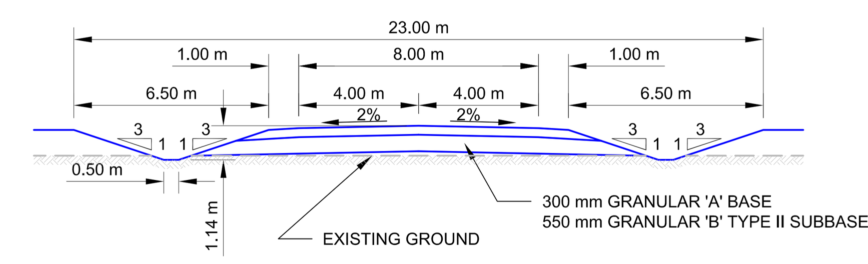
SECTION P1-P1'

SCALE 1:200 METRES



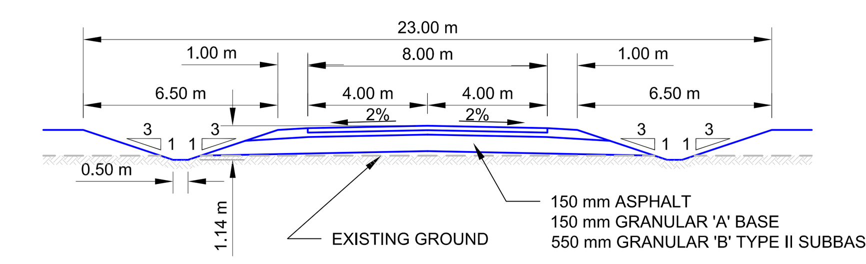
SECTION P2-P2'

SCALE 1:200 METRES



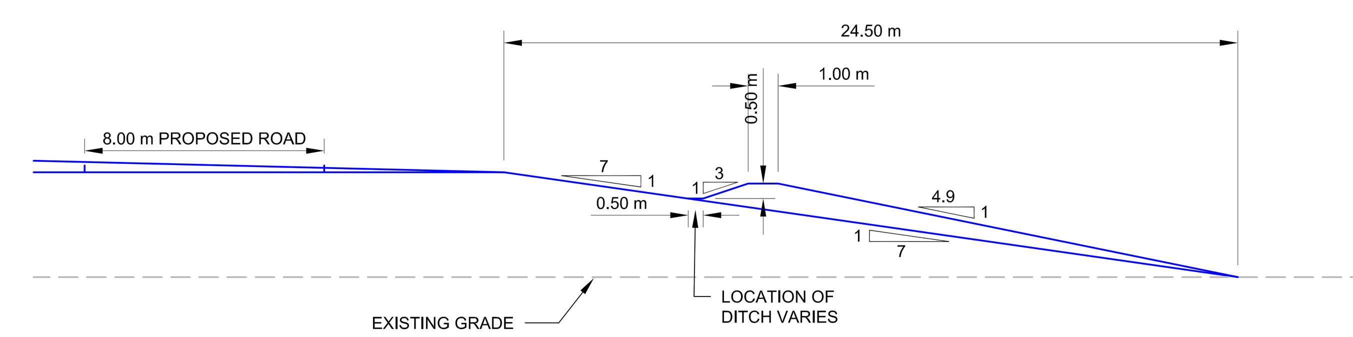
TYPICAL GRAVEL ROAD SECTION

SCALE: N.T.S.



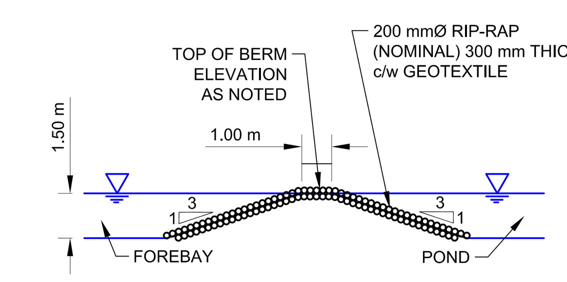
TYPICAL ASPHALT ROAD SECTION

SCALE: N.T.S.



TYPICAL PERIMETER DITCH ON PERIMETER BERM

SCALE 1:200 METRES



INTERNAL BERM DETAIL

SCALE 1:200 METRES

NOT FOR CONSTRUCTION

LEGEND:

- PROPERTY BOUNDARY
- × (75.50) PROPOSED SWALE GRADE
- × 77.25 PROPOSED GRADE
- × TOB 77.25 PROPOSED TOP OF BERM GRADE
- H.P. HIGH POINT
- PROPOSED SURFACE DRAINAGE DIRECTION
- PROPOSED RIP-RAP (NOMINAL 200 mmØ, 300 mm THICK c/w GEOTEXTILE)
- × 75.8 EXISTING GRADE
- PROPOSED DITCH
- PROPOSED 600 mmØ CULVERT OR AS NOTED
- EXISTING CULVERT AS NOTED

POND 1 LEVELS

NORMAL WATER LEVEL = 76.00

1:2 EVENT LEVEL = 76.14

1:5 EVENT LEVEL = 76.60

1:25 EVENT LEVEL = 77.04

1:100 EVENT LEVEL = 77.27

NOTE:

1. ALL GRADES ARE METRES ABOVE SEA LEVEL (masl)
2. TO BE READ IN CONJUNCTION WITH GRADING PLAN NO. GD1 AND GD2.

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

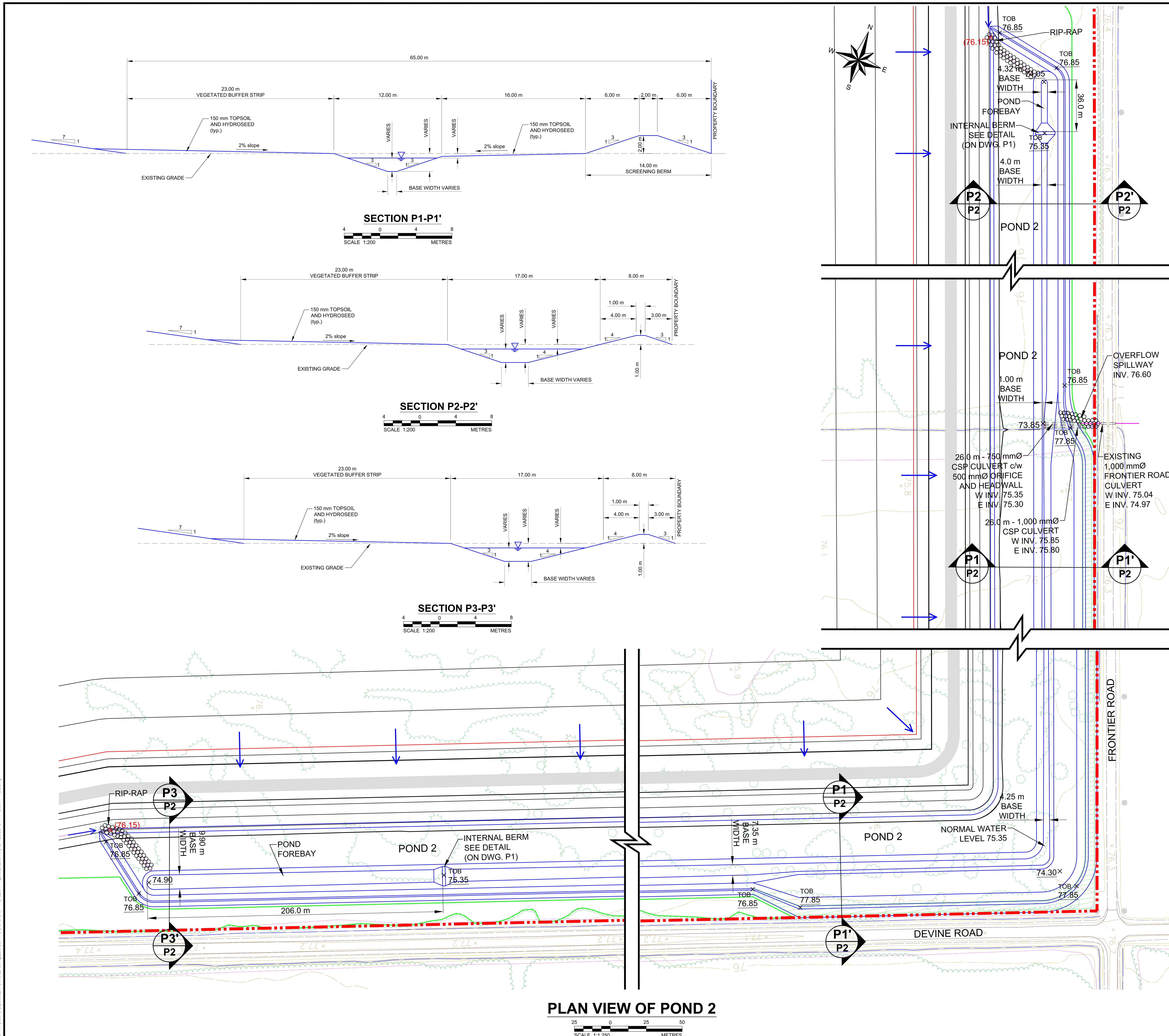
TITLE

PLAN VIEW OF POND 1 AND DETAILS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No.1211250045-V4-Storm-PDS.dwg
DESIGN	D.V.K.	20 Nov. 2013	SCALE AS SHOWN REV. 0
CAD	M.L.F.	28 Nov. 2013	DRAWING No.
CHECK	P.L.E.	Aug. 2014	
REVIEW	P.A.S.	Aug. 2014	P1

PLOT DATE: July 7, 2014



LEGEND:

- PROPERTY BOUNDARY
- (75.50) PROPOSED SWALE GRADE
- 77.25 PROPOSED GRADE
- TOB 77.25 PROPOSED TOP OF BERM GRADE
- H.P. HIGH POINT
- PROPOSED SURFACE DRAINAGE DIRECTION
- PROPOSED RIP-RAP (NOMINAL 200 mmØ, 300 mm THICK c/w GEOTEXTILE)
- EXISTING GRADE
- PROPOSED DITCH
- PROPOSED 600 mmØ CULVERT OR AS NOTED
- EXISTING CULVERT AS NOTED

POND 2 LEVELS

NORMAL WATER LEVEL = 75.35

1:2 EVENT LEVEL = 75.47

1:5 EVENT LEVEL = 75.93

1:25 EVENT LEVEL = 76.04

1:100 EVENT LEVEL = 76.07

NOTE:

1. ALL GRADES ARE METRES ABOVE SEA LEVEL (masl)
2. TO BE READ IN CONJUNCTION WITH GRADING PLAN NO. GD1 AND GD2.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

PLAN VIEW OF POND 2 AND DETAILS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No.1211250045-V4-Storm-PDS.dwg
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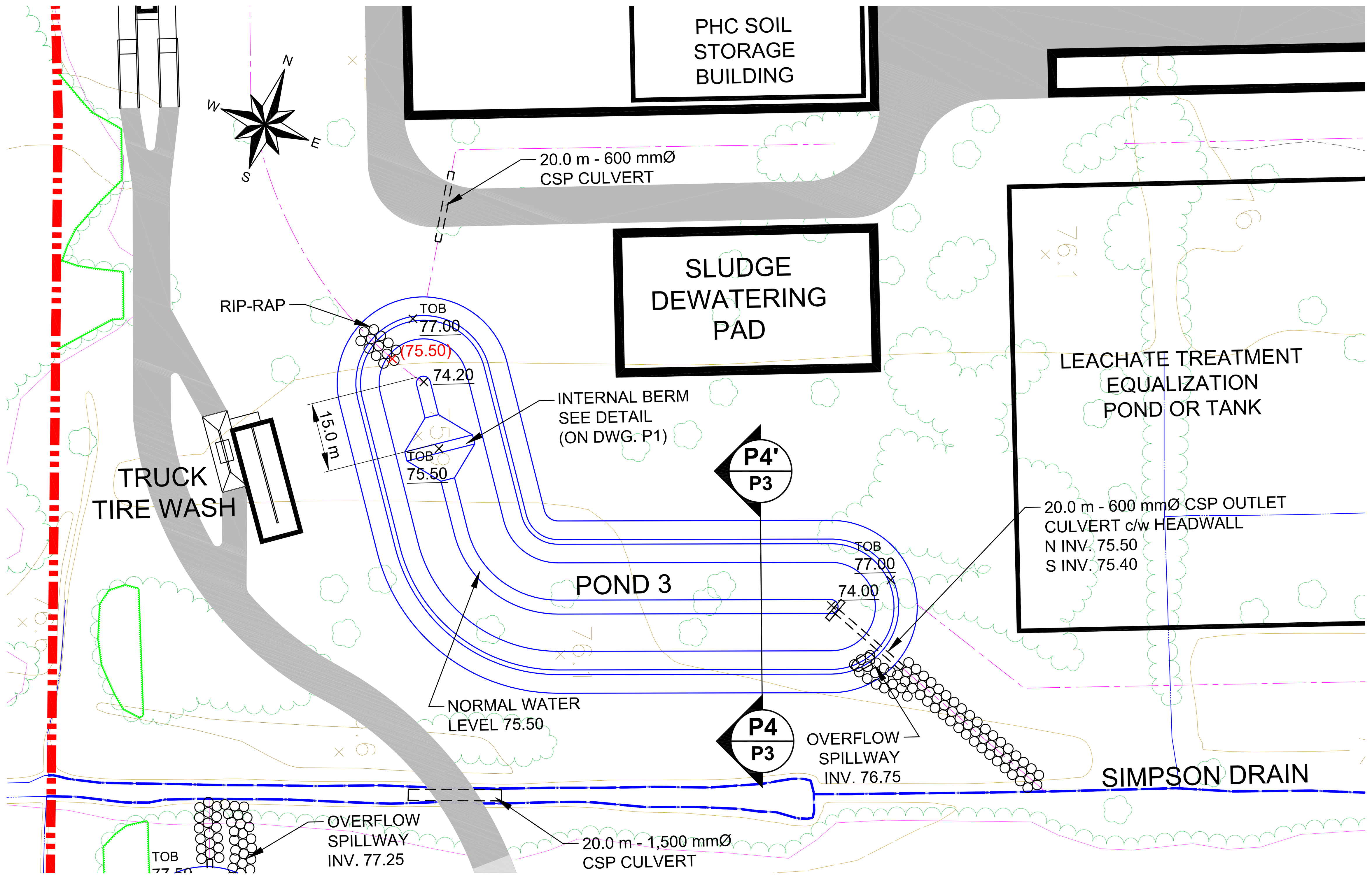
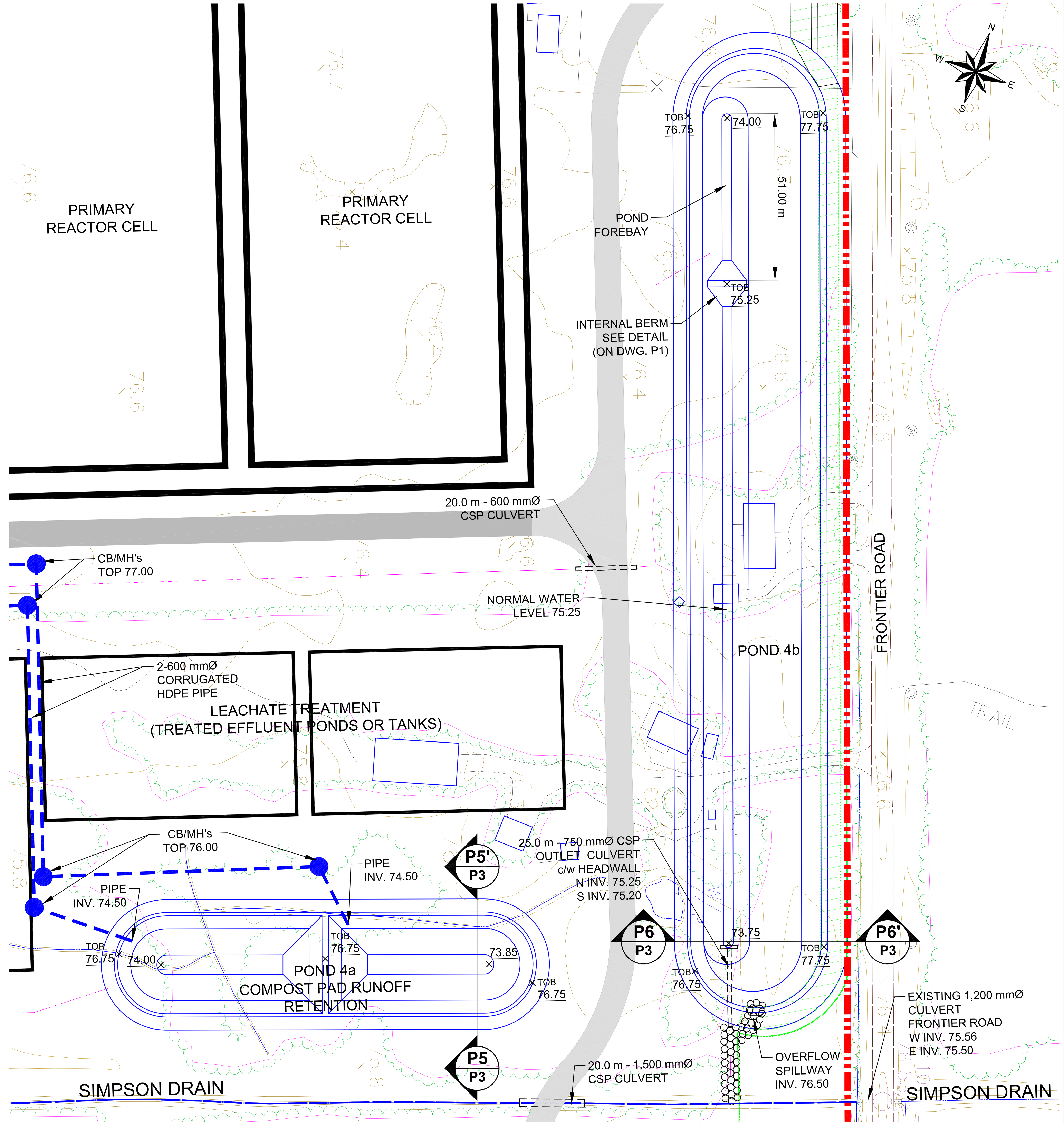
CAD	M.L.F.	28 Nov. 2013	DRAWING No.
CHECK	P.L.E.	Aug. 2014	
REVIEW	P.A.S.	Aug. 2014	P2



PLAN VIEW OF POND 3

SCALE 1:750 — 15, 0, 15, 30 METRES



PLAN VIEW OF POND 4a and 4b

SCALE 1:750 — 15, 0, 15, 30 METRES

POND 3 LEVEL

NORMAL WATER LEVEL = 75.50

1:2 EVENT LEVEL = 75.96

1:5 EVENT LEVEL = 76.64

1:25 EVENT LEVEL = 76.80

1:100 EVENT LEVEL = 76.86

POND 4b LEVEL

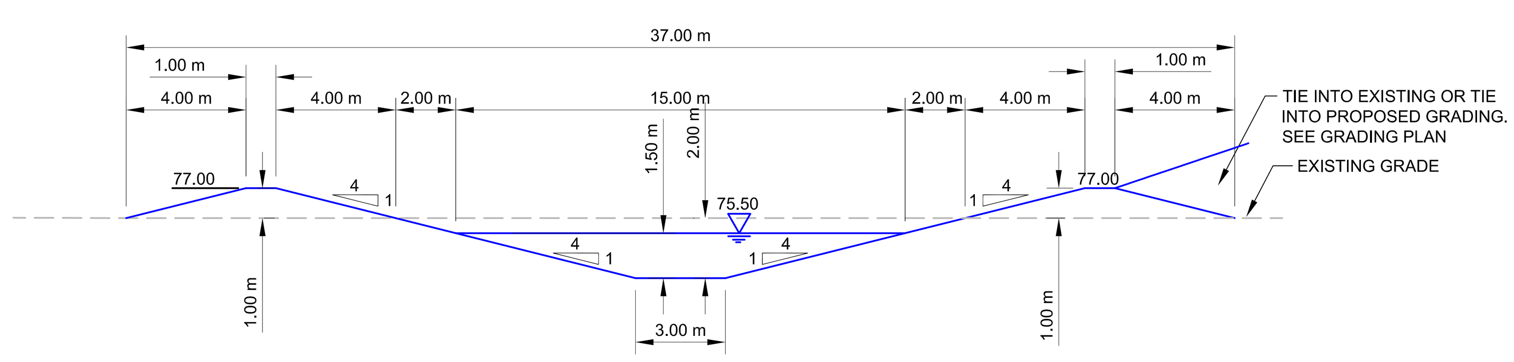
NORMAL WATER LEVEL = 75.25

1:2 EVENT LEVEL = 75.70

1:5 EVENT LEVEL = 76.41

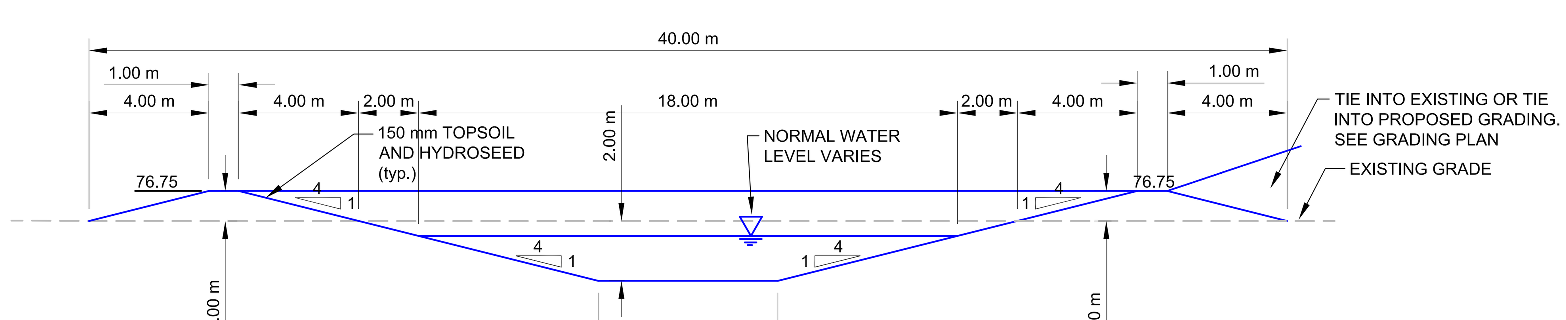
1:25 EVENT LEVEL = 76.54

1:100 EVENT LEVEL = 76.59



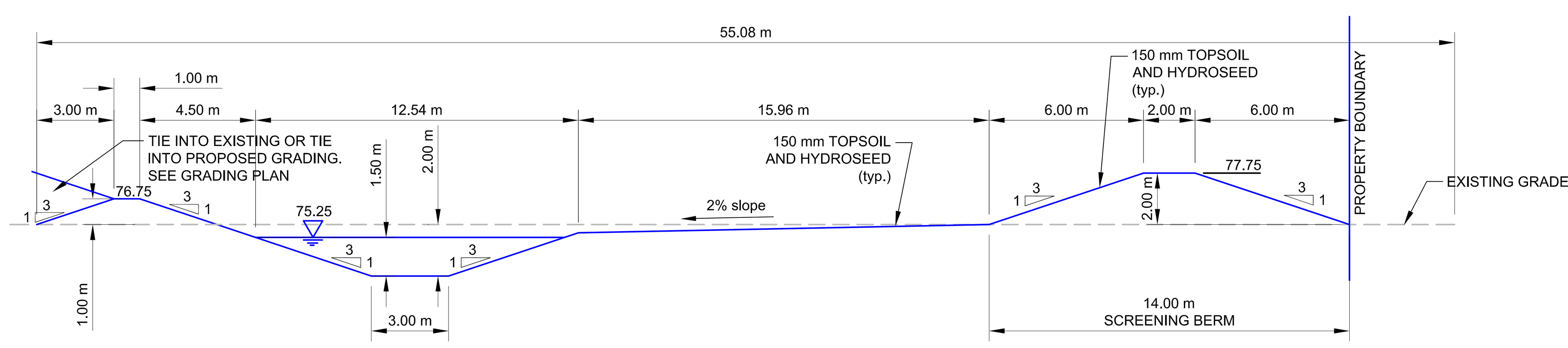
SECTION P4-P4'

SCALE 1:200 — 4, 0, 4, 8 METRES



SECTION P5-P5'

SCALE 1:250 — 5, 0, 5, 10 METRES



SECTION P6-P6'

SCALE 1:250 — 5, 0, 5, 10 METRES

LEGEND:

	PROPERTY BOUNDARY
× (75.50)	PROPOSED SWALE GRADE
× 77.25	PROPOSED GRADE
× TOB 77.25	PROPOSED TOP OF BERM GRADE
H.P.	HIGH POINT
←	PROPOSED SURFACE DRAINAGE DIRECTION
	PROPOSED RIP-RAP (NOMINAL 200 mmØ, 300 mm THICK c/w GEOTEXTILE)
	EXISTING GRADE
	PROPOSED DITCH
	PROPOSED 600 mmØ CULVERT OR AS NOTED
	EXISTING CULVERT AS NOTED

NOTE:

1. ALL GRADES ARE METRES ABOVE SEA LEVEL (masl)
2. TO BE READ IN CONJUNCTION WITH GRADING PLAN NO. GD1 AND GD2.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

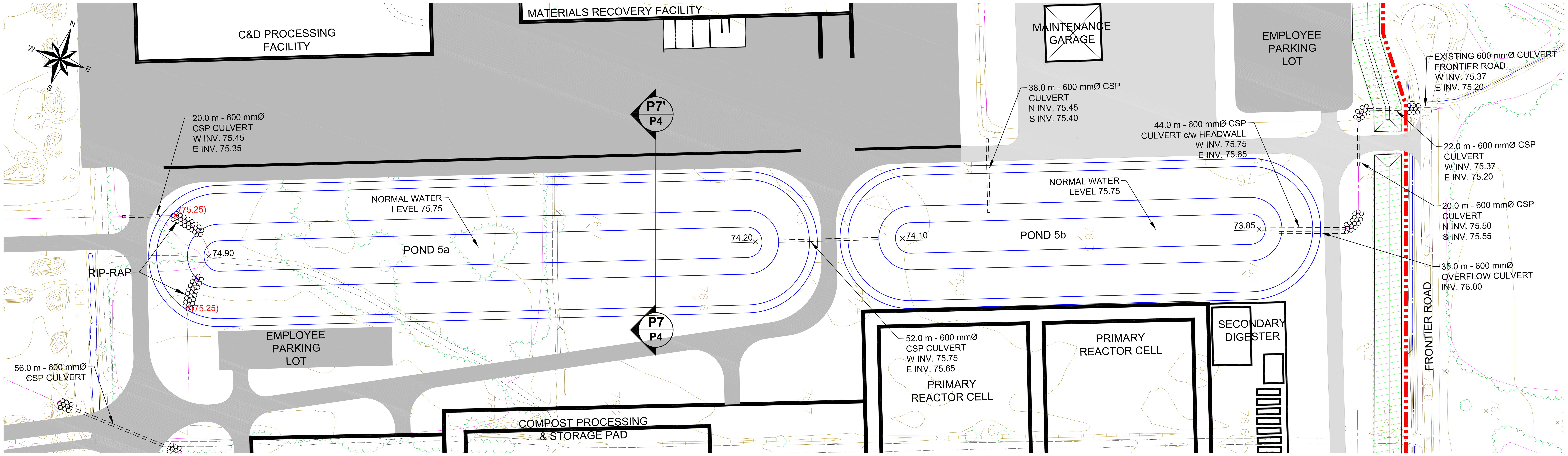
TITLE

PLAN VIEW OF POND 3, 4a and 4b AND DETAILS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.	12-1125-0045		FILE No. 1211250045-V4-Storm-PDS.dwg	
DESIGN	D.V.K.	20 Nov. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	28 Nov. 2013	DRAWING No.	
CHECK	P.L.E.	Aug. 2014		
REVIEW	P.A.S.	Aug. 2014	P3	

PLOT DATE: October 9, 2014 FILENAME: ...1211250045-V4-Storm-PDS.dwg



PLAN VIEW OF STORM / FIRE POND 5a and 5b

SCALE 1:1,000 METRES

POND 5a LEVEL

NORMAL WATER LEVEL = 75.75

1:2 EVENT LEVEL = 76.06

1:5 EVENT LEVEL = 76.46

1:25 EVENT LEVEL = 76.64

1:100 EVENT LEVEL = 76.67

POND 5b LEVEL

NORMAL WATER LEVEL = 75.75

1:2 EVENT LEVEL = 75.84

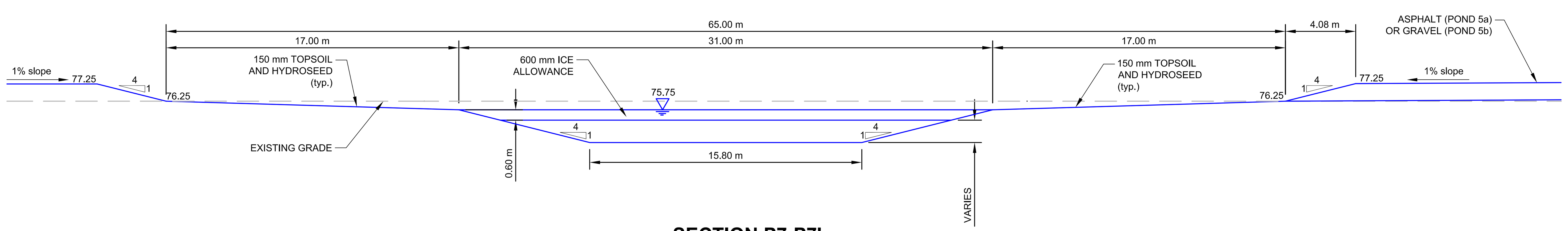
1:5 EVENT LEVEL = 75.93

1:25 EVENT LEVEL = 76.00

1:100 EVENT LEVEL = 76.04

LEGEND:

	PROPERTY BOUNDARY
× (75.50)	PROPOSED SWALE GRADE
× 77.25	PROPOSED GRADE
× TOB 77.25	PROPOSED TOP OF BERM GRADE
H.P.	HIGH POINT
	PROPOSED SURFACE DRAINAGE DIRECTION
	PROPOSED RIP-RAP (NOMINAL 200 mmØ, 300 mm THICK c/w GEOTEXTILE)
	EXISTING GRADE
	PROPOSED DITCH
	PROPOSED 600 mmØ CULVERT OR AS NOTED
	EXISTING CULVERT AS NOTED



SECTION P7-P7'
Typical Section for Pond 5a & 5b

SCALE 1:200 METRES

NOTE:

1. ALL GRADES ARE METRES ABOVE SEA LEVEL (masl)
2. TO BE READ IN CONJUNCTION WITH GRADING PLAN NO. GD1 AND GD2.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

PLAN VIEW OF STORM / FIRE POND 5a and 5b AND DETAILS

Golder Associates, Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No.1211250045-V4-Storm-PDS.dwg
DESIGN	D.V.K.	20 Nov. 2013	SCALE AS SHOWN REV. 0
CAD	M.L.F.	28 Nov. 2013	DRAWING No.
CHECK	P.L.E.	Aug. 2014	P4
REVIEW	P.A.S.	Aug. 2014	

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

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North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

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32 Steacie Drive
Kanata, Ontario, K2K 2A9
Canada
T: +1 (613) 592 9600

APPENDIX B

Acoustic Assessment Report

December 2014

APPENDIX B

Acoustic Assessment Report
Facility Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Golder Associates

Executive Summary

Golder Associates Ltd. (Golder) was retained by Taggart Miller Environmental Services (Taggart Miller) to prepare an Acoustic Assessment Report (AAR) for the Capital Region Resource Recovery Centre (CRRRC) facility (the Facility) located in Ottawa, Ontario. The purpose of this AAR is to evaluate the overall noise emissions of the Facility operations with respect to the Ontario Ministry of Environment and Climate Change (MOECC) noise guidelines.

The proposed CRRRC facility will provide Industrial, Commercial & Institutional (IC&I) and Construction & Demolition (C&D) waste processing and recovery in the Capital Region. The proposed operating hours for waste receiving and processing are from 6:00 am to 7:00 pm Monday to Saturday. Outdoor activities for the organic processing at the primary reactor cells are limited to 7:00 am to 7:00 pm. Indoor operations for the materials recovery facility (MRF) and C&D processing facility may operate until 11:00 pm (this excludes truck activities and outdoor operations). Equipment associated with bio-gas, leachate management and power generation is required to operate 24 hours per day 365 days of the year.

Noise generating equipment is summarised in Table 1.

Site specific noise measurements at a similar facility and Golder's database of similar sources were used as inputs to a predictive acoustical model to quantify outdoor noise emissions associated with the Facility. The criteria were established in accordance with MOECC publication NPC-300. Due to the nature of the sources, the Facility is not a significant source of vibration.

Ten (10) locations have been identified as being representative of the sensitive Points of Reception (PORs) in the vicinity of the Facility. In addition, three (3) vacant lots (VLs) zoned to allow possible future noise sensitive land uses have been identified in the vicinity of the Facility.

Golder predicted noise impacts from the Facility at these sensitive PORs below the applicable sound level limits during the predictable worst case hour of Facility operation. Therefore, based on the results presented in this AAR, the facility is expected to operate in compliance with MOECC noise guidelines as specified in NPC-300.

Table of Contents

ATTACHMENTS

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Company Name: Taggart Miller Environmental Services

Company Address: c/o 225 Metcalfe Street, Suite 708

Ottawa, Ontario K2P 1P9

Location of Facility: Boundary Road and Devine Road

Ottawa

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the Ministry document "Information to be Submitted for Approval of Stationary Sources of Sound" (NPC 233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:

Name: Derek Cathcart

Title: General Manager of Engineering

Phone Number: 905-415-7317

Signature: ____________________

Date: ____________________

Technical Contact:

Name: Tim Gully

Representing: Golder Associates Ltd.

Phone Number: 416-3661730 x2210

Signature: ____________________

Date: ____________________

Recreated by Golder Associates Ltd. from Ontario Ministry of Environment Publication PIBS 5356e

ACOUSTIC ASSESSMENT REPORT CHECKLIST

	Required Information		
		Submitted	Explanation/Reference
1.0	**Introduction** (Project Background and Overview)	☒ Yes	Section 1.0
2.0	**Facility Description**		
	2.1 Operating hours of facility and significant Noise Sources	☒ Yes	Sections 2.0 and 3.0
	2.2 Site Plan identifying all significant Noise Sources	☒ Yes	Figure 1
3.0	**Noise Source Summary**		
	3.1 Noise Source Summary Table	☒ Yes	Table 1
	3.2 Source noise emissions specifications	☒ Yes	Table 1
	3.3 Source power/capacity ratings	☒ Yes	Table 1, Attachment G
	3.4 Noise control equipment description and acoustical specifications	☒ Yes	Table 1, Attachment D
4.0	**Point of Reception Noise Impact Calculations**		
	4.1 Point of Reception Noise Impact Table	☒ Yes	Section 6.2, Table 4
	4.2 Point(s) of Reception (POR) list and description	☒ Yes	Section 4.0
	4.3 Land-use Zoning Plan	☒ Yes	Attachment A
	4.4 Scaled Area Location Plan	☒ Yes	Figure 2
	4.5 Procedure used to assess noise impacts at each POR	☒ Yes	Sections 5.0 and 6.1
	4.6 List of parameters/assumptions used in calculations	☒ Yes	Section 6.0
5.0	**Acoustics Assessment Summary**		
	5.1 Acoustic Assessment Summary Table	☒ Yes	Section 6.2, Table 8
	5.2 Rationale for selecting applicable noise guideline limits	☒ Yes	Section 5.0
	5.3 Predictable Worst Case Impacts Operating Scenario	☒ Yes	Sections 2.0 and 3.0
6.0	**Conclusions**		
	Statement of compliance with the selected noise performance limits	☒ Yes	Section 7.0
7.0	**Appendices** (Provide details such as)		
	Listing of Insignificant Noise Sources	☐ Yes	N/A
	Manufacturer's Noise Specifications	☒ Yes	Attachment C
	Calculations	☒ Yes	Attachment G
	Instrumentation	☒ Yes	Attachment E
	Meteorology during Sound Level Measurements	☒ Yes	Attachment F
	Raw Data from Measurements	☒ Yes	Attachment C
	Drawings (Facility / Equipment)	☒ Yes	Figures

Recreated by Golder Associates Ltd., from Ontario Ministry of Environment Publication PIBS 5356e

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Taggart Miller Environmental Services (Taggart Miller) to prepare an Acoustic Assessment Report (AAR) for the Capital Region Resource Recovery Centre (CRRRC) facility (the Facility) located in Ottawa, Ontario. The purpose of this AAR is to evaluate the overall noise emissions of the Facility operations with respect to the Ontario Ministry of Environment and Climate Change (MOECC) noise guidelines.

A site layout plan showing the locations of noise sources is provided in Figure 1. A site location plan showing the location of the Facility and sensitive Points of Reception (PORs) is provided in Figure 2. Figure 3 shows the location of the vacant lots (VLs) zoned to allow possible future noise sensitive land use and the assumed location of such possible future developments. The land use and zoning to the west of the Site is Rural Heavy Industrial, as is a limited portion of the Site. The Site itself is otherwise zoned General Rural, as is the land to the south and west. A 400 series highway is located to the north of the Site. Lands to the east are mainly zoned Agricultural Resource and are used for this purpose. A zoning plan for the property and surrounding areas is provided in Attachment A.

Sound level limits for the Facility's operations were established in accordance with MOECC guidelines. Noise predictions were completed to determine the possible noise impact of the Facility operations at the neighbouring PORs. For a description of technical terminology used in this report, refer to Attachment B.

The Facility is not considered a significant source of vibration; therefore a vibration assessment was not considered warranted.

For the purpose of this assessment ten (10) locations have been selected representing the existing sensitive PORs, labelled POR01 to POR10, and three (3) vacant lots (VLs) zoned to allow possible future noise sensitive land use labelled VL01 to VL03. The closest existing POR is located approximately 70 metres from the property line south of the Facility entrance.

2.0 FACILITY DESCRIPTION

The proposed CRRRC facility will provide Industrial, Commercial & Institutional (IC&I) and Construction & Demolition (C&D) waste processing and recovery in the Capital Region. The primary components will be a materials recovery facility (MRF) for commercial waste; C&D waste processing; hydrocarbon contaminated soil treatment; surplus soil management; anaerobic digestion of organic waste from commercial sources; a drop off for separated materials or separation of materials; and leaf and yard materials composting. The outputs from the organics processing will be bio-gas that will be sent to an on-Site flare and possibly an on-Site electrical generation plant, a high quality compost for use as a soil amendment and fertilizer, and a non-organic residue for disposal. The organics digestion process will be equipped with a bio-filter for odour control. The primary noise generating equipment is summarised in Table 1.

The proposed operating hours for outdoor waste receiving and processing are from 6:00 am to 7:00 pm Monday to Saturday. Outdoor activities for the organic processing at the primary reactor cells are limited to 7:00 am to 7:00 pm. The proposed operating hours for indoor operations for the MRF and C&D processing facility are from 6:00 am to 11:00 pm Monday to Saturday. Equipment associated with bio-gas, leachate management and power generation is required to operate 24 hours per day 365 days of the year.

3.0 NOISE SOURCE SUMMARY

The primary noise sources are summarized in Table 1. Noise data is attached in Attachment C. In preparing the assessment, efforts were taken to ensure the source ID numbering convention was consistent, where applicable, with the information submitted by Miller Taggart to the MOECC, as part of the documentation provided in the Emission Summary and Dispersion Modelling (ESDM) Report. Also attached in Attachment C is Table 1 from the ESDM Report that provides descriptions of the sources.

Table 1: Noise Source Summary

Source ID (ESDM ID)	Source Description	Overall Day (0700 to 1900) Sound Power Level (dBA)	Overall Night (0600 to 0700) Sound Power Level (dBA)	Source Location[1]	Sound Characteristics[1]	Noise Control Measures[1]
001 (FLARE)	Flare[2, 3]	96	96	O	S	U
002	MRF Vent 1	83	83	O	S	U
003	MRF Vent 2	83	83	O	S	U
004	MRF Vent 3	83	83	O	S	U
005	MRF Vent 4	83	83	O	S	U
006	MRF Vent 5	83	83	O	S	U
007	MRF Vent 7	83	83	O	S	U
008	MRF Vent 6	83	83	O	S	U
009	MRF Vent 8	83	83	O	S	U
010	MRF Vent 9	83	83	O	S	U
011	MRF Vent 10	83	83	O	S	U
012	MRF Vent 11	83	83	O	S	U
013	MRF Vent 12	83	83	O	S	U
014	C&D Vent 1	83	83	O	S	U
015	C&D Vent 2	83	83	O	S	U
016	C&D Vent 3	83	83	O	S	U
017	C&D Vent 4	83	83	O	S	U
018	C&D Vent 5	83	83	O	S	U
019	C&D Vent 6	83	83	O	S	U
020	C&D Vent 7	83	83	O	S	U
021	C&D Vent 8	83	83	O	S	U
022	C&D Vent 9	83	83	O	S	U
023	C&D Vent 10	83	83	O	S	U
024	C&D Vent 11	83	83	O	S	U
025	C&D Vent 12	83	83	O	S	U
026 (MRFDC1)	MRF Dust Collector	102	102	O	S	U
027 (CDC1)	C&D Dust Collector	102	102	O	S	U
028	Welding Fume Hood	91	91	O	S	U

Source ID (ESDM ID)	Source Description	Overall Day (0700 to 1900) Sound Power Level (dBA)	Overall Night (0600 to 0700) Sound Power Level (dBA)	Source Location[1]	Sound Characteristics[1]	Noise Control Measures[1]
029	SS Loader CAT966[4]	109	109	O	S	U
030	HC Loader CAT966[4]	109	109	O	S	U
031	SS Grader CAT12	116	116	O	S	U
032	SS Dozer CATD6	110	110	O	S	U
033	Compost Loader 1	109	109	O	S	U
034	Compost Loader 2	109	109	O	S	U
035	Compost Chipper	118	118	O	S	U
036	Compost Conveyor	94	94	O	S	U
037	Compost Turner	111	111	O	S	U
038	Compost Screen	104	104	O	S	U
039	Comp Air Classifier	111	111	O	S	U
040	C&D Truck Idle	98	98	O	S	U
041	MRF Truck Idle	98	98	O	S	U
042	MRF Exhaust 1	87	87	O	S	U
043	MRF Exhaust 2	87	87	O	S	U
044	MRF Exhaust 3	87	87	O	S	U
045	MRF Exhaust 4	87	87	O	S	U
046	MRF Exhaust 5	87	87	O	S	U
047	C&D Exhaust 1	87	87	O	S	U
048	C&D Exhaust 2	87	87	O	S	U
049	C&D Exhaust 3	87	87	O	S	U
050	C&D Exhaust 4	87	87	O	S	U
051	C&D Exhaust 5	87	87	O	S	U
052	Mech Exhaust	87	87	O	S	U
053	HC Soil Exhaust 1[2]	87	87	O	S	U
054	HC Soil Exhaust 2[2]	87	87	O	S	U
055	Org Pre Processing Exhaust 1[2]	87	87	O	S	U
056	Org Pre Processing Exhaust 2[2]	87	87	O	S	U
057	Leachate Exhaust 1[2]	87	87	O	S	U
058	Leachate Exhaust 2[2]	87	87	O	S	U
059 (EPG)	Diesel Generator	117	117	O	S	U
060	Compost Aerator Fans[2]	95	95	O	S	U
062 (ORG_FILT)	Pre Processing Biofilter[2]	90	90	O	S	U
063 (HC_FILT)	HC Soil Biofilter[2]	90	90	O	S	U

Source ID (ESDM ID)	Source Description	Overall Day (0700 to 1900) Sound Power Level (dBA)	Overall Night (0600 to 0700) Sound Power Level (dBA)	Source Location[1]	Sound Characteristics[1]	Noise Control Measures[1]
064 (LFG_ENG)	Generator 1[2, 5]	88	88	O	S	S / E
065 (LFG_ENG)	Generator 2[2, 5]	88	88	O	S	S / E
066 (LFG_ENG)	Generator 3[2, 5]	88	88	O	S	S / E
067 (LFG_ENG)	Generator 4[2, 5]	88	88	O	S	S / E
068 (LFG_ENG)	Generator 5[2, 5]	88	88	O	S	S / E
069 (LFG_ENG)	Generator 6[2, 5]	88	88	O	S	S / E
070 (LFG_ENG)	Generator 7[2, 5]	88	88	O	S	S / E
071	EGP Exhaust[2]	87	87	O	S	U
072	MRF HVAC 1	83	83	O	S	U
073	MRF HVAC 2	83	83	O	S	U
074	MRF HVAC 3	83	83	O	S	U
075	MRF HVAC 4	83	83	O	S	U
076	C&D HVAC 1	83	83	O	S	U
077	C&D HVAC 2	83	83	O	S	U
078	C&D HVAC 3	83	83	O	S	U
079	C&D HVAC 4	83	83	O	S	U
080	Mech HVAC	83	83	O	S	U
081	HC Soil HVAC 1[2]	83	83	O	S	U
082	HC Soil HVAC 2[2]	83	83	O	S	U
083	Leachate HVAC 1[2]	83	83	O	S	U
084	Org Pre Processing HVAC 2[2]	83	83	O	S	U
085	Fire Pump	106	106	O	S	U
086	Org Pre Processing HVAC 1[2]	83	83	O	S	U
087	EGP HVAC[2]	83	83	O	S	U
088	Soil Truck Idle	98	98	O	S	U
089	Organics Truck Idle	98	98	O	S	U
090	Secondary Reactor Exhaust[2]	87	87	O	S	U
091	Secondary Reactor HVAC[2]	83	83	O	S	U
092	Truck Pump[2]	111	111	O	S	U
093	Admin HVAC	83	83	O	S	U
094	Leachate Truck Idle[2]	98	98	O	S	U
095	Generator Exhaust 1[2, 5]	86	86	O	S	S
096	Generator Exhaust 2[2, 5]	86	86	O	S	S

Source ID (ESDM ID)	Source Description	Overall Day (0700 to 1900) Sound Power Level (dBA)	Overall Night (0600 to 0700) Sound Power Level (dBA)	Source Location[1]	Sound Characteristics[1]	Noise Control Measures[1]
097	Generator Exhaust 3[2, 5]	86	86	O	S	S
098	Generator Exhaust 4[2, 5]	86	86	O	S	S
099	Generator Exhaust 5[2, 5]	86	86	O	S	S
100	Generator Exhaust 6[2, 5]	86	86	O	S	S
101	Generator Exhaust 7[2, 5]	86	86	O	S	S
102	Compost Excavator[6]	103	103	O	S	S
103	Organics Loader	109	-	O	S	S
104	Organics Excavator[6]	103	-	O	S	S
105	Organics Skidsteer	92	-	O	S	S
106	Organics Dump Truck	108	-	O	S	S
107	Organics Conveyor	94	-	O	S	S
108	Truck Movements Road Segment 1	105	103	O	S	U
109	Truck Movements Road Segment 2	92	91	O	S	U
110	Truck Movements Road Segment 3	97	95	O	S	U
111	Truck Movements Road Segment 4	86	85	O	S	U
112	Truck Movements Road Segment 5	96	95	O	S	U
113	Truck Movements Road Segment 6	80	79	O	S	U
114	Truck Movements Road Segment 7	100	98	O	S	U
115	Truck Movements Road Segment 8	84	82	O	S	U
116	Truck Movements Road Segment 9	96	95	O	S	U
117	Truck Movements Road Segment 10	84	83	O	S	U
118	Truck Movements Road Segment 11	97	96	O	S	U
119	Truck Movements Road Segment 13	88	88	O	S	U
120	Leachate Truck Movements[2]	98	98	O	S	U

Notes:
[1] See Attachment D for noise source summary table nomenclature
[2] Equipment operates 24 hours per day, 365 days per year[3] Enclosed flare designed not to exceed 85 dBA at 1 m
[4] One loader is modelled at the PHC soil treatment facility, and one loader is modelled at the surplus soil facility, though one loader will be shared between these facilities and the landfill and may operate at one time.
[5] Electrical Generators will be equipped with silencers and they will be housed in containers. Generator containers designed not to exceed 55 dBA at 10 m
[6] The number of excavators modelled is 2, though 1 excavator is shared by ancillary facilities and may operate at one time.

4.0 POINT(S) OF RECEPTION

A total of ten (10) existing PORs were identified in the AAR as the most sensitive PORs in the vicinity of the Facility. Three (3) vacant lots (VLs) zoned to allow possible future noise sensitive land use have also been identified. Table 2 provides a summary of the PORs and VLs used in the assessment. The table also includes the UTM coordinates and indicates which baseline noise monitoring location was used to establish the existing noise level at each POR. The existing PORs are shown on Figure 2, and the VLs are shown on Figure 3.

Table 2: Summary of Sensitive Points of Reception (PORs)

Receptor	UTM Coordinates	Representative Noise Monitoring Location
POR01	465558, 5020774	Meas Loc #2
POR02	465319, 5020015	Meas Loc #3
POR03	465888, 5019611	Meas Loc #3
POR04	465421, 5020818	Meas Loc #2
POR05	465428, 5021084	Meas Loc #2
POR06	465323, 5021149	Meas Loc #2
POR07	465319, 5021197	Meas Loc #2
POR08	465306, 5021229	Meas Loc #2
POR09	465318, 5021389	Meas Loc #2
POR10	464934, 5021613	Meas Loc #1
VL01	465916, 5020949[1]	Meas Loc #2
VL02	466206, 5020603[1]	Meas Loc #3
VL03	466808, 5021378[1]	N/A[2]

Notes:

[1] UTM coordinates are for the assumed location of the future developments

[2] Noise monitoring was not carried out at this location. The minimum background sound level due to road traffic was calculated using STAMSON v5.04 (see Table 6)

5.0 ASSESSMENT CRITERIA

The PORs located in the vicinity of the Facility are in an area defined as Class 1 as per MOECC publication NPC-300. A Class 1 area means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum". In this case Highway 417 and Boundary Road are primarily responsible for background noise.

In assessing stationary noise sources, the MOECC has established exclusionary sound level limits for Class 1 areas for both Plane of Window (POW) and Outdoor areas. The POW sound level limit for the noise sensitive receptors in a Class 1 area is described as follows:

> *The sound level limit at a POW POR is set as the higher of either the applicable exclusionary limit of 50 dBA in the daytime period of 07:00-19:00, 50 dBA in the evening period of 19:00-23:00 and 45 dBA in the night-time period of 23:00-07:00, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment.*

The outdoor sound level limit for the noise sensitive receptors in a Class 1 area is described as follows:

> *The sound level limit at an outdoor POR is set as the higher of either the applicable exclusionary limit of 50 dBA in the daytime period of 07:00-19:00 and 50 dBA in the evening period of 19:00-23:00, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment. In general, the outdoor POR will be protected during the night-time as a consequence of meeting the sound level limit at the adjacent POW.*

The One Hour Equivalent Sound Level (L_{eq}, dBA) MOECC exclusionary sound level limits for a POR in a Class 1 area are summarized in Table 3 below:

Table 3: Points of Reception Sound Level Limits for Class 1 Area

Time Period	Class 1 POW MOE Exclusionary Sound Level Limit (dBA)	Class 1 Outdoor MOE Exclusionary Sound Level Limit (dBA)
Daytime (07:00-19:00)	50	50
Evening (19:00-23:00)	50	50
Night-time (23:00-07:00)	45	N/A

A field study was carried out to characterize existing noise levels in the Site-vicinity study area. Continuous noise monitoring was carried out at three locations within the Site-vicinity study area to determine the existing noise levels for normal operations during daytime (0700 to 1900), evening (1900 to 2300) and night-time (0600 to 0700) periods, and for essential operations during night-time (2300 to 0600) periods, at sensitive Points of Reception (PORs). The monitoring lasted from August 23, 2013 through to August 29, 2013. Noise data was logged continuously on an hourly basis for the duration of the monitoring. The locations where noise monitoring was carried out are shown in Figure 4 and summarised in Table 4.

Table 4: Summary of Noise Monitoring Locations

Monitoring Location	Address	Monitor UTM Coordinates
Meas Loc #1	6150 Chemin Thunder Road	464943, 5021708
Meas Loc #2	5368 Boundary Road	465339, 5021249
Meas Loc #3	5716 Boundary Road	465969, 5019628

The existing acoustic environment in the Site-vicinity study area is dominated primarily by road traffic noise. Tables 5 and 6 summarize the minimum hourly noise levels measured at each of the monitoring locations (see Figure 4) which were used as the sound level limits for this assessment. The noise monitoring data that shows the hourly variation in sound level during the monitoring period is available in Attachment H. For the vacant lot located to the east of the Facility (VL03 – see Figure 3), the minimum background sound level due to road traffic was calculated using hourly traffic data for Highway 417. The sound energy exposure was determined using STAMSON v5.04 – ORNAMENT, the computerized road traffic noise prediction model provided by the MOECC. The minimum hourly noise level predictions for location VL03 are summarized in Table 7. Details of a STAMSON calculation are included in Attachment I.

The proposed operating hours for outdoor waste receiving and processing are from 6:00 am to 7:00 pm Monday to Saturday. Outdoor activities for the organic processing at the primary reactor cells are limited to 7:00 am to 7:00 pm. The proposed operating hours for indoor operations for the MRF and C&D processing facilities are from 6:00 am to 11:00 pm Monday to Saturday. In order to biodegrade organic material the compost processing pad will either incorporate physical compost turners or an aerated static pile system (ASP). The primary noise sources associated with the ASP are the fans used to force air through the composting mass. To remain conservative, both options have been included in the predictions for normal operations. If compost turners are used their operation will be limited from 0600 to 1900 hours. If the ASP system is preferred it will operate 24 hours per day, therefore the ASP system has also been included in the essential operations scenario. Equipment associated with leachate management, biogas and power generation is required to operate 24 hours per day 365 days of the year. As such the assessment has been based on the following operating scenarios:

Normal Operations (waste receiving and processing) – 0600 to 2300 hours Monday to Saturday

For normal operations during daytime hours the minimum 1 hour L_{eq} monitored from 0700 to 1900 hours (excluding Sunday) has been used for each location. During this time period the Facility is assumed to be fully operating. For on-Site truck activity the total daily number of trucks associated with the waste processing facilities is 156 entering and 156 exiting the site. To be conservative, a 10 hour day has been assumed and a 1.45% peaking factor has been applied, resulting in a total of 23 trucks per hour entering and exiting the Site.

For normal operations during evening hours the minimum 1 hour L_{eq} monitored from 1900 to 2300 hours (excluding Sunday) has been used for each location. During this time period operations are limited to activities indoors within the MRF and C&D processing facility. For on-Site truck activity a maximum of 4 trucks per hour (associated with the leachate pre-treatment facility) has been used. On-Site truck activity associated with waste receiving and processing is limited from 0600 to 1900 hours.

For normal operations during night-time hours the minimum 1 hour L_{eq} monitored from 0600 to 0700 hours (excluding Sunday) has been used for each location. During this time period the initial phase of mobile equipment will be to start the equipment, allow it to idle, and perform a pre-operational system check. To remain conservative all equipment is assumed to be fully operating. Outdoor activities for the organic processing at the primary reactor cells are limited to 7:00 am to 7:00 pm and therefore are not included in the assessment of normal operations during night-time hours (0600 to 0700 hours). For on-Site truck activity the maximum number of trucks expected from 0600 to 0700 hours is 22. To be conservative, a 1.45% peaking factor has been applied resulting in 32 trucks per hour.

Essential Operations (leachate management, bio-gas and power generation) – 24 hours per day, 365 days per year.

Equipment associated with leachate management, biogas and power generation is required to operate 24 hours per day. For essential operations the minimum 1 hour L_{eq} monitored from 2300 to 0600 hours (including Sunday) has been used for each location. Equipment operating during this time period is indicated in Table 1. For on-Site truck activity a maximum of 4 trucks per hour (associated with the leachate pre-treatment facility) has been used.

Table 5: Summary of Noise Monitoring Data Normal Operations (0600 to 2300 hours Monday to Saturday)

Location	Daytime (0700 to 1900 hours)		Evening (1900 to 2300 hours)		Night-time (0600 to 0700 hours)	
	Lowest Hourly L_{eq} dBA	Date and Time	Lowest Hourly L_{eq} dBA	Date and Time	Lowest Hourly L_{eq} dBA	Date and Time
Meas Loc #1	58	Saturday, August 24, 2013 from 1400 to 1500 hours	56	Monday, August 26, 2013 from 2200 to 2300 hours	58	Monday, August 26, 2013 from 0600 to 0700 hours
Meas Loc #2	65	Saturday, August 24, 2013 from 0800 to 0900 hours	61	Monday, August 26, 2013 from 2200 to 2300 hours	63	Saturday, August 24, 2013 from 0600 to 0700 hours
Meas Loc #3	58	Saturday, August 24, 2013 from 1800 to 1900 hours	54	Monday, August 26, 2013 from 2200 to 2300 hours	56	Saturday, August 24, 2013 from 0600 to 0700 hours

Table 6: Summary of Noise Monitoring Data Essential Operations (24 hours per day 7 days per week)

Location	Night-time (2300 to 0600 hours)	
	Lowest Hourly L_{eq} dBA	Date and Time
Meas Loc #1	47	Monday, August 26, 2013 from 0100 to 0200 hours
Meas Loc #2	50	Wednesday, August 28, 2013 from 0300 to 0400 hours
Meas Loc #3	47	Saturday, August 24, 2013 from 0300 to 0400 hours

Table 7: Summary of Minimum Background Sound Level Due to Road Traffic (applicable to VL03)

Location	Daytime (0700 to 1900 hours)	Evening (1900 to 2300 hours)	Night-time Normal Operations (0600 to 0700 hours)	Night-time Essential Operations (2300 to 0600 hours)
VL03	57	55	54	45

6.0 IMPACT ASSESSMENT

6.1 Methodology

Golder generated noise impact predictions for the identified sensitive PORs (including vacant lots zoned for future noise sensitive land use), using noise measurements at an existing Miller facility and Golder's database of similar sources. Predictions for Outdoor Points of Reception (receptors at 1.5 metres above ground within 30 metres of the building façade) and "Plane of Window" (receptors at 4.5 metres representing a second storey window of a noise sensitive space) were made as defined in NCP-300.

Sound pressure measurements were carried out on July 25, 2013 at an existing Miller Waste Management Facility located at 100 Garfield Wright Boulevard, East Gwillimbury, Ontario. Measurements were made for all external noise sources at the Material Recovery Facility (MRF) and were used to represent similar external noise sources at the proposed MRF and Construction and Demolition (C&D) processing facility. Golder's database of similar noise sources was used for equipment that does not currently operate at the East Gwillimbury location or was not operating at the time of site measurements.

Weather conditions during the site visit are presented in Table 8 below:

Table 8: Weather Conditions During Site Visit

Date	Condition	Temperature	Wind Direction (from)	Wind Speed
July 25, 2013	Cloudy	21˚C	N	15 km/hour

Weather data during the visit is provided in Attachment F. Measurements were made using a Larson Davis 2900+ (Serial #0983) sound level meter/real-time analyzer. All measuring equipment used in this study meets the MOE requirements, and calibration certificates are provided in Attachment E.

The predictive analysis was carried out using the commercially available software package Cadna/A V 4.3.143. Geometrical spreading, attenuation from barriers, ground effect and air absorption were included in the analysis as determined from ISO 9613 (part 2), which is the current standard used for outdoor sound propagation predictions. It should be noted this standard makes provisions to include a correction to address downwind or ground based temperature inversion conditions. Noise predictions have been made assuming a downwind or moderate temperature inversion conditions for all PORs, a design condition consistent with MOECC accepted practice.

As described in ISO 9613 (part 2), ground factor values that represent the ground effect on sound levels range between 0 and 1. Based on the specific Site conditions, the ground factor values used in the modelling were a ground factor value of 0.5 for the site property, and a ground factor value of 0.8 for the landfill and surrounding areas.

6.2 Results – Facility Operations

The Facility's noise emissions were modelled to predict the noise impact on the identified PORs during a predictable worst case 1-hour operation, as described in Section 5.0.

Table 9 provides detailed noise impact predictions from each source at each POR (POW receptors). The table also includes the approximate distance to each source. A sample calculation is provided in Attachment G.

Table 9: Point of Reception Noice Impact

Source ID	VL01					VL02					VL03				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_001	852	16	16	16	16	850	16	16	16	16	140	41	41	41	41
A_002	607	9	9	9		855	12	12	12		565	0	0	0	
A_003	595	10	10	10		835	12	12	12		555	0	0	0	
A_004	584	16	16	16		817	13	13	13		546	0	0	0	
A_005	614	16	16	16		825	12	12	12		503	12	12	12	
A_006	656	15	15	15		849	12	12	12		461	12	12	12	
A_007	759	5	5	5		923	12	12	12		384	20	20	20	
A_008	697	14	14	14		873	12	12	12		422	19	19	19	
A_009	789	0	0	0		958	0	0	0		389	14	14	14	
A_010	776	0	0	0		957	0	0	0		414	0	0	0	
A_011	729	0	0	0		928	0	0	0		454	0	0	0	
A_012	678	0	0	0		898	0	0	0		502	0	0	0	
A_013	630	0	0	0		872	0	0	0		551	0	0	0	
A_014	459	18	18	18		795	13	13	13		746	0	0	0	
A_015	437	19	19	19		766	13	13	13		736	0	0	0	
A_016	414	19	19	19		735	13	13	13		726	0	0	0	
A_017	431	19	19	19		735	13	13	13		697	10	10	10	
A_018	471	18	18	18		749	13	13	13		647	10	10	10	
A_019	510	17	17	17		765	13	13	13		602	10	10	10	
A_020	535	0	0	0		782	0	0	0		583	11	11	11	
A_021	551	0	0	0		809	0	0	0		595	5	5	5	
A_022	570	0	0	0		838	0	0	0		608	4	4	4	
A_023	563	0	0	0		839	0	0	0		624	0	0	0	
A_024	517	0	0	0		820	0	0	0		679	0	0	0	
A_025	484	0	0	0		808	0	0	0		722	0	0	0	
A_026	695	32	32	32		902	30	30	30		476	30	30	30	
A_027	498	36	36	36		795	31	31	31		671	28	28	28	
A_028	812	20		20		941	15		15		308	7		7	
A_029	364	47		47		463	44		44		632	35		35	
A_030	373	46		46		404	46		46		646	35		35	
A_031	363	53		53		475	50		50		630	41		41	
A_032	363	46		46		486	44		44		628	36		36	
A_033	482	44		44		546	43		43		511	36		36	
A_034	546	43		43		618	42		42		444	35		35	
A_035	485	52		52		587	50		50		506	43		43	
A_036	489	28		28		579	27		27		502	21		21	
A_037	475	45		45		550	44		44		517	37		37	
A_038	482	37		37		563	35		35		509	27		27	
A_039	474	45		45		569	43		43		516	37		37	
A_040	504	6		6		818	0		0		702	1		1	
A_041	676	2		2		899	0		0		509	5		5	
A_042	614	19	19	19		845	16	16	16		535	18	18	18	
A_043	646	18	18	18		862	16	16	16		502	21	21	21	
A_044	684	18	18	18		884	16	16	16		465	22	22	22	
A_045	725	18	18	18		909	15	15	15		427	23	23	23	
A_046	763	17	17	17		933	15	15	15		396	23	23	23	
A_047	453	22	22	22		772	17	17	17		718	13	13	13	
A_048	490	21	21	21		785	17	17	17		668	14	14	14	
A_049	533	20	20	20		802	16	16	16		616	15	15	15	
A_050	473	22	22	22		758	17	17	17		658	14	14	14	
A_051	508	16	16	16		808	16	16	16		675	14	14	14	
A_052	824	17		17		952	12		12		304	26		26	
A_053	453	22	22	22	22	395	23	23	23	23	605	14	14	14	14
A_054	438	22	22	22	22	371	24	24	24	24	629	14	14	14	14
A_055	619	19	19	19	19	671	18	18	18	18	372	19	19	19	19
A_056	637	19	19	19	19	665	13	13	13	13	356	24	24	24	24
A_057	573	20	20	20	20	510	21	21	21	21	475	16	16	16	16
A_058	613	19	19	19	19	544	20	20	20	20	438	17	17	17	17
A_059	813	0	0	0	0	929	0	0	0	0	284	0	0	0	0
A_060	455	19	19	19	19	512	22	22	22	22	542	17	17	17	17

Source ID	POR01					POR02				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_001	1250	12	12	12	12	1881	6	6	6	6
A_002	971	4	4	4		1715	0	0	0	
A_003	963	5	5	5		1703	0	0	0	
A_004	955	6	6	6		1691	4	4	4	
A_005	990	10	10	10		1719	4	4	4	
A_006	1035	10	10	10		1758	4	4	4	
A_007	1141	0	0	0		1858	0	0	0	
A_008	1078	10	10	10		1797	4	4	4	
A_009	1169	0	0	0		1890	0	0	0	
A_010	1153	0	0	0		1879	0	0	0	
A_011	1103	0	0	0		1834	0	0	0	
A_012	1048	0	0	0		1785	0	0	0	
A_013	994	0	0	0		1737	0	0	0	
A_014	792	13	13	13		1558	5	5	5	
A_015	778	13	13	13		1539	5	5	5	
A_016	763	13	13	13		1519	6	6	6	
A_017	787	13	13	13		1537	5	5	5	
A_018	835	12	12	12		1579	5	5	5	
A_019	879	12	12	12		1618	5	5	5	
A_020	905	0	0	0		1642	0	0	0	
A_021	915	0	0	0		1659	0	0	0	
A_022	928	0	0	0		1678	0	0	0	
A_023	918	0	0	0		1670	0	0	0	
A_024	863	0	0	0		1622	0	0	0	
A_025	821	0	0	0		1585	0	0	0	
A_026	1067	28	28	28		1800	22	22	22	
A_027	850	30	30	30		1604	23	23	23	
A_028	1200	14		14		1902	1		1	
A_029	760	39		39		1409	33		33	
A_030	761	39		39		1379	33		33	
A_031	760	45		45		1414	38		38	
A_032	761	39		39		1420	32		32	
A_033	879	38		38		1525	32		32	
A_034	944	37		37		1599	32		32	
A_035	883	45		45		1547	37		37	
A_036	887	22		22		1546	15		15	
A_037	872	38		38		1523	32		32	
A_038	880	30		30		1533	22		22	
A_039	872	38		38		1532	32		32	
A_040	844	4		4		1606	0		0	
A_041	1044	0		0		1783	0		0	
A_042	984	14	14	14		1721	8	8	8	
A_043	1019	14	14	14		1752	8	8	8	
A_044	1060	14	14	14		1789	8	8	8	
A_045	1104	13	13	13		1828	8	8	8	
A_046	1143	13	13	13		1863	8	8	8	
A_047	797	16	16	16		1556	10	10	10	
A_048	844	16	16	16		1597	9	9	9	
A_049	895	15	15	15		1641	9	9	9	
A_050	833	16	16	16		1580	9	9	9	
A_051	857	16	16	16		1614	9	9	9	
A_052	1212	13		13		1915	7		7	
A_053	832	16	16	16	16	1414	10	10	10	10
A_054	813	16	16	16	16	1389	11	11	11	11
A_055	1017	14	14	14	14	1667	9	9	9	9
A_056	1034	14	14	14	14	1673	9	9	9	9
A_057	959	15	15	15	15	1545	10	10	10	10
A_058	1001	14	14	14	14	1584	9	9	9	9
A_059	1203	0	0	0	0	1899	0	0	0	0
A_060	851	15	15	15	15	1491	12	12	12	12

Table 9: Point of Reception Noice Impact

Source ID	VL01					VL02					VL03					POR01					POR02				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_062	627	22	22	22	22	668	19	19	19	19	364	27	27	27	27	1025	17	17	17	17	1669	12	12	12	12
A_063	425	25	25	25	25	367	27	27	27	27	638	16	16	16	16	801	19	19	19	19	1380	14	14	14	14
A_064	884	6	6	6	6	902	6	6	6	6	110	32	32	32	32	1282	3	3	3	3	1925	0	0	0	0
A_065	883	11	11	11	11	898	11	11	11	11	110	33	33	33	33	1281	8	8	8	8	1923	5	5	5	5
A_066	883	11	11	11	11	895	11	11	11	11	110	33	33	33	33	1281	8	8	8	8	1921	5	5	5	5
A_067	882	11	11	11	11	892	11	11	11	11	109	33	33	33	33	1280	8	8	8	8	1919	5	5	5	5
A_068	881	11	11	11	11	889	11	11	11	11	110	33	33	33	33	1279	8	8	8	8	1917	5	5	5	5
A_069	881	11	11	11	11	887	11	11	11	11	110	33	33	33	33	1279	8	8	8	8	1915	5	5	5	5
A_070	880	11	11	11	11	883	11	11	11	11	110	33	33	33	33	1278	8	8	8	8	1913	5	5	5	5
A_071	891	9	9	9	9	927	7	7	7	7	124	34	34	34	34	1288	6	6	6	6	1943	2	2	2	2
A_072	648	14	14	14		872	11	11	11		516	11	11	11		1018	9	9	9		1755	2	2	2	
A_073	632	14	14	14		844	11	11	11		499	14	14	14		1007	9	9	9		1738	3	3	3	
A_074	710	13	13	13		889	11	11	11		422	18	18	18		1091	8	8	8		1811	2	2	2	
A_075	727	7	7	7		918	10	10	10		441	18	18	18		1103	8	8	8		1831	2	2	2	
A_076	479	17	17	17		792	12	12	12		703	7	7	7		823	11	11	11		1583	4	4	4	
A_077	456	18	18	18		761	12	12	12		692	8	8	8		808	12	12	12		1562	4	4	4	
A_078	506	16	16	16		780	12	12	12		630	9	9	9		869	11	11	11		1614	4	4	4	
A_079	528	10	10	10		811	12	12	12		641	8	8	8		884	11	11	11		1636	3	3	3	
A_080	829	12		12		950	6		6		289	22		22		1218	7		7		1917	2		2	
A_081	434	18	18	18	18	381	19	19	19	19	623	8	8	8	8	812	11	11	11	11	1395	5	5	5	5
A_082	457	17	17	17	17	385	19	19	19	19	611	9	9	9	9	833	11	11	11	11	1408	5	5	5	5
A_083	531	16	16	16	16	476	17	17	17	17	514	11	11	11	11	917	10	10	10	10	1504	4	4	4	4
A_084	616	14	14	14	14	651	10	10	10	10	376	14	14	14	14	1013	9	9	9	9	1654	3	3	3	3
A_085	826	0		0		938	0		0		272	0		0		1217	0		0		1911	0		0	
A_086	639	14	14	14	14	685	11	11	11	11	352	14	14	14	14	1037	9	9	9	9	1685	3	3	3	3
A_087	893	3	3	3	3	925	1	1	1	1	117	30	30	30	30	1290	0	0	0	0	1942	0	0	0	0
A_088	436	26		26		587	19		19		560	23		23		833	24		24		1515	10		10	
A_089	605	22		22		687	21		21		389	21		21		1003	16		16		1667	9		9	
A_090	870	16	16	16	16	909	10	10	10	10	141	33	33	33	33	1267	12	12	12	12	1923	2	2	2	2
A_091	868	11	11	11	11	901	5	5	5	5	136	29	29	29	29	1265	7	7	7	7	1917	0	0	0	0
A_092	550	42	42	42	42	457	44	44	44	44	526	23	23	23	23	929	29	29	29	29	1497	29	29	29	29
A_093	148	28		28		556	15		15		909	4		4		502	16		16		1247	6		6	
A_094	543	26	26	26	26	452	32	32	32	32	532	11	11	11	11	923	17	17	17	17	1491	16	16	16	16
A_095	879	10	10	10	10	897	5	5	5	5	115	30	30	30	30	1277	10	10	10	10	1921	7	7	7	7
A_096	879	10	10	10	10	894	5	5	5	5	115	30	30	30	30	1276	2	2	2	2	1919	7	7	7	7
A_097	878	9	9	9	9	892	5	5	5	5	114	30	30	30	30	1276	2	2	2	2	1917	7	7	7	7
A_098	877	9	9	9	9	889	5	5	5	5	114	30	30	30	30	1275	2	2	2	2	1915	7	7	7	7
A_099	877	9	9	9	9	885	5	5	5	5	114	30	30	30	30	1275	2	2	2	2	1913	7	7	7	7
A_100	877	5	5	5	5	883	5	5	5	5	114	30	30	30	30	1275	2	2	2	2	1911	7	7	7	7
A_101	876	5	5	5	5	880	5	5	5	5	114	30	30	30	30	1274	2	2	2	2	1909	7	7	7	7
A_102	475	37		37		527	36		36		521	30		30		871	31		31		1510	24		24	
A_103	700	30		0		762	22		0		296	32		0		1098	25		0		1758	14		0	
A_104	692	23		0		672	18		0		317	25		0		1087	18		0		1702	7		0	
A_105	692	12		0		681	6		0		312	14		0		1088	7		0		1707	0		0	
A_106	699	27		0		755	20		0		295	30		0		1097	22		0		1754	11		0	
A_107	697	14		0		746	8		0		295	17		0		1095	9		0		1748	0		0	
A_108	77 / 439	50		49		506 / 770	36		35		700 / 1419	25		23		115 / 697	46		44		870 / 1400	29		28	
A_109	304 / 347	31		29		544 / 637	24		23		700 / 708	16		15		697 / 722	22		20		1401 / 1455	14		12	
A_110	347 / 521	31		30		637 / 841	25		24		708 / 767	16		15		722 / 856	26		24		1455 / 1622	17		16	
A_111	501 / 521	0		0		815 / 840	0		0		700 / 712	0		0		843 / 855	0		0		1604 / 1621	0		0	
A_112	522 / 688	9		7		841 / 919	8		7		522 / 712	9		7		856 / 1053	11		10		1622 / 1796	6		4	
A_113	673 / 689	0		0		896 / 920	0		0		507 / 522	0		0		1042 / 1054	0		0		1780 / 1796	0		0	
A_114	615 / 816	28		26		722 / 998	20		18		312 / 522	31		30		1011 / 1192	22		21		1689 / 1920	11		10	
A_115	604 / 614	9		8		686 / 722	8		6		390 / 392	9		7		1002 / 1010	10		8		1666 / 1689	0		0	
A_116	439 / 614	30		28		608 / 721	21		20		393 / 564	23		22		834 / 1009	23		22		1525 / 1688	11		9	
A_117	433 / 439	20		18		586 / 607	10		8		564 / 564	11		9		830 / 834	13		11		1513 / 1524	0		0	
A_118	304 / 439	34		32		543 / 608	26		25		564 / 700	22		21		697 / 834	26		24		1400 / 1525	18		16	
A_119	193 / 422	27		27		618 / 832	18		18		708 / 1000	9		9		490 / 722	20		20		1258 / 1478	10		10	
A_120	75 / 541	41	41	41	41	313 / 767	31	31	31	31	534 / 1418	16	16	16	16	112 / 920	36	36	36	36	867 / 1488	20	20	20	20

Table 9: Point of Reception Noice Impact

Source ID	POR03					POR04					POR05					POR06				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_001	1872	12	12	12	12	1359	10	10	10	10	1281	18	18	18	18	1377	17	17	17	17
A_002	1880	3	3	3		1046	4	4	4		902	5	5	5		976	6	6	6	
A_003	1862	3	3	3		1040	4	4	4		901	5	5	5		977	4	4	4	
A_004	1845	3	3	3		1035	4	4	4		900	5	5	5		979	4	4	4	
A_005	1859	3	3	3		1073	10	10	10		942	2	2	2		1022	0	0	0	
A_006	1886	3	3	3		1119	9	9	9		989	2	2	2		1069	0	0	0	
A_007	1964	2	2	2		1225	0	0	0		1094	0	0	0		1172	0	0	0	
A_008	1913	3	3	3		1163	9	9	9		1035	2	2	2		1114	0	0	0	
A_009	1999	0	0	0		1251	0	0	0		1115	0	0	0		1190	0	0	0	
A_010	1997	0	0	0		1234	0	0	0		1094	0	0	0		1168	9	9	9	
A_011	1965	0	0	0		1182	0	0	0		1041	0	0	0		1114	9	9	9	
A_012	1931	0	0	0		1125	0	0	0		982	0	0	0		1055	10	10	10	
A_013	1899	0	0	0		1069	0	0	0		923	0	0	0		997	10	10	10	
A_014	1782	4	4	4		856	12	12	12		702	14	14	14		776	13	13	13	
A_015	1756	4	4	4		846	12	12	12		700	14	14	14		778	13	13	13	
A_016	1728	4	4	4		836	12	12	12		700	14	14	14		782	13	13	13	
A_017	1735	4	4	4		862	12	12	12		728	9	9	9		811	2	2	2	
A_018	1761	4	4	4		913	11	11	11		781	7	7	7		863	0	0	0	
A_019	1785	4	4	4		959	11	11	11		829	6	6	6		911	0	0	0	
A_020	1805	0	0	0		984	0	0	0		852	0	0	0		933	0	0	0	
A_021	1830	0	0	0		991	0	0	0		852	0	0	0		930	0	0	0	
A_022	1857	0	0	0		1000	0	0	0		854	0	0	0		928	0	0	0	
A_023	1855	0	0	0		989	0	0	0		840	1	1	1		914	11	11	11	
A_024	1825	0	0	0		930	0	0	0		779	3	3	3		852	12	12	12	
A_025	1802	0	0	0		886	0	0	0		732	6	6	6		805	12	12	12	
A_026	1938	21	21	21		1146	27	27	27		1006	23	23	23		1080	28	28	28	
A_027	1801	22	22	22		920	29	29	29		775	31	31	31		852	30	30	30	
A_028	1982	0		0		1289	14		14		1166	8		8		1246	7		7	
A_029	1499	32		32		875	38		38		833	39		39		942	37		37	
A_030	1444	33		33		883	38		38		861	38		38		974	37		37	
A_031	1509	37		37		874	43		43		828	44		44		936	43		43	
A_032	1520	31		31		874	37		37		824	38		38		931	37		37	
A_033	1587	32		32		992	37		37		937	31		31		1042	36		36	
A_034	1660	25		25		1053	36		36		985	37		37		1085	36		36	
A_035	1627	37		37		991	43		43		922	44		44		1024	43		43	
A_036	1620	15		15		996	20		20		930	22		22		1032	20		20	
A_037	1592	32		32		984	37		37		926	36		36		1030	37		37	
A_038	1604	22		22		990	28		28		929	29		29		1033	28		28	
A_039	1610	31		31		981	37		37		917	38		38		1019	37		37	
A_040	1817	0		0		910	6		6		756	22		22		829	25		25	
A_041	1932	0		0		1120	0		0		976	12		12		1049	22		22	
A_042	1875	7	7	7		1062	14	14	14		923	15	15	15		1000	14	14	14	
A_043	1896	7	7	7		1099	13	13	13		961	9	9	9		1038	14	14	14	
A_044	1921	7	7	7		1141	13	13	13		1005	9	9	9		1081	8	8	8	
A_045	1948	7	7	7		1186	13	13	13		1051	8	8	8		1127	8	8	8	
A_046	1974	7	7	7		1226	12	12	12		1092	8	8	8		1168	7	7	7	
A_047	1767	8	8	8		866	16	16	16		720	17	17	17		798	16	16	16	
A_048	1791	8	8	8		916	15	15	15		773	17	17	17		851	16	16	16	
A_049	1819	8	8	8		969	15	15	15		829	16	16	16		907	15	15	15	
A_050	1767	8	8	8		909	15	15	15		774	17	17	17		855	16	16	16	
A_051	1814	8	8	8		926	15	15	15		777	17	17	17		852	16	16	16	
A_052	1994	7		7		1301	12		12		1177	7		7		1257	6		6	
A_053	1435	10	10	10	10	959	15	15	15	15	948	15	15	15	15	1062	14	14	14	14
A_054	1411	11	11	11	11	941	15	15	15	15	936	15	15	15	15	1051	14	14	14	14
A_055	1711	9	9	9	9	1126	13	13	13	13	1053	14	14	14	14	1152	13	13	13	13
A_056	1702	9	9	9	9	1145	13	13	13	13	1079	14	14	14	14	1179	13	13	13	13
A_057	1540	10	10	10	10	1083	13	13	13	13	1055	14	14	14	14	1165	13	13	13	13
A_058	1569	9	9	9	9	1124	13	13	13	13	1094	13	13	13	13	1203	12	12	12	12
A_059	1969	0	0	0	0	1295	0	0	0	0	1177	0	0	0	0	1259	0	0	0	0
A_060	1554	12	12	12	12	966	14	14	14	14	918	14	14	14	14	1025	15	15	15	15

Table 9: Point of Reception Noice Impact

Source ID	POR03					POR04					POR05					POR06				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_062	1706	12	12	12	12	1135	16	16	16	16	1066	17	17	17	17	1165	16	16	16	16
A_063	1408	14	14	14	14	928	18	18	18	18	923	18	18	18	18	1038	17	17	17	17
A_064	1926	0	0	0	0	1388	2	2	2	2	1301	3	3	3	3	1393	2	2	2	2
A_065	1922	5	5	5	5	1388	8	8	8	8	1302	8	8	8	8	1394	8	8	8	8
A_066	1918	5	5	5	5	1387	8	8	8	8	1302	8	8	8	8	1395	8	8	8	8
A_067	1915	5	5	5	5	1387	8	8	8	8	1303	8	8	8	8	1396	8	8	8	8
A_068	1911	5	5	5	5	1387	8	8	8	8	1303	8	8	8	8	1397	8	8	8	8
A_069	1908	5	5	5	5	1387	8	8	8	8	1304	8	8	8	8	1397	8	8	8	8
A_070	1904	5	5	5	5	1386	8	8	8	8	1304	8	8	8	8	1398	8	8	8	8
A_071	1955	2	2	2	2	1391	5	5	5	5	1296	6	6	6	6	1385	5	5	5	5
A_072	1904	2	2	2		1095	8	8	8		955	4	4	4		1030	3	3	3	
A_073	1878	2	2	2		1088	8	8	8		955	4	4	4		1033	3	3	3	
A_074	1928	1	1	1		1174	8	8	8		1043	3	3	3		1121	2	2	2	
A_075	1957	1	1	1		1184	2	2	2		1046	3	3	3		1121	2	2	2	
A_076	1791	2	2	2		891	10	10	10		743	12	12	12		819	11	11	11	
A_077	1762	2	2	2		881	10	10	10		741	12	12	12		821	11	11	11	
A_078	1795	2	2	2		944	10	10	10		807	12	12	12		887	10	10	10	
A_079	1824	2	2	2		956	10	10	10		810	12	12	12		886	10	10	10	
A_080	1991	0		0		1308	6		6		1187	2		2		1267	1		1	
A_081	1422	5	5	5	5	939	10	10	10	10	930	10	10	10	10	1045	9	9	9	9
A_082	1424	5	5	5	5	961	10	10	10	10	954	10	10	10	10	1068	8	8	8	8
A_083	1511	4	4	4	4	1040	9	9	9	9	1016	9	9	9	9	1127	8	8	8	8
A_084	1690	3	3	3	3	1124	8	8	8	8	1058	9	9	9	9	1159	8	8	8	8
A_085	1978	0		0		1309	0		0		1191	0		0		1273	0		0	
A_086	1723	3	3	3	3	1145	8	8	8	8	1072	9	9	9	9	1171	8	8	8	8
A_087	1952	0	0	0	0	1394	0	0	0	0	1300	0	0	0	0	1390	0	0	0	0
A_088	1623	9		9		937	23		23		860	24		24		960	23		23	
A_089	1728	8		8		1108	21		21		1027	22		22		1124	21		21	
A_090	1939	2	2	2	2	1370	11	11	11	11	1276	12	12	12	12	1366	11	11	11	11
A_091	1929	0	0	0	0	1369	6	6	6	6	1278	7	7	7	7	1368	6	6	6	6
A_092	1485	23	23	23	23	1056	28	28	28	28	1042	22	22	22	22	1154	20	20	20	20
A_093	1484	4		4		592	15		15		517	16		16		625	14		14	
A_094	1481	10	10	10	10	1050	15	15	15	15	1036	15	15	15	15	1148	9	9	9	9
A_095	1922	0	0	0	0	1383	10	10	10	10	1296	10	10	10	10	1388	10	10	10	10
A_096	1918	0	0	0	0	1383	10	10	10	10	1297	10	10	10	10	1389	10	10	10	10
A_097	1915	0	0	0	0	1383	10	10	10	10	1298	10	10	10	10	1390	10	10	10	10
A_098	1911	0	0	0	0	1383	10	10	10	10	1298	10	10	10	10	1391	10	10	10	10
A_099	1908	7	7	7	7	1382	10	10	10	10	1299	10	10	10	10	1392	10	10	10	10
A_100	1905	7	7	7	7	1382	10	10	10	10	1300	10	10	10	10	1393	10	10	10	10
A_101	1901	7	7	7	7	1382	1	1	1	1	1301	10	10	10	10	1394	10	10	10	10
A_102	1569	24		24		986	29		29		936	25		25		1042	29		29	
A_103	1800	13		0		1203	24		0		1117	25		0		1211	24		0	
A_104	1699	7		0		1203	16		0		1147	17		0		1250	16		0	
A_105	1709	0		0		1203	6		0		1144	7		0		1246	0		0	
A_106	1792	10		0		1202	21		0		1119	22		0		1213	21		0	
A_107	1783	0		0		1201	8		0		1121	9		0		1216	8		0	
A_108	1322 / 1554	21		19		81 / 797	45		43		220 / 723	42		40		323 / 826	38		37	
A_109	1555 / 1638	9		7		798 / 809	19		17		703 / 723	22		21		797 / 826	21		20	
A_110	1638 / 1838	15		14		809 / 918	25		23		693 / 758	27		25		767 / 828	26		24	
A_111	1814 / 1837	0		0		909 / 918	9		7		756 / 758	15		14		828 / 829	14		13	
A_112	1838 / 1951	2		0		918 / 1127	16		14		758 / 978	24		22		828 / 1049	23		22	
A_113	1928 / 1951	0		0		1119 / 1127	0		0		975 / 978	2		1		1049 / 1049	5		4	
A_114	1763 / 2038	10		9		1111 / 1270	21		20		978 / 1126	23		22		1049 / 1207	23		21	
A_115	1728 / 1764	0		0		1107 / 1111	9		7		1019 / 1026	10		8		1112 / 1123	9		7	
A_116	1641 / 1763	10		8		935 / 1110	22		21		852 / 1019	23		22		950 / 1112	22		21	
A_117	1621 / 1640	0		0		933 / 935	11		10		852 / 857	12		11		950 / 957	11		10	
A_118	1554 / 1641	11		10		797 / 935	25		23		723 / 852	26		24		826 / 950	24		23	
A_119	1528 / 1760	7		7		564 / 809	19		19		446 / 703	21		21		520 / 797	20		20	
A_120	1318 / 1588	12	12	12	12	81 / 1047	35	35	35	35	224 / 1033	32	32	32	32	327 / 1146	28	28	28	28

Table 9: Point of Reception Noice Impact

Source ID	POR07					POR08					POR09					POR10				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_001	1376	17	17	17	17	1386	17	17	17	17	1375	10	10	10	10	1785	7	7	7	7
A_002	966	6	6	6		970	7	7	7		933	11	11	11		1325	7	7	7	
A_003	968	5	5	5		973	5	5	5		939	5	5	5		1335	1	1	1	
A_004	971	4	4	4		976	4	4	4		946	5	5	5		1345	1	1	1	
A_005	1014	0	0	0		1019	0	0	0		989	0	0	0		1387	0	0	0	
A_006	1061	0	0	0		1066	0	0	0		1034	0	0	0		1428	0	0	0	
A_007	1163	0	0	0		1167	0	0	0		1129	0	0	0		1513	0	0	0	
A_008	1106	0	0	0		1111	0	0	0		1078	0	0	0		1469	0	0	0	
A_009	1179	0	0	0		1182	0	0	0		1140	0	0	0		1519	0	0	0	
A_010	1157	9	9	9		1160	9	9	9		1116	9	9	9		1494	5	5	5	
A_011	1103	9	9	9		1106	9	9	9		1064	9	9	9		1445	6	6	6	
A_012	1045	10	10	10		1048	10	10	10		1007	10	10	10		1392	6	6	6	
A_013	986	10	10	10		990	10	10	10		951	11	11	11		1340	7	7	7	
A_014	767	13	13	13		772	13	13	13		744	13	13	13		1152	8	8	8	
A_015	771	13	13	13		777	13	13	13		755	13	13	13		1168	8	8	8	
A_016	776	13	13	13		783	13	13	13		768	13	13	13		1185	8	8	8	
A_017	806	0	0	0		813	0	0	0		797	0	0	0		1213	0	0	0	
A_018	857	0	0	0		864	0	0	0		845	0	0	0		1256	0	0	0	
A_019	904	0	0	0		911	0	0	0		889	0	0	0		1297	0	0	0	
A_020	926	0	0	0		932	0	0	0		907	0	0	0		1312	0	0	0	
A_021	922	0	0	0		927	0	0	0		897	0	0	0		1297	0	0	0	
A_022	918	0	0	0		922	0	0	0		887	0	0	0		1281	0	0	0	
A_023	903	11	11	11		907	11	11	11		872	12	12	12		1266	7	7	7	
A_024	842	12	12	12		846	12	12	12		813	12	12	12		1213	8	8	8	
A_025	795	13	13	13		799	13	13	13		769	13	13	13		1173	8	8	8	
A_026	1070	28	28	28		1073	28	28	28		1033	28	28	28		1418	24	24	24	
A_027	843	30	30	30		848	30	30	30		820	30	30	30		1224	26	26	26	
A_028	1238	6		6		1243	5		5		1207	6		6		1593	3		3	
A_029	952	37		37		969	37		37		997	37		37		1437	33		33	
A_030	987	37		37		1005	30		30		1042	36		36		1484	33		33	
A_031	945	43		43		962	42		42		989	42		42		1428	38		38	
A_032	940	37		37		956	36		36		982	36		36		1420	32		32	
A_033	1048	36		36		1063	36		36		1079	36		36		1512	33		33	
A_034	1089	36		36		1102	36		36		1107	36		36		1534	32		32	
A_035	1028	43		43		1041	43		43		1051	43		43		1480	38		38	
A_036	1037	20		20		1051	20		20		1061	20		20		1491	16		16	
A_037	1036	37		37		1051	37		37		1066	36		36		1498	32		32	
A_038	1038	28		28		1052	28		28		1065	27		27		1497	23		23	
A_039	1024	37		37		1038	37		37		1050	37		37		1481	33		33	
A_040	818	25		25		822	25		25		790	25		25		1191	19		19	
A_041	1038	22		22		1041	22		22		1000	22		22		1385	17		17	
A_042	991	14	14	14		995	14	14	14		961	14	14	14		1355	11	11	11	
A_043	1029	14	14	14		1033	14	14	14		998	14	14	14		1389	10	10	10	
A_044	1072	14	14	14		1076	14	14	14		1039	14	14	14		1427	10	10	10	
A_045	1117	13	13	13		1121	13	13	13		1083	13	13	13		1468	10	10	10	
A_046	1159	7	7	7		1162	7	7	7		1123	13	13	13		1505	10	10	10	
A_047	790	16	16	16		796	16	16	16		773	17	17	17		1183	12	12	12	
A_048	843	16	16	16		848	16	16	16		822	16	16	16		1229	12	12	12	
A_049	898	15	15	15		903	15	15	15		875	15	15	15		1276	12	12	12	
A_050	848	16	16	16		855	16	16	16		833	16	16	16		1244	12	12	12	
A_051	842	16	16	16		847	16	16	16		816	16	16	16		1218	12	12	12	
A_052	1248	6		6		1253	6		6		1216	7		7		1600	4		4	
A_053	1076	14	14	14	14	1095	13	13	13	13	1133	13	13	13	13	1575	10	10	10	10
A_054	1066	14	14	14	14	1086	13	13	13	13	1127	13	13	13	13	1570	10	10	10	10
A_055	1154	13	13	13	13	1166	13	13	13	13	1167	13	13	13	13	1589	10	10	10	10
A_056	1183	13	13	13	13	1195	13	13	13	13	1198	13	13	13	13	1621	9	9	9	9
A_057	1175	13	13	13	13	1192	13	13	13	13	1217	12	12	12	12	1654	9	9	9	9
A_058	1212	12	12	12	12	1228	12	12	12	12	1251	12	12	12	12	1686	9	9	9	9
A_059	1251	0	0	0	0	1257	0	0	0	0	1224	0	0	0	0	1613	0	0	0	0
A_060	1033	15	15	15	15	1048	15	15	15	15	1069	15	15	15	15	1504	12	12	12	12

Table 9: Point of Reception Noice Impact

Source ID	POR07					POR08					POR09					POR10				
	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)	Distance (m)	Normal Operations Daytime (0700 - 1900)	Normal Operations Evening (1900 - 2300)	Normal Operations Night-time (0600 - 0700)	Essential Operations Night-time (2300 - 0600)
A_062	1168	16	16	16	16	1180	16	16	16	16	1182	16	16	16	16	1605	12	12	12	12
A_063	1053	17	17	17	17	1073	16	16	16	16	1115	16	16	16	16	1558	13	13	13	13
A_064	1391	2	2	2	2	1399	2	2	2	2	1382	2	2	2	2	1785	0	0	0	0
A_065	1392	8	8	8	8	1401	8	8	8	8	1384	8	8	8	8	1787	5	5	5	5
A_066	1393	8	8	8	8	1402	8	8	8	8	1385	8	8	8	8	1789	5	5	5	5
A_067	1394	8	8	8	8	1403	8	8	8	8	1387	8	8	8	8	1792	5	5	5	5
A_068	1395	8	8	8	8	1404	8	8	8	8	1389	7	7	7	7	1794	5	5	5	5
A_069	1396	8	8	8	8	1405	8	8	8	8	1391	7	7	7	7	1796	5	5	5	5
A_070	1397	8	8	8	8	1406	8	8	8	8	1392	7	7	7	7	1798	5	5	5	5
A_071	1382	5	5	5	5	1390	4	4	4	4	1368	6	6	6	6	1766	3	3	3	3
A_072	1020	9	9	9		1023	9	9	9		986	9	9	9		1375	5	5	5	
A_073	1024	3	3	3		1029	3	3	3		997	9	9	9		1391	5	5	5	
A_074	1112	2	2	2		1117	2	2	2		1082	3	3	3		1470	4	4	4	
A_075	1110	2	2	2		1114	8	8	8		1074	8	8	8		1456	4	4	4	
A_076	810	11	11	11		815	11	11	11		787	12	12	12		1193	7	7	7	
A_077	814	11	11	11		820	11	11	11		799	12	12	12		1210	7	7	7	
A_078	879	11	11	11		885	10	10	10		860	11	11	11		1266	6	6	6	
A_079	877	11	11	11		882	11	11	11		851	11	11	11		1251	6	6	6	
A_080	1259	1		1		1263	1		1		1228	1		1		1613	0		0	
A_081	1059	8	8	8	8	1078	8	8	8	8	1118	8	8	8	8	1561	4	4	4	4
A_082	1082	8	8	8	8	1102	8	8	8	8	1142	8	8	8	8	1584	4	4	4	4
A_083	1138	8	8	8	8	1155	8	8	8	8	1184	8	8	8	8	1622	4	4	4	4
A_084	1162	8	8	8	8	1175	8	8	8	8	1179	8	8	8	8	1603	4	4	4	4
A_085	1266	0		0		1271	0		0		1238	0		0		1626	0		0	
A_086	1173	8	8	8	8	1185	8	8	8	8	1184	8	8	8	8	1605	0	0	0	0
A_087	1387	0	0	0	0	1395	0	0	0	0	1374	0	0	0	0	1773	0	0	0	0
A_088	964	23		23		977	22		22		986	22		22		1415	17		17	
A_089	1124	21		21		1136	20		20		1132	20		20		1552	10		10	
A_090	1362	11	11	11	11	1370	11	11	11	11	1349	6	6	6	6	1749	3	3	3	3
A_091	1365	6	6	6	6	1374	6	6	6	6	1354	0	0	0	0	1755	0	0	0	0
A_092	1166	19	19	19	19	1185	18	18	18	18	1217	16	16	16	16	1657	14	14	14	14
A_093	635	14		14		653	14		14		693	13		13		1137	8		8	
A_094	1161	7	7	7	7	1179	7	7	7	7	1212	5	5	5	5	1652	3	3	3	3
A_095	1386	10	10	10	10	1395	10	10	10	10	1377	1	1	1	1	1781	0	0	0	0
A_096	1387	10	10	10	10	1396	10	10	10	10	1379	1	1	1	1	1783	0	0	0	0
A_097	1388	10	10	10	10	1397	10	10	10	10	1381	1	1	1	1	1785	0	0	0	0
A_098	1389	10	10	10	10	1399	10	10	10	10	1383	1	1	1	1	1788	0	0	0	0
A_099	1391	10	10	10	10	1400	10	10	10	10	1385	1	1	1	1	1790	0	0	0	0
A_100	1392	10	10	10	10	1401	10	10	10	10	1387	1	1	1	1	1793	0	0	0	0
A_101	1393	10	10	10	10	1403	10	10	10	10	1389	1	1	1	1	1795	0	0	0	0
A_102	1049	29		29		1065	29		29		1083	28		28		1518	24		24	
A_103	1210	24		0		1220	24		0		1210	18		0		1623	14		0	
A_104	1254	16		0		1267	16		0		1274	10		0		1699	7		0	
A_105	1250	0		0		1263	0		0		1267	0		0		1691	0		0	
A_106	1213	21		0		1223	21		0		1215	15		0		1628	12		0	
A_107	1216	8		0		1227	8		0		1220	8		0		1634	0		0	
A_108	368 / 832	37		36		402 / 847	37		35		545 / 866	35		34		926 / 1303	29		28	
A_109	797 / 832	21		19		809 / 847	21		19		812 / 866	21		19		1241 / 1303	16		14	
A_110	755 / 816	26		24		758 / 819	26		24		724 / 812	26		24		1126 / 1241	21		19	
A_111	816 / 819	15		13		819 / 823	14		13		782 / 791	15		13		1179 / 1193	10		8	
A_112	816 / 1037	23		22		819 / 1039	23		21		782 / 995	23		22		1179 / 1375	19		17	
A_113	1037 / 1038	6		4		1039 / 1041	5		4		995 / 1001	6		4		1375 / 1386	2		0	
A_114	1037 / 1202	23		21		1039 / 1208	22		20		995 / 1181	21		20		1375 / 1577	18		16	
A_115	1111 / 1124	9		7		1121 / 1135	8		7		1112 / 1132	9		7		1527 / 1551	0		0	
A_116	952 / 1111	22		21		965 / 1121	22		21		970 / 1112	22		21		1398 / 1527	17		16	
A_117	952 / 961	11		10		965 / 974	11		10		970 / 982	11		10		1398 / 1412	6		5	
A_118	832 / 952	24		23		847 / 965	24		23		866 / 970	24		23		1303 / 1398	19		18	
A_119	509 / 797	20		20		513 / 809	20		20		494 / 812	20		20		919 / 1241	13		13	
A_120	371 / 1159	28	28	28	28	405 / 1177	27	27	27	27	549 / 1210	25	25	25	25	929 / 1650	19	19	19	19

Table 10 provides a summary of the noise impact from the Facility's predictable worst case operation at the identified PORs. Although several of the PORs are one-storey dwellings, to remain conservative, receptor heights of 4.5 m representing two-storey dwellings have been used for all Plane of Window (POW) assessments.

Table 10: Noise Impact Summary – Facility Operations

POR ID	POR Description	Facility Operating Scenario	Time Period	SPL Outdoor (dBA)	SPL POW (dBA)	Sound Level Limit (dBA)	Compliance with Sound Level Limit
POR01	Two-storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	52	52	65	Yes
			Evening (1900 to 2300)	40	39	61	Yes
			Night-time (0600 to 0700)	N/A	52	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	38	50	Yes
POR02	One-storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	43	44	58	Yes
			Evening (1900 to 2300)	31	32	54	Yes
			Night-time (0600 to 0700)	N/A	44	56	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	31	47	Yes
POR03	One -storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	38	43	58	Yes
			Evening (1900 to 2300)	26	29	54	Yes
			Night-time (0600 to 0700)	N/A	43	56	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	27	47	Yes
POR04	Two-storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	51	51	65	Yes
			Evening (1900 to 2300)	39	38	61	Yes
			Night-time (0600 to 0700)	N/A	50	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	36	50	Yes

POR ID	POR Description	Facility Operating Scenario	Time Period	SPL Outdoor (dBA)	SPL POW (dBA)	Sound Level Limit (dBA)	Compliance with Sound Level Limit
POR05	One -storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	50	51	65	Yes
			Evening (1900 to 2300)	36	36	61	Yes
			Night-time (0600 to 0700)	N/A	50	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	34	50	Yes
POR06	One -storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	48	49	65	Yes
			Evening (1900 to 2300)	34	35	61	Yes
			Night-time (0600 to 0700)	N/A	49	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	31	50	Yes
POR7	One -storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	48	49	65	Yes
			Evening (1900 to 2300)	34	35	61	Yes
			Night-time (0600 to 0700)	N/A	49	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	31	50	Yes
POR08	One -storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	48	49	65	Yes
			Evening (1900 to 2300)	34	35	61	Yes
			Night-time (0600 to 0700)	N/A	49	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	30	50	Yes
POR09	One -storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	48	49	65	Yes
			Evening (1900 to 2300)	33	35	61	Yes
			Night-time (0600 to 0700)	N/A	49	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	29	50	Yes

POR ID	POR Description	Facility Operating Scenario	Time Period	SPL Outdoor (dBA)	SPL POW (dBA)	Sound Level Limit (dBA)	Compliance with Sound Level Limit
POR10	Two-storey residential dwelling	Normal Operations	Daytime (0700 to 1900)	43	45	58	Yes
			Evening (1900 to 2300)	29	31	56	Yes
			Night-time (0600 to 0700)	N/A	44	58	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	25	47	Yes
VL01	Vacant Lot	Normal Operations	Daytime (0700 to 1900)	58	59	65	Yes
			Evening (1900 to 2300)	46	46	61	Yes
			Night-time (0600 to 0700)	N/A	58	63	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	45	50	Yes
VL02	Vacant Lot	Normal Operations	Daytime (0700 to 1900)	56	56	58	Yes
			Evening (1900 to 2300)	46	46	54	Yes
			Night-time (0600 to 0700)	N/A	56	56	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	45	47	Yes
VL03	Vacant Lot	Normal Operations	Daytime (0700 to 1900)	51	51	57	Yes
			Evening (1900 to 2300)	47	47	55	Yes
			Night-time (0600 to 0700)	N/A	50	54	Yes
		Essential Operations	Night-time (2300 to 0600)	N/A	45	45	Yes

7.0 CONCLUSION

Golder Associates Ltd. (Golder) was retained by Taggart Miller Environmental Services (Taggart Miller) to prepare an Acoustic Assessment Report (AAR) for the Capital Region Resource Recovery Centre (CRRRC) facility (the Facility) located in Ottawa, Ontario.

Noise measurements at an existing Miller facility and Golder's database of similar sources were used as inputs to a predictive acoustical model to quantify outdoor noise emissions associated with the Facility. Golder predicted noise impacts from the Facility at the sensitive PORs to be below the applicable sound level limits during the predictable worst case hour of Facility operation. Therefore, the Facility is expected to operate in compliance with Ministry of the Environment and Climate Change noise guidelines as specified in NPC-300.

8.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

Tim Gully, B.A., AMIOA(D)
Acoustics, Noise, and Vibration Specialist

Danny da Silva, B.Sc., P.Eng., Associate
Acoustics, Noise, and Vibration Engineer

TG/DS/ca/sg
n:\active\2012\1125 - environmental and civil engineering\12-1125-0045 crrrc ea eastern on\phase 4500_final_easr\vol 4 - d&o\appendices\app b_acoustic assessment\12-1125-0045 crrrc aar_dec2014.docx

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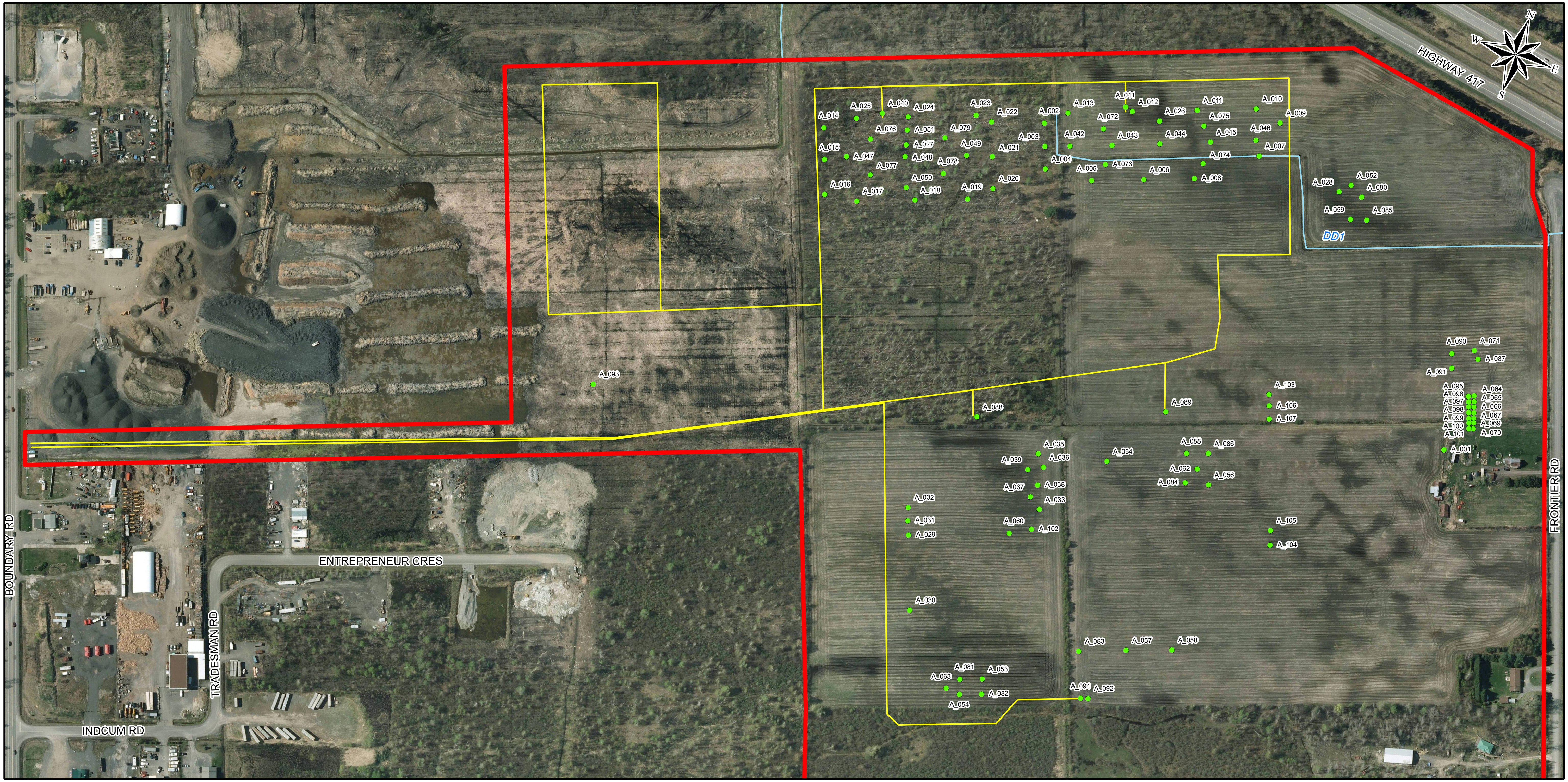
FIGURES

N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\GIS\MXDs\12-1125-0045\Working\Phase4000\Task0110_Atmosphere\1211250045-4000-0110-01_SiteLayoutPlan.mxd



LEGEND

- POINT SOURCES
- LINE SOURCES
- SURFACE WATER FEATURE
- PROPERTY BOUNDARY

80 40 0 80

SCALE 1:3,500 METRES

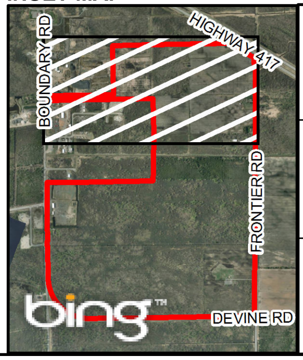
NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

INSET MAP



PROJECT

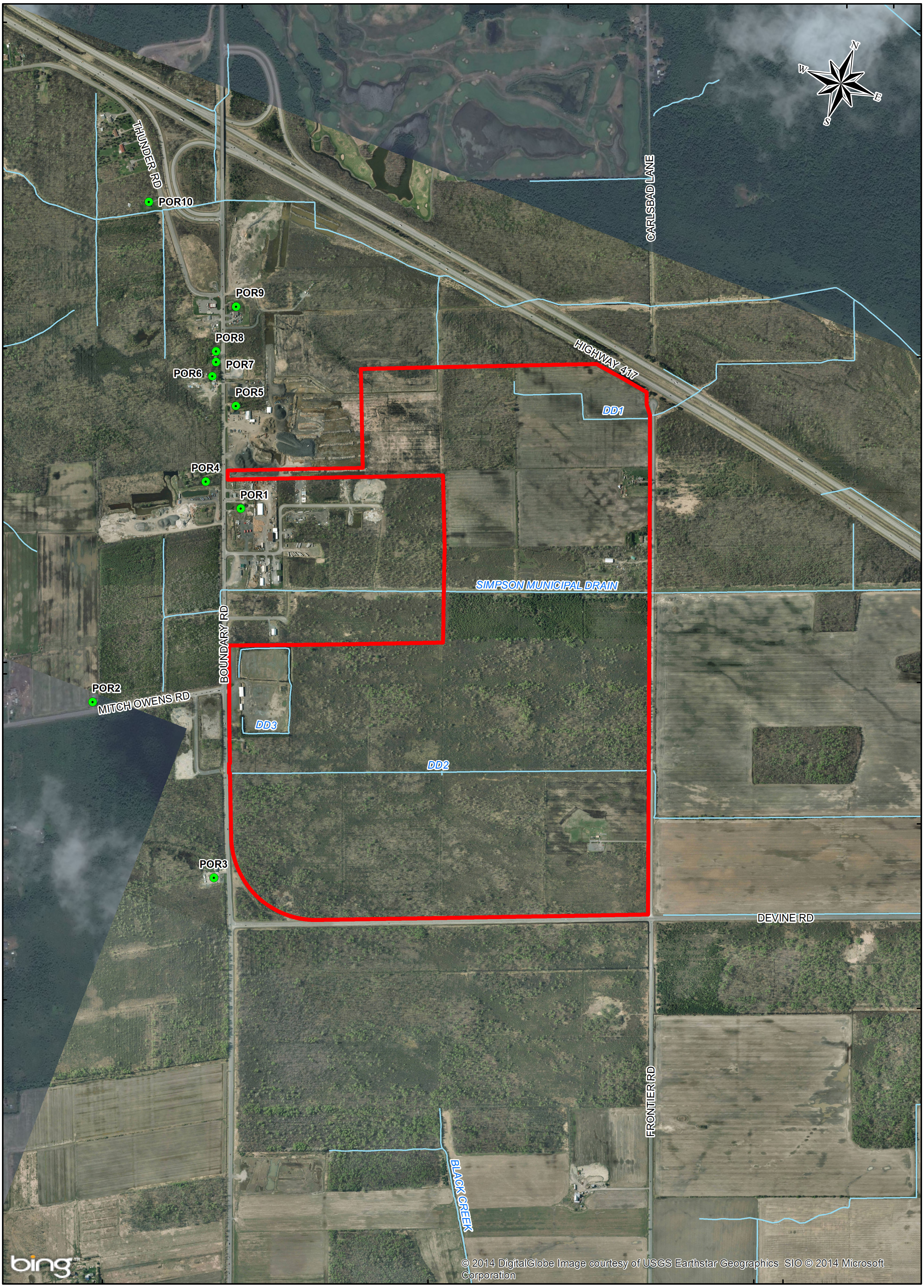
ACOUSTIC ASSESSMENT REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

SITE LAYOUT PLAN

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	TG	DEC. 2013	FIGURE 1	
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		



LEGEND

- POINT OF RECEPTION LOCATIONS
- SURFACE WATER FEATURE
- PROPERTY BOUNDARY

400 200 0 400

SCALE 1:12,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

ACOUSTIC ASSESSMENT REPORT FOR
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

POINT OF RECEPTION LOCATIONS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	TG	DEC. 2013	**FIGURE 2**	
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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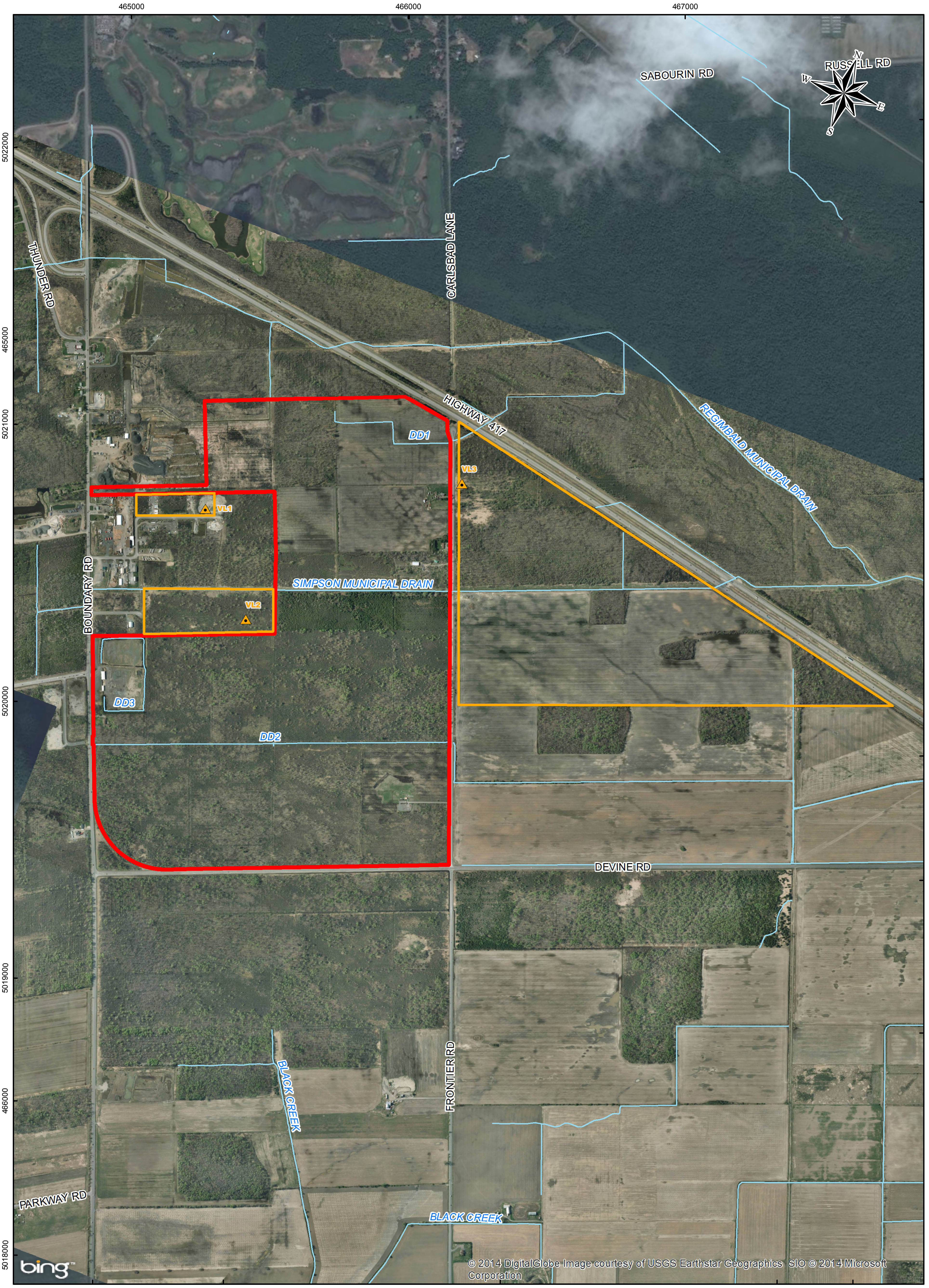

400 200 0 400

SCALE 1:14,000 METRES

LEGEND

- RECEPTOR LOCATION
- VACANT LOT
- SURFACE WATER FEATURE
- PROPERTY BOUNDARY

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT
ACOUSTIC ASSESSMENT REPORT FOR
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
VACANT LOT LOCATIONS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	TG	DEC. 2013	**FIGURE 3**	
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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400 200 0 400

SCALE 1:12,000 METRES

LEGEND

NOISE MONITORING LOCATIONS

SURFACE WATER FEATURE

PROPERTY BOUNDARY

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

ACOUSTIC ASSESSMENT REPORT FOR
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

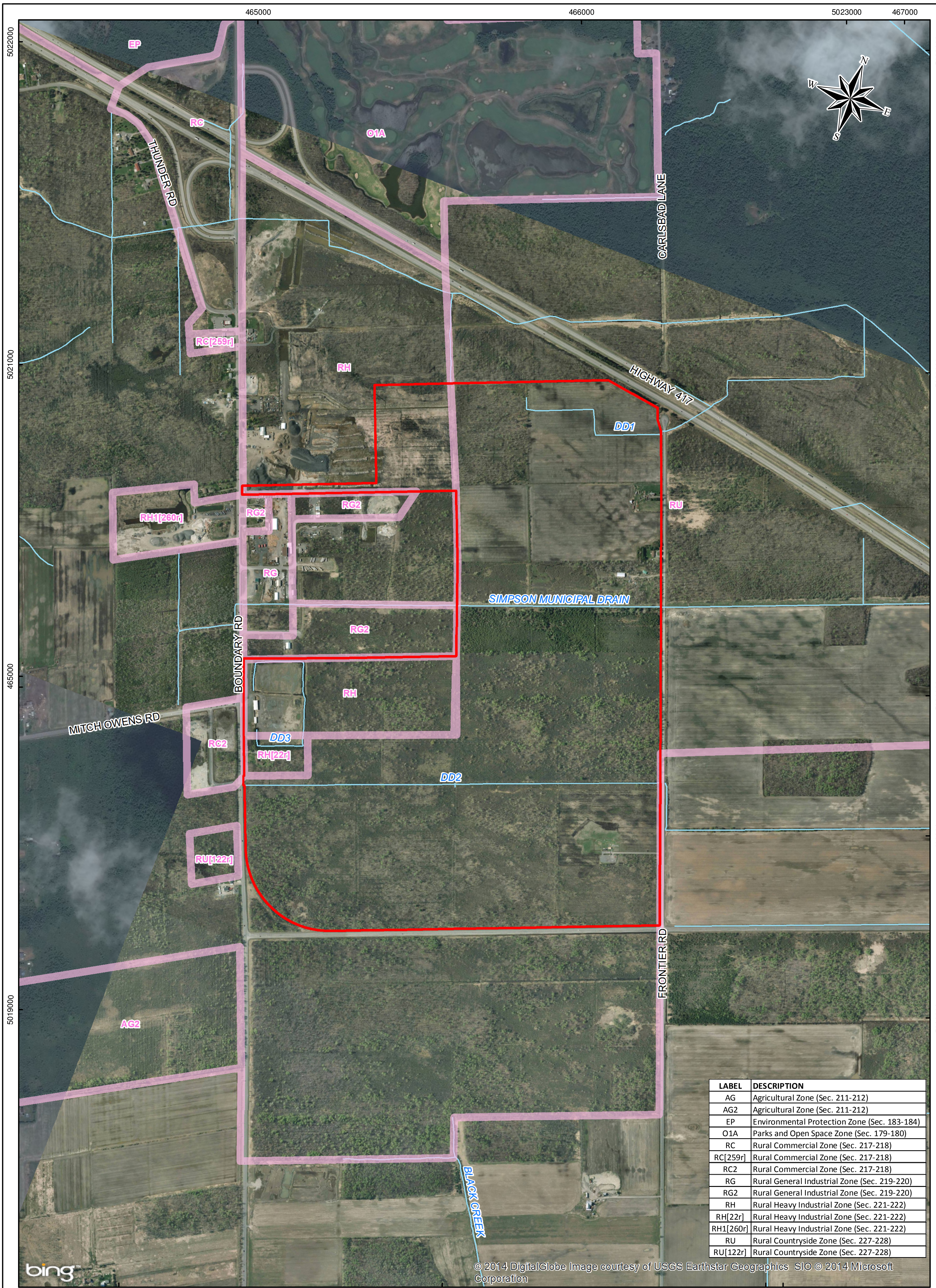
NOISE MONITORING LOCATIONS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	TG	DEC. 2013	**FIGURE 4**	
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

ATTACHMENT A

Zoning Designation Plan



LEGEND

SURFACE WATER FEATURE

CITY OF OTTAWA ZONING BOUNDARY

PROPERTY BOUNDARY

400 200 0 400

SCALE 1:12,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
ZONING BOUNDARIES DIGITIZED FROM GEOOTTAWA, CITY OF OTTAWA MAPPING WEBSITE, HTTP://MAPS.OTTAWA.CA/GEOOTTAWA.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

ACOUSTIC ASSESSMENT REPORT FOR
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

ZONING PLAN

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	TG	DEC. 2013	**ATTACHMENT A**	
GIS	BR	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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ATTACHMENT B

Description of Technical Terms

To help understand the analysis and recommendations made in this report, the following is a brief discussion of technical noise terms.

Sound pressure level is expressed on a logarithmic scale in units of decibels (dB). Since the scale is logarithmic, a sound that is twice the sound pressure level as another will be three decibels (3 dB) higher.

The noise data and analysis in this report have been given in terms of frequency distribution. The levels are grouped into octave bands. Typically, the centre frequencies for each octave band are 31.5, 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hertz (Hz.). The human ear responds to the pressure variations in the atmosphere that reach the ear drum. These pressure variations are composed of different frequencies that give each sound we hear its unique character.

It is common practice to sum sound levels over the entire audible spectrum (i.e., 20 Hz to 20 kHz) to give an overall sound level. However, to approximate the hearing response of humans, each octave band measured has a weighting applied to it. The resulting “A-weighted” sound level is often used as a criterion to indicate a maximum allowable sound level. In general, low frequencies are weighted higher, as human hearing is less sensitive to low frequency sound.

Environmental noise levels vary over time, and are described using an overall sound level known as the L_{eq}, or energy averaged sound level. The L_{eq} is the equivalent continuous sound level, which in a stated time, and at a stated location, has the same energy as the time varying noise level. It is common practice to measure L_{eq} sound levels in order to obtain a representative average sound level. The L_{90} is defined as the sound level exceeded for 90% of the time and is used as an indicator of the “ambient” noise level.

ATTACHMENT C

Noise Data

Name	ID	Frequency (Hz)									
		31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**A**
HVAC*	HVAC	80	82	83	82	79	79	74	71	62	83
Large Exhaust*	EX	89	91	92	90	85	80	74	73	66	87
Ventilation Opening*	VENT	93	86	83	84	82	78	76	70	57	83
Dust Collector	DC	106	104	102	99	101	96	92	89	82	102
Welding Fume Hood	WFH	38	51	64	72	83	88	86	76	69	91
BioFilter	BF	92	94	95	93	88	83	77	76	69	90
PUMP	PUMP	107	105	107	101	104	97	99	95	93	106
Diesel Generator (Cummins)	DGen	82	82	98	106	112	112	111	108	103	117
Generator	GEN	104	112	119	105	98	88	85	83	82	105
Generator Exhaust	GENEX	74	85	95	87	90	91	94	92	91	99
Loader	LOAD	116	125	117	106	104	103	102	97	87	109
Chipper	CHIP	97	109	106	108	112	114	112	106	97	118
Conveyor	CONV	89	92	96	95	92	88	85	78	71	94
Compost Turner	COMP	106	116	114	108	109	104	103	98	93	111
Compost Aerator**	AERTR	99	99	99	98	93	89	83	78	76	95
Screen	SCRN	105	101	98	97	96	98	99	97	93	104
Air Classifier	AIRC	106	116	114	108	109	104	103	98	93	111
Truck Idle*	TRKI	99	102	94	93	88	91	96	85	75	98
Flare	FLR	76	82	89	95	99	98	98	93	97	104
Haul Truck Movements*	TKM	91	101	102	98	100	98	96	91	87	103
Dump Truck	DUMPT	103	105	112	107	104	103	102	93	92	108
Grader CAT12	GRDR	118	122	113	113	113	110	109	108	101	116
Dozer CATD6	DOZR6	105	109	114	112	106	103	103	96	88	110
Excavator	EXCV	101	106	103	105	100	96	97	91	83	103
Skidsteer (Backhoe)	BKHOE	104	103	97	85	87	88	86	78	67	92
Leachate Truck Pumping	LTKP	103	104	107	99	102	105	106	101	99	111
Leachate Truck Movements	LTKM	98	103	104	100	95	99	98	93	89	104

Notes:

*Data measured at Miller Waste Management Facility - East Gwillimbury.

**Calculated using airflow data. Golder's database was used for all other noise sources.

ATTACHMENT D

Nomenclature

NOISE SOURCE SUMMARY TABLE NOMENCLATURE

Source Location

O – Located/installed outside the building, including on the roof

I – Located/installed inside the building

Sound Characteristics

S – Steady

Q – Quasi Steady Impulsive

I – Impulsive

B – Buzzing

T – Tonal

C – Cyclic

Noise Control Measures

S – Silencer, acoustic louver, muffler

A – Acoustic lining, plenum

B – Barrier, berm, screening

L – Lagging

E – Acoustic enclosure

O – Other

U – Uncontrolled

ATTACHMENT E

Equipment Calibration

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-159876

Instrument Model 2900, Serial Number 0983, was calibrated on 29MAY2012. The instrument meets factory specifications per Procedure D0001.8146, ANSI S1.11 1986, ANSI S1.4 1983, ANSI S1.9-1996 Class 1, IEC 651-Type 1 1979, and IEC 804-Type 1 1985, IEC1043-1993 Class 1 when normalized.

Instrument found to be in calibration as received: YES
Date Calibrated: 29MAY2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0662/0114	12 Months	20JAN2013	2012-154016

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.

Signed:
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-159574

Microphone Model 2560, Serial Number 3462, was calibrated on 21MAY2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 21MAY2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	2559	3034LF	12 Months	15AUG2012	2011-147516
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	PRM902	0529	12 Months	07SEP2012	2011-148677
Larson Davis	PRM902	0528	12 Months	07SEP2012	2011-148679
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Larson Davis

Larson-Davis 1/2" Microphone Calibration Chart
Model: 2560 Serial Number: 3462

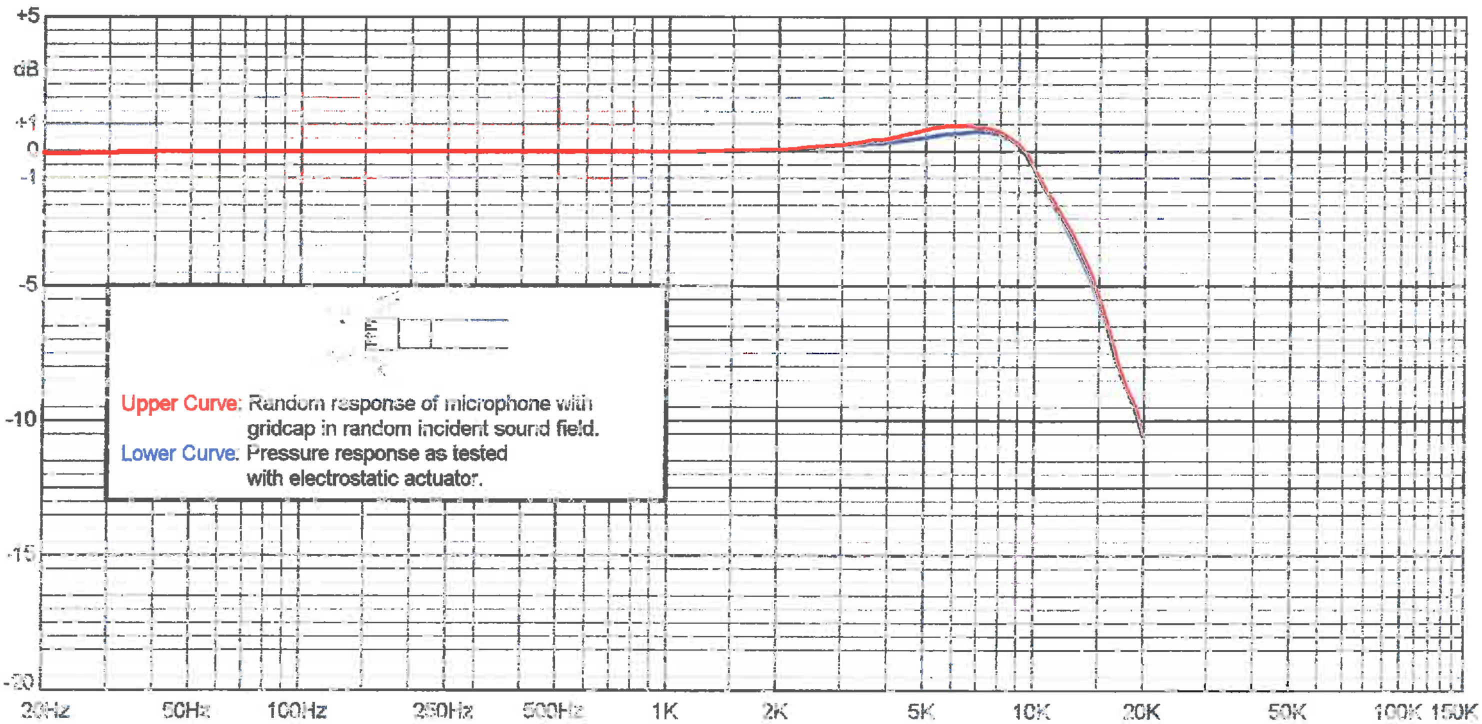
Open Circuit Sensitivity @ 1015.2 mbar & 251.19 Hz
-27.14 dB re 1V/Pascal
43.96 mV/Pascal
+1.12 K_0(-dB re 50 mV/Pascal)

Expanded Uncertainty @ ~95% confidence level
0.18 dB

Capacitance @ 251.2 Hz
20.5 pF

Lower Limiting Frequency
-3 dB @ 1.12 Hz

Test Conditions:
Polarization Voltage **200** V
Ambient Pressure **1015.2** mbar
Temperature **23.6** °C
Relative Humidity **37.2** %



Frequency Response (0 dB @ 251.19 Hz)
Random and actuator response with reference to level at 251.19 Hz

Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)
19.95	-0.07	-0.07	501.19	-0.01	-0.01	1883.65	0.07	0.06	4216.97	0.58	0.39	9440.61	-0.09	-0.15
25.12	-0.04	-0.04	630.96	-0.01	-0.01	1995.26	0.08	0.07	4466.84	0.66	0.43	10000.00	-0.74	-0.82
31.62	-0.01	-0.01	794.33	0.00	-0.00	2113.49	0.10	0.08	4731.51	0.75	0.48	10592.54	-1.39	-1.49
39.81	0.00	-0.00	1000.00	0.00	0.00	2238.72	0.11	0.09	5011.87	0.83	0.53	11220.19	-1.89	-2.01
50.12	0.00	0.00	1059.25	0.01	0.01	2371.37	0.16	0.14	5308.84	0.91	0.59	11885.02	-2.51	-2.68
63.10	0.01	0.01	1122.02	0.01	0.01	2511.89	0.18	0.15	5623.41	0.95	0.64	12589.25	-3.06	-3.28
79.43	0.01	0.01	1188.50	0.01	0.01	2660.73	0.20	0.17	5956.62	0.94	0.66	13335.21	-3.72	-3.98
100.00	0.01	0.01	1258.93	0.03	0.02	2818.38	0.23	0.18	6309.57	0.95	0.70	14125.38	-4.47	-4.72
125.89	0.00	0.00	1333.52	0.03	0.02	2985.38	0.27	0.21	6683.44	0.94	0.73	14962.36	-5.43	-5.64
158.49	0.00	0.00	1412.54	0.04	0.03	3162.28	0.32	0.24	7079.46	0.91	0.73	15848.93	-6.52	-6.68
199.53	0.00	0.00	1496.24	0.04	0.03	3349.65	0.36	0.26	7498.94	0.84	0.70	16788.04	-7.78	-7.90
251.19	0.00	0.00	1584.89	0.05	0.04	3548.13	0.42	0.30	7943.28	0.73	0.63	17782.80	-8.71	-8.82
316.23	0.00	-0.00	1678.80	0.06	0.05	3758.37	0.43	0.30	8413.95	0.53	0.45	18836.49	-9.42	-9.53
398.11	-0.01	-0.01	1778.28	0.06	0.05	3981.07	0.50	0.34	8912.51	0.28	0.21	19952.62	-10.54	-10.62

Abraham Ortega 21MAY2012
Larson-Davis Model 9700 ES Microphone Calibration System

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-160328

Instrument Model 900C, Serial Number 1573, was calibrated on 11JUN2012. The instrument meets factory specifications per Procedure D0001.8200.

Instrument found to be in calibration as received: NO
Date Calibrated: 11JUN2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	US36033460	12 Months	20JUN2012	5254394
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 25 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

See "as received" data.

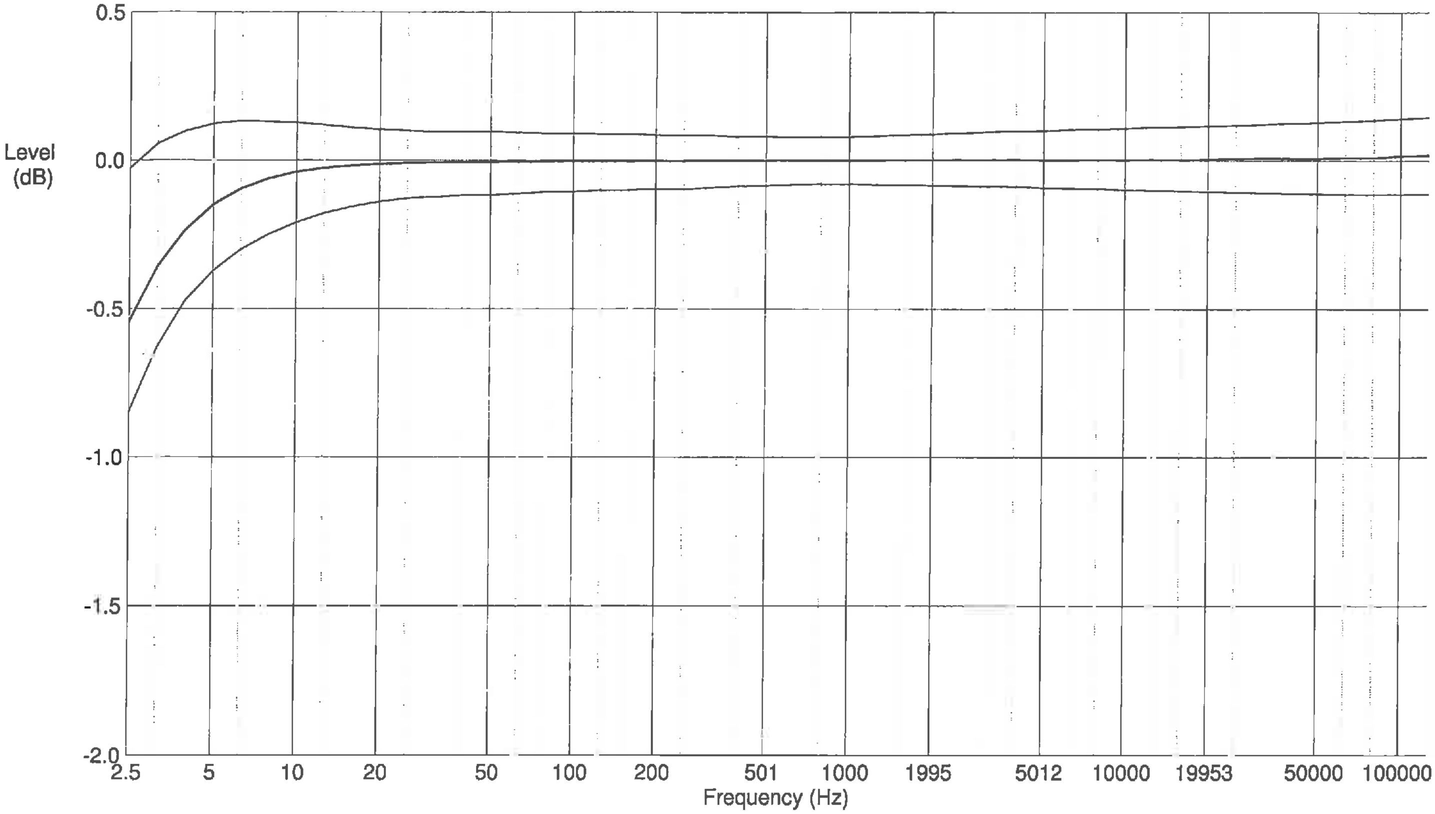
Signed: Sean Childs

Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Preamplifier Model: 900C Serial Number: 1573
Certificate of Electrical Conformance

Frequency response of this model 900C preamplifier was tested at a level of 1 Vrms with 18pF microphone capacitance and driving a short cable. Output level at 1kHz is 0.9802 Vrms (-0.173 dBV), uncertainty 0.033 dB. Results are displayed relative to the level at 1kHz.



Freq (Hz)	Measured (dB)	Uncert (dB)	Tolerance (dB)
2.51	-0.54	0.075	-0.03, -0.85
3.16	-0.36	0.058	+0.06, -0.63
3.98	-0.24	0.058	+0.10, -0.47
5.01	-0.15	0.036	+0.12, -0.37
6.31	-0.10	0.036	+0.13, -0.30
7.94	-0.06	0.036	+0.13, -0.25
10.00	-0.04	0.016	+0.13, -0.21
12.59	-0.03	0.016	+0.12, -0.18
15.85	-0.02	0.016	+0.11, -0.16
19.95	-0.01	0.016	+0.10, -0.14
25.12	-0.01	0.016	+0.10, -0.13
31.62	-0.01	0.016	+0.10, -0.12
39.81	-0.01	0.016	+0.09, -0.12
50.12	-0.01	0.016	+0.10, -0.12
63.10	-0.00	0.016	+0.09, -0.11
79.43	-0.00	0.016	+0.09, -0.11
100.00	-0.00	0.016	+0.09, -0.11
125.89	-0.00	0.016	+0.09, -0.10
158.49	-0.00	0.016	+0.09, -0.10
199.53	-0.00	0.016	+0.09, -0.10
251.19	-0.00	0.016	+0.09, -0.10
316.23	-0.00	0.016	+0.08, -0.09
398.11	-0.00	0.016	+0.08, -0.09
501.19	-0.00	0.016	+0.08, -0.09

Freq (Hz)	Measured (dB)	Uncert (dB)	Tolerance (dB)
630.96	0.00	0.016	+0.08, -0.08
794.33	0.00	0.016	+0.08, -0.08
1000.00	0.00	0.016	+0.08, -0.08
1258.90	0.00	0.016	+0.08, -0.08
1584.90	0.00	0.016	+0.09, -0.08
1995.30	0.00	0.016	+0.09, -0.09
2511.90	0.00	0.016	+0.09, -0.09
3162.30	0.00	0.016	+0.10, -0.09
3981.10	0.00	0.016	+0.10, -0.09
5011.90	0.00	0.016	+0.10, -0.09
6309.60	0.00	0.016	+0.10, -0.09
7943.30	0.00	0.016	+0.11, -0.10
10000.00	0.00	0.016	+0.11, -0.10
12589.00	0.00	0.016	+0.11, -0.10
15849.00	0.00	0.016	+0.11, -0.10
19953.00	0.01	0.016	+0.12, -0.10
25250.00	0.01	0.022	+0.12, -0.11
31500.00	0.01	0.022	+0.12, -0.11
39750.00	0.01	0.022	+0.13, -0.11
50000.00	0.01	0.022	+0.13, -0.11
63000.00	0.01	0.047	+0.13, -0.11
79500.00	0.01	0.047	+0.14, -0.11
100000.00	0.02	0.047	+0.14, -0.12
126000.00	0.02	0.063	+0.14, -0.12

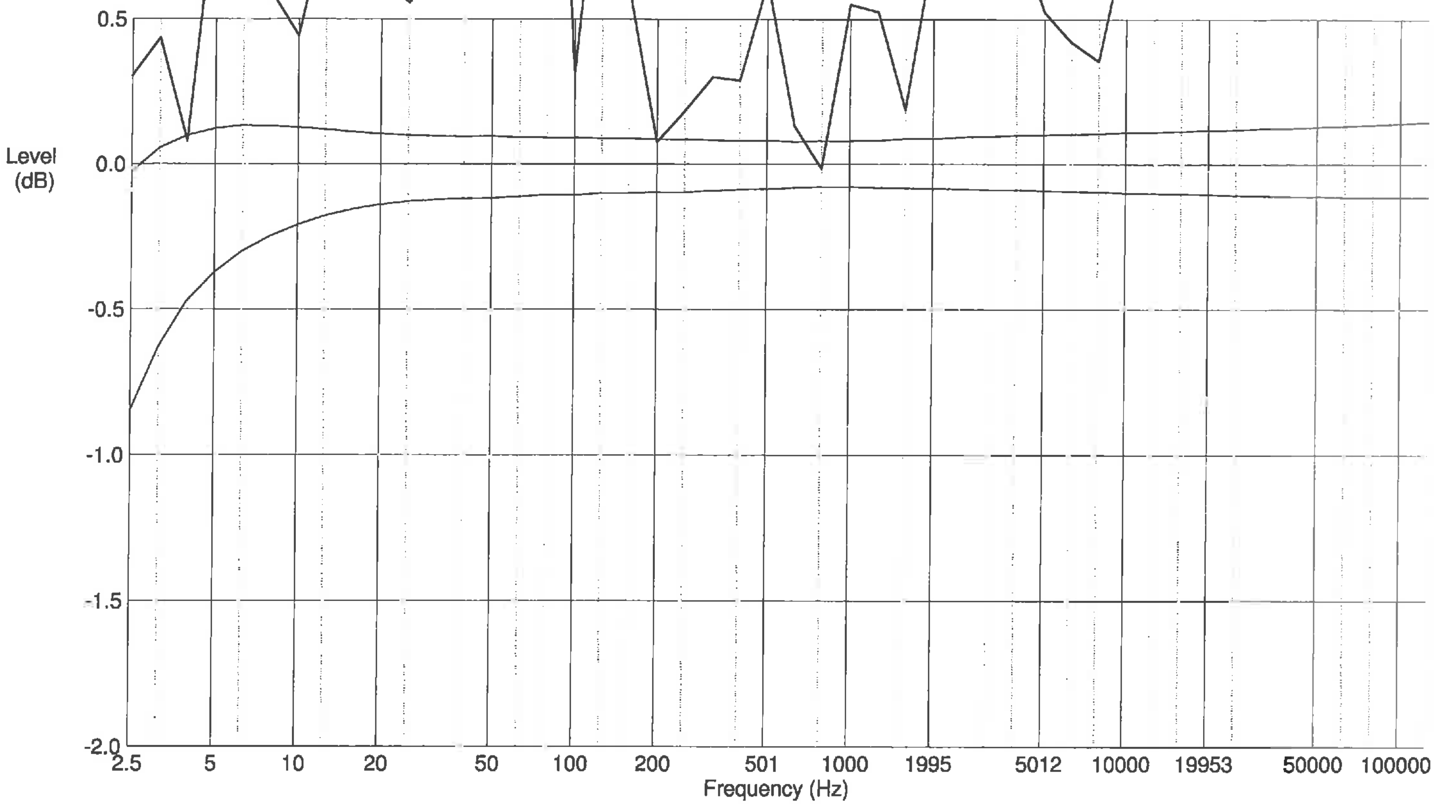
Noise floor data: 1kHz (1/3 Octave) = 0.35 uV, -9.0 dBuV, uncertainty = 0.47 dB
Flat (20Hz-20kHz) = 3.5 uV, 10.8 dBuV, uncertainty = 0.47 dB
Awt = 1.8 uV, 4.9 dBuV, uncertainty = 0.46 dB

Uncertainties are given as expanded uncertainty at ~95% confidence interval (k = 2).

Technician: Sean Childs   Test Date: 11JUN2012

Preamplifier Model: 900C Serial Number: 1573
Certificate of Electrical Conformance
****Failed**: (Out of Limits) (Reference) (1kHz NF) (Sum NF) (AWt NF)**

Frequency response of this model 900C preamplifier was tested at a level of 1 Vrms with 18pF microphone capacitance and driving a short cable. Output level at 1kHz is 0.0001 Vrms (-82.110 dBV), uncertainty 0.033 dB. Results are displayed relative to the level at 1kHz.



Freq (Hz)	Measured (dB)	Uncert (dB)	Tolerance (dB)
2.51	0.31 *	0.075	-0.03, -0.85
3.16	0.43 *	0.058	+0.06, -0.63
3.98	0.08	0.058	+0.10, -0.47
5.01	0.98 *	0.036	+0.12, -0.37
6.31	0.99 *	0.036	+0.13, -0.30
7.94	0.59 *	0.036	+0.13, -0.25
10.00	0.44 *	0.016	+0.13, -0.21
12.59	0.85 *	0.016	+0.12, -0.18
15.85	0.66 *	0.016	+0.11, -0.16
19.95	0.63 *	0.016	+0.10, -0.14
25.12	0.56 *	0.016	+0.10, -0.13
31.62	0.67 *	0.016	+0.10, -0.12
39.81	0.60 *	0.016	+0.09, -0.12
50.12	0.95 *	0.016	+0.10, -0.12
63.10	0.70 *	0.016	+0.09, -0.11
79.43	2.07 *	0.016	+0.09, -0.11
100.00	0.31 *	0.016	+0.09, -0.11
125.89	1.25 *	0.016	+0.09, -0.10
158.49	0.60 *	0.016	+0.09, -0.10
199.53	0.08	0.016	+0.09, -0.10
251.19	0.18 *	0.016	+0.09, -0.10
316.23	0.30 *	0.016	+0.08, -0.09
398.11	0.29 *	0.016	+0.08, -0.09
501.19	0.63 *	0.016	+0.08, -0.09
630.96	0.13 *	0.016	+0.08, -0.08
794.33	-0.02	0.016	+0.08, -0.08
1000.00	0.55 *	0.016	+0.08, -0.08
1258.90	0.53 *	0.016	+0.08, -0.08
1584.90	0.19 *	0.016	+0.09, -0.08
1995.30	0.76 *	0.016	+0.09, -0.09
2511.90	1.09 *	0.016	+0.09, -0.09
3162.30	0.80 *	0.016	+0.10, -0.09
3981.10	0.79 *	0.016	+0.10, -0.09
5011.90	0.53 *	0.016	+0.10, -0.09
6309.60	0.42 *	0.016	+0.10, -0.09
7943.30	0.36 *	0.016	+0.11, -0.10
10000.00	0.81 *	0.016	+0.11, -0.10
12589.00	0.87 *	0.016	+0.11, -0.10
15849.00	1.60 *	0.016	+0.11, -0.10
19953.00	0.94 *	0.016	+0.12, -0.10
25250.00	2.23 *	0.022	+0.12, -0.11
31500.00	2.28 *	0.022	+0.12, -0.11
39750.00	3.02 *	0.022	+0.13, -0.11
50000.00	4.01 *	0.022	+0.13, -0.11
63000.00	4.86 *	0.047	+0.13, -0.11
79500.00	6.50 *	0.047	+0.14, -0.11
100000.00	6.40 *	0.047	+0.14, -0.12
126000.00	6.01 *	0.063	+0.14, -0.12

Noise floor data: 1kHz (1/3 Octave) = 0.79 uV, -2.1 dBuV, uncertainty = 0.47 dB
Flat (20Hz-20kHz) = 35.5 uV, 31.0 dBuV, uncertainty = 0.47 dB
Awt = 6.4 uV, 16.1 dBuV, uncertainty = 0.46 dB

Uncertainties are given as expanded uncertainty at ~95% confidence interval (k = 2).

Technician: Sean Childs Test Date: 29MAY2012

ATTACHMENT F

Weather Data

Attachment F
Weather Data for Site Visit
(Miller Waste Facility - 25th July 2013)

Year	Month	Day	Time	Temp (°C)	Wind Dir (10s deg)	Wind Spd (km/h)	Weather
2013	7	25	0:00	15	34	9	Mainly Clear
2013	7	25	1:00	15.1	34	13	Mainly Clear
2013	7	25	2:00	13.5	34	7	Mainly Clear
2013	7	25	3:00	13.3	34	9	Mainly Clear
2013	7	25	4:00	13.2	34	6	Mainly Clear
2013	7	25	5:00	12.7	34	7	Mainly Clear
2013	7	25	6:00	13.5	-	0	Mainly Clear
2013	7	25	7:00	16.3	36	6	Clear
2013	7	25	8:00	18.5	5	6	Clear
2013	7	25	9:00	20.3	12	4	Clear
2013	7	25	10:00	21.4	12	9	Mainly Clear
2013	7	25	11:00	21.6	12	9	Mainly Clear
2013	7	25	12:00	22.3	9	9	Mainly Clear
2013	7	25	13:00	23.2	12	15	Mainly Clear
2013	7	25	14:00	22.6	12	17	Mainly Clear
2013	7	25	15:00	22.6	13	13	Mainly Clear
2013	7	25	16:00	22.2	13	15	Mainly Clear
2013	7	25	17:00	21.9	11	7	Clear
2013	7	25	18:00	21.4	14	11	Clear
2013	7	25	19:00	20.2	15	13	Clear
2013	7	25	20:00	18.9	14	7	Clear
2013	7	25	21:00	17.4	14	4	Clear
2013	7	25	22:00	15.7	-	0	Clear
2013	7	25	23:00	14.3	-	0	Clear

ATTACHMENT G

Sample Calculations

Configuration	
Parameter	Value
General	
Country	International
Max. Error (dB)	0.00
Max. Search Radius (m)	2500.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	60.00
Reference Time Night (min)	60.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	77.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	0
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (℃)	10
rel. Humidity (%)	70
Ground Absorption G	0.80
Wind Speed for Dir. (m/s)	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03)	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receiver
Name: POR01 - Plane of window
ID: R1
X: 465558.29
Y: 5020774.00
Z: 81.50

Point Source, ISO 9613, Name: "Flare", ID: "A_001"

Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466690.93	5021301.92	89.20	0	32	28.6	28.6	0.0	0.0	72.9	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-49.1	-49.1
2	466690.93	5021301.92	89.20	0	63	47.8	47.8	0.0	0.0	72.9	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	-30.1	-30.1
3	466690.93	5021301.92	89.20	0	125	64.9	64.9	0.0	0.0	72.9	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-13.3	-13.3
4	466690.93	5021301.92	89.20	0	250	78.4	78.4	0.0	0.0	72.9	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-0.6	-0.6
5	466690.93	5021301.92	89.20	0	500	87.8	87.8	0.0	0.0	72.9	2.4	-1.6	0.0	0.0	6.3	0.0	-0.0	7.7	7.7
6	466690.93	5021301.92	89.20	0	1000	90.0	90.0	0.0	0.0	72.9	4.6	-1.6	0.0	0.0	6.3	0.0	-0.0	7.7	7.7
7	466690.93	5021301.92	89.20	0	2000	91.2	91.2	0.0	0.0	72.9	12.1	-1.6	0.0	0.0	6.3	0.0	-0.0	1.4	1.4
8	466690.93	5021301.92	89.20	0	4000	86.0	86.0	0.0	0.0	72.9	40.9	-1.6	0.0	0.0	6.3	0.0	-0.0	-32.7	-32.7
9	466690.93	5021301.92	89.20	0	8000	87.9	87.9	0.0	0.0	72.9	146.1	-1.6	0.0	0.0	6.3	0.0	-0.0	-135.9	-135.9

Point Source, ISO 9613, Name: "MRF - Vent - 1", ID: "A_002"

Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466249.05	5021456.41	87.00	0	32	53.1	53.1	0.0	0.0	70.7	0.0	-4.7	0.0	0.0	9.4	0.0	-0.0	-22.4	-22.4
2	466249.05	5021456.41	87.00	0	63	59.3	59.3	0.0	0.0	70.7	0.1	-4.7	0.0	0.0	9.4	0.0	-0.0	-16.3	-16.3
3	466249.05	5021456.41	87.00	0	125	66.4	66.4	0.0	0.0	70.7	0.4	1.5	0.0	0.0	3.3	0.0	-0.0	-9.5	-9.5
4	466249.05	5021456.41	87.00	0	250	74.9	74.9	0.0	0.0	70.7	1.0	-0.5	0.0	0.0	5.3	0.0	-0.0	-1.7	-1.7
5	466249.05	5021456.41	87.00	0	500	78.3	78.3	0.0	0.0	70.7	1.9	-1.6	0.0	0.0	6.5	0.0	-0.0	0.8	0.8
6	466249.05	5021456.41	87.00	0	1000	77.5	77.5	0.0	0.0	70.7	3.5	-1.6	0.0	0.0	6.5	0.0	-0.0	-1.7	-1.7
7	466249.05	5021456.41	87.00	0	2000	76.7	76.7	0.0	0.0	70.7	9.4	-1.6	0.0	0.0	6.7	0.0	-0.0	-8.5	-8.5
8	466249.05	5021456.41	87.00	0	4000	70.5	70.5	0.0	0.0	70.7	31.8	-1.6	0.0	0.0	7.0	0.0	-0.0	-37.5	-37.5
9	466249.05	5021456.41	87.00	0	8000	55.4	55.4	0.0	0.0	70.7	113.5	-1.6	0.0	0.0	7.6	0.0	-0.0	-134.8	-134.8

Point Source, ISO 9613, Name: "MRF - Vent - 2", ID: "A_003"

Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466256.62	5021436.80	87.00	0	32	53.1	53.1	0.0	0.0	70.7	0.0	-4.6	0.0	0.0	7.1	0.0	-0.0	-20.1	-20.1
2	466256.62	5021436.80	87.00	0	63	59.3	59.3	0.0	0.0	70.7	0.1	-4.6	0.0	0.0	8.0	0.0	-0.0	-14.8	-14.8
3	466256.62	5021436.80	87.00	0	125	66.4	66.4	0.0	0.0	70.7	0.4	1.5	0.0	0.0	3.1	0.0	-0.0	-9.2	-9.2
4	466256.62	5021436.80	87.00	0	250	74.9	74.9	0.0	0.0	70.7	1.0	-0.5	0.0	0.0	5.1	0.0	-0.0	-1.4	-1.4
5	466256.62	5021436.80	87.00	0	500	78.3	78.3	0.0	0.0	70.7	1.9	-1.6	0.0	0.0	6.3	0.0	-0.0	1.1	1.1
6	466256.62	5021436.80	87.00	0	1000	77.5	77.5	0.0	0.0	70.7	3.5	-1.6	0.0	0.0	6.5	0.0	-0.0	-1.6	-1.6
7	466256.62	5021436.80	87.00	0	2000	76.7	76.7	0.0	0.0	70.7	9.3	-1.6	0.0	0.0	6.6	0.0	-0.0	-8.3	-8.3
8	466256.62	5021436.80	87.00	0	4000	70.5	70.5	0.0	0.0	70.7	31.6	-1.6	0.0	0.0	6.9	0.0	-0.0	-37.0	-37.0
9	466256.62	5021436.80	87.00	0	8000	55.4	55.4	0.0	0.0	70.7	112.5	-1.6	0.0	0.0	7.4	0.0	-0.0	-133.7	-133.7

Point Source, ISO 9613, Name: "MRF - Vent - 3", ID: "A_004"

Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466263.98	5021417.73	87.00	0	32	53.1	53.1	0.0	0.0	70.6	0.0	-4.6	0.0	0.0	4.6	0.0	-0.0	-17.5	-17.5
2	466263.98	5021417.73	87.00	0	63	59.3	59.3	0.0	0.0	70.6	0.1	-4.6	0.0	0.0	4.8	0.0	-0.0	-11.6	-11.6
3	466263.98	5021417.73	87.00	0	125	66.4	66.4	0.0	0.0	70.6	0.4	1.5	0.0	0.0	2.0	0.0	-0.0	-8.1	-8.1
4	466263.98	5021417.73	87.00	0	250	74.9	74.9	0.0	0.0	70.6	1.0	-0.5	0.0	0.0	4.0	0.0	-0.0	-0.2	-0.2
5	466263.98	5021417.73	87.00	0	500	78.3	78.3	0.0	0.0	70.6	1.8	-1.6	0.0	0.0	5.4	0.0	-0.0	2.1	2.1
6	466263.98	5021417.73	87.00	0	1000	77.5	77.5	0.0	0.0	70.6	3.5	-1.6	0.0	0.0	5.9	0.0	-0.0	-0.9	-0.9
7	466263.98	5021417.73	87.00	0	2000	76.7	76.7	0.0	0.0	70.6	9.2	-1.6	0.0	0.0	6.3	0.0	-0.0	-7.8	-7.8
8	466263.98	5021417.73	87.00	0	4000	70.5	70.5	0.0	0.0	70.6	31.3	-1.6	0.0	0.0	6.7	0.0	-0.0	-36.5	-36.5
9	466263.98	5021417.73	87.00	0	8000	55.4	55.4	0.0	0.0	70.6	111.6	-1.6	0.0	0.0	7.2	0.0	-0.0	-132.5	-132.5

Point Source, ISO 9613, Name: "MRF - Vent - 4", ID: "A_005"

Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466307.16	5021422.20	87.00	0	32	53.1	53.1	0.0	0.0	70.9	0.0	-4.7	0.0	0.0	0.0	0.0	-0.0	-13.2	-13.2

Point Source, ISO 9613, Name: "MRF - Vent - 4", ID: "A_005"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
2	466307.16	5021422.20	87.00	0	63	59.3	59.3	0.0	0.0	70.9	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	-7.0	-7.0
3	466307.16	5021422.20	87.00	0	125	66.4	66.4	0.0	0.0	70.9	0.4	1.5	0.0	0.0	0.0	0.0	-0.0	-6.4	-6.4
4	466307.16	5021422.20	87.00	0	250	74.9	74.9	0.0	0.0	70.9	1.0	-0.5	0.0	0.0	0.0	0.0	-0.0	3.5	3.5
5	466307.16	5021422.20	87.00	0	500	78.3	78.3	0.0	0.0	70.9	1.9	-1.6	0.0	0.0	0.0	0.0	-0.0	7.1	7.1
6	466307.16	5021422.20	87.00	0	1000	77.5	77.5	0.0	0.0	70.9	3.6	-1.6	0.0	0.0	0.0	0.0	-0.0	4.6	4.6
7	466307.16	5021422.20	87.00	0	2000	76.7	76.7	0.0	0.0	70.9	9.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-2.2	-2.2
8	466307.16	5021422.20	87.00	0	4000	70.5	70.5	0.0	0.0	70.9	32.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-31.3	-31.3
9	466307.16	5021422.20	87.00	0	8000	55.4	55.4	0.0	0.0	70.9	115.8	-1.6	0.0	0.0	0.0	0.0	-0.0	-129.7	-129.7

Point Source, ISO 9613, Name: "MRF - Vent - 5", ID: "A_006"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466351.22	5021439.25	87.00	0	32	53.1	53.1	0.0	0.0	71.3	0.0	-4.7	0.0	0.0	0.0	0.0	-0.0	-13.5	-13.5
2	466351.22	5021439.25	87.00	0	63	59.3	59.3	0.0	0.0	71.3	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	-7.4	-7.4
3	466351.22	5021439.25	87.00	0	125	66.4	66.4	0.0	0.0	71.3	0.4	1.4	0.0	0.0	0.0	0.0	-0.0	-6.8	-6.8
4	466351.22	5021439.25	87.00	0	250	74.9	74.9	0.0	0.0	71.3	1.1	-0.6	0.0	0.0	0.0	0.0	-0.0	3.1	3.1
5	466351.22	5021439.25	87.00	0	500	78.3	78.3	0.0	0.0	71.3	2.0	-1.7	0.0	0.0	0.0	0.0	-0.0	6.7	6.7
6	466351.22	5021439.25	87.00	0	1000	77.5	77.5	0.0	0.0	71.3	3.8	-1.7	0.0	0.0	0.0	0.0	-0.0	4.1	4.1
7	466351.22	5021439.25	87.00	0	2000	76.7	76.7	0.0	0.0	71.3	10.0	-1.7	0.0	0.0	0.0	0.0	-0.0	-2.9	-2.9
8	466351.22	5021439.25	87.00	0	4000	70.5	70.5	0.0	0.0	71.3	33.9	-1.7	0.0	0.0	0.0	0.0	-0.0	-33.0	-33.0
9	466351.22	5021439.25	87.00	0	8000	55.4	55.4	0.0	0.0	71.3	121.0	-1.7	0.0	0.0	0.0	0.0	-0.0	-135.2	-135.2

Point Source, ISO 9613, Name: "MRF - Vent - 6", ID: "A_007"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466442.41	5021495.05	87.00	0	32	53.1	53.1	0.0	0.0	72.1	0.0	-4.9	0.0	0.0	9.7	0.0	-0.0	-23.9	-23.9
2	466442.41	5021495.05	87.00	0	63	59.3	59.3	0.0	0.0	72.1	0.1	-4.9	0.0	0.0	9.9	0.0	-0.0	-18.0	-18.0
3	466442.41	5021495.05	87.00	0	125	66.4	66.4	0.0	0.0	72.1	0.5	1.4	0.0	0.0	4.0	0.0	-0.0	-11.6	-11.6
4	466442.41	5021495.05	87.00	0	250	74.9	74.9	0.0	0.0	72.1	1.2	-0.6	0.0	0.0	6.8	0.0	-0.0	-4.6	-4.6
5	466442.41	5021495.05	87.00	0	500	78.3	78.3	0.0	0.0	72.1	2.2	-1.8	0.0	0.0	9.1	0.0	-0.0	-3.4	-3.4
6	466442.41	5021495.05	87.00	0	1000	77.5	77.5	0.0	0.0	72.1	4.2	-1.8	0.0	0.0	10.7	0.0	-0.0	-7.8	-7.8
7	466442.41	5021495.05	87.00	0	2000	76.7	76.7	0.0	0.0	72.1	11.0	-1.8	0.0	0.0	12.8	0.0	-0.0	-17.6	-17.6
8	466442.41	5021495.05	87.00	0	4000	70.5	70.5	0.0	0.0	72.1	37.4	-1.8	0.0	0.0	15.3	0.0	-0.0	-52.6	-52.6
9	466442.41	5021495.05	87.00	0	8000	55.4	55.4	0.0	0.0	72.1	133.4	-1.8	0.0	0.0	18.0	0.0	-0.0	-166.4	-166.4

Point Source, ISO 9613, Name: "MRF - Vent - 7", ID: "A_008"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466393.90	5021455.76	87.00	0	32	53.1	53.1	0.0	0.0	71.7	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-13.8	-13.8
2	466393.90	5021455.76	87.00	0	63	59.3	59.3	0.0	0.0	71.7	0.1	-4.8	0.0	0.0	0.0	0.0	-0.0	-7.7	-7.7
3	466393.90	5021455.76	87.00	0	125	66.4	66.4	0.0	0.0	71.7	0.4	1.4	0.0	0.0	0.0	0.0	-0.0	-7.1	-7.1
4	466393.90	5021455.76	87.00	0	250	74.9	74.9	0.0	0.0	71.7	1.1	-0.6	0.0	0.0	0.0	0.0	-0.0	2.7	2.7
5	466393.90	5021455.76	87.00	0	500	78.3	78.3	0.0	0.0	71.7	2.1	-1.7	0.0	0.0	0.0	0.0	-0.0	6.3	6.3
6	466393.90	5021455.76	87.00	0	1000	77.5	77.5	0.0	0.0	71.7	3.9	-1.7	0.0	0.0	0.0	0.0	-0.0	3.6	3.6
7	466393.90	5021455.76	87.00	0	2000	76.7	76.7	0.0	0.0	71.7	10.4	-1.7	0.0	0.0	0.0	0.0	-0.0	-3.7	-3.7
8	466393.90	5021455.76	87.00	0	4000	70.5	70.5	0.0	0.0	71.7	35.3	-1.7	0.0	0.0	0.0	0.0	-0.0	-34.8	-34.8
9	466393.90	5021455.76	87.00	0	8000	55.4	55.4	0.0	0.0	71.7	126.1	-1.7	0.0	0.0	0.0	0.0	-0.0	-140.6	-140.6

Point Source, ISO 9613, Name: "MRF - Vent - 8", ID: "A_009"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466449.84	5021529.74	87.00	0	32	53.1	53.1	0.0	0.0	72.3	0.0	-4.9	0.0	0.0	17.5	0.0	-0.0	-31.9	-31.9
2	466449.84	5021529.74	87.00	0	63	59.3	59.3	0.0	0.0	72.3	0.1	-4.9	0.0	0.0	20.7	0.0	-0.0	-29.0	-29.0
3	466449.84	5021529.74	87.00	0	125	66.4	66.4	0.0	0.0	72.3	0.5	1.4	0.0	0.0	17.5	0.0	-0.0	-25.3	-25.3
4	466449.84	5021529.74	87.00	0	250	74.9	74.9	0.0	0.0	72.3	1.2	-0.7	0.0	0.0	22.5	0.0	-0.0	-20.5	-20.5
5	466449.84	5021529.74	87.00	0	500	78.3	78.3	0.0	0.0	72.3	2.3	-1.8	0.0	0.0	26.6	0.0	-0.0	-21.1	-21.1
6	466449.84	5021529.74	87.00	0	1000	77.5	77.5	0.0	0.0	72.3	4.3	-1.8	0.0	0.0	26.8	0.0	-0.0	-24.1	-24.1
7	466449.84	5021529.74	87.00	0	2000	76.7	76.7	0.0	0.0	72.3	11.3	-1.8	0.0	0.0	26.8	0.0	-0.0	-31.9	-31.9
8	466449.84	5021529.74	87.00	0	4000	70.5	70.5	0.0	0.0	72.3	38.3	-1.8	0.0	0.0	26.8	0.0	-0.0	-65.1	-65.1
9	466449.84	5021529.74	87.00	0	8000	55.4	55.4	0.0	0.0	72.3	136.6	-1.8	0.0	0.0	26.8	0.0	-0.0	-178.6	-178.6

Point Source, ISO 9613, Name: "MRF - Vent - 9", ID: "A_010"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466425.25	5021534.40	87.00	0	32	53.1	53.1	0.0	0.0	72.2	0.0	-4.9	0.0	0.0	17.7	0.0	-0.0	-32.0	-32.0
2	466425.25	5021534.40	87.00	0	63	59.3	59.3	0.0	0.0	72.2	0.1	-4.9	0.0	0.0	20.8	0.0	-0.0	-29.0	-29.0
3	466425.25	5021534.40	87.00	0	125	66.4	66.4	0.0	0.0	72.2	0.5	1.4	0.0	0.0	17.4	0.0	-0.0	-25.1	-25.1
4	466425.25	5021534.40	87.00	0	250	74.9	74.9	0.0	0.0	72.2	1.2	-0.6	0.0	0.0	22.4	0.0	-0.0	-20.3	-20.3
5	466425.25	5021534.40	87.00	0	500	78.3	78.3	0.0	0.0	72.2	2.2	-1.8	0.0	0.0	26.5	0.0	-0.0	-20.9	-20.9
6	466425.25	5021534.40	87.00	0	1000	77.5	77.5	0.0	0.0	72.2	4.2	-1.8	0.0	0.0	26.8	0.0	-0.0	-23.9	-23.9
7	466425.25	5021534.40	87.00	0	2000	76.7	76.7	0.0	0.0	72.2	11.1	-1.8	0.0	0.0	26.8	0.0	-0.0	-31.7	-31.7
8	466425.25	5021534.40	87.00	0	4000	70.5	70.5	0.0	0.0	72.2	37.8	-1.8	0.0	0.0	26.8	0.0	-0.0	-64.5	-64.5
9	466425.25	5021534.40	87.00	0	8000	55.4	55.4	0.0	0.0	72.2	134.8	-1.8	0.0	0.0	26.8	0.0	-0.0	-176.6	-176.6

Point Source, ISO 9613, Name: "MRF - Vent - 10", ID: "A_011"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466375.29	5021514.97	87.00	0	32	53.1	53.1	0.0	0.0	71.8	0.0	-4.8	0.0	0.0	17.4	0.0	-0.0	-31.4	-31.4
2	466375.29	5021514.97	87.00	0	63	59.3	59.3	0.0	0.0	71.8	0.1	-4.8	0.0	0.0	20.7	0.0	-0.0	-28.5	-28.5
3	466375.29	5021514.97	87.00	0	125	66.4	66.4	0.0	0.0	71.8	0.5	1.4	0.0	0.0	17.4	0.0	-0.0	-24.8	-24.8
4	466375.29	5021514.97	87.00	0	250	74.9	74.9	0.0	0.0	71.8	1.2	-0.6	0.0	0.0	22.4	0.0	-0.0	-19.9	-19.9
5	466375.29	5021514.97	87.00	0	500	78.3	78.3	0.0	0.0	71.8	2.1	-1.7	0.0	0.0	26.5	0.0	-0.0	-20.5	-20.5
6	466375.29	5021514.97	87.00	0	1000	77.5	77.5	0.0	0.0	71.8	4.0	-1.7	0.0	0.0	26.7	0.0	-0.0	-23.4	-23.4
7	466375.29	5021514.97	87.00	0	2000	76.7	76.7	0.0	0.0	71.8	10.7	-1.7	0.0	0.0	26.7	0.0	-0.0	-30.8	-30.8
8	466375.29	5021514.97	87.00	0	4000	70.5	70.5	0.0	0.0	71.8	36.1	-1.7	0.0	0.0	26.7	0.0	-0.0	-62.5	-62.5
9	466375.29	5021514.97	87.00	0	8000	55.4	55.4	0.0	0.0	71.8	128.9	-1.7	0.0	0.0	26.7	0.0	-0.0	-170.4	-170.4

Point Source, ISO 9613, Name: "MRF - Vent - 11", ID: "A_012"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466320.35	5021493.61	87.00	0	32	53.1	53.1	0.0	0.0	71.4	0.0	-4.8	0.0	0.0	16.6	0.0	-0.0	-30.2	-30.2
2	466320.35	5021493.61	87.00	0	63	59.3	59.3	0.0	0.0	71.4	0.1	-4.8	0.0	0.0	20.2	0.0	-0.0	-27.7	-27.7
3	466320.35	5021493.61	87.00	0	125	66.4	66.4	0.0	0.0	71.4	0.4	1.4	0.0	0.0	17.3	0.0	-0.0	-24.2	-24.2
4	466320.35	5021493.61	87.00	0	250	74.9	74.9	0.0	0.0	71.4	1.1	-0.6	0.0	0.0	22.4	0.0	-0.0	-19.4	-19.4
5	466320.35	5021493.61	87.00	0	500	78.3	78.3	0.0	0.0	71.4	2.0	-1.7	0.0	0.0	26.5	0.0	-0.0	-20.0	-20.0
6	466320.35	5021493.61	87.00	0	1000	77.5	77.5	0.0	0.0	71.4	3.8	-1.7	0.0	0.0	26.7	0.0	-0.0	-22.7	-22.7
7	466320.35	5021493.61	87.00	0	2000	76.7	76.7	0.0	0.0	71.4	10.1	-1.7	0.0	0.0	26.7	0.0	-0.0	-29.8	-29.8
8	466320.35	5021493.61	87.00	0	4000	70.5	70.5	0.0	0.0	71.4	34.3	-1.7	0.0	0.0	26.7	0.0	-0.0	-60.3	-60.3
9	466320.35	5021493.61	87.00	0	8000	55.4	55.4	0.0	0.0	71.4	122.5	-1.7	0.0	0.0	26.7	0.0	-0.0	-163.5	-163.5

Point Source, ISO 9613, Name: "MRF - Vent - 12", ID: "A_013"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466265.87	5021472.42	87.00	0	32	53.1	53.1	0.0	0.0	71.0	0.0	-4.7	0.0	0.0	17.8	0.0	-0.0	-31.0	-31.0
2	466265.87	5021472.42	87.00	0	63	59.3	59.3	0.0	0.0	71.0	0.1	-4.7	0.0	0.0	20.8	0.0	-0.0	-27.9	-27.9
3	466265.87	5021472.42	87.00	0	125	66.4	66.4	0.0	0.0	71.0	0.4	1.5	0.0	0.0	17.6	0.0	-0.0	-24.0	-24.0
4	466265.87	5021472.42	87.00	0	250	74.9	74.9	0.0	0.0	71.0	1.0	-0.5	0.0	0.0	22.6	0.0	-0.0	-19.1	-19.1
5	466265.87	5021472.42	87.00	0	500	78.3	78.3	0.0	0.0	71.0	1.9	-1.6	0.0	0.0	26.6	0.0	-0.0	-19.6	-19.6
6	466265.87	5021472.42	87.00	0	1000	77.5	77.5	0.0	0.0	71.0	3.6	-1.6	0.0	0.0	26.6	0.0	-0.0	-22.1	-22.1
7	466265.87	5021472.42	87.00	0	2000	76.7	76.7	0.0	0.0	71.0	9.6	-1.6	0.0	0.0	26.6	0.0	-0.0	-28.9	-28.9
8	466265.87	5021472.42	87.00	0	4000	70.5	70.5	0.0	0.0	71.0	32.6	-1.6	0.0	0.0	26.6	0.0	-0.0	-58.0	-58.0
9	466265.87	5021472.42	87.00	0	8000	55.4	55.4	0.0	0.0	71.0	116.2	-1.6	0.0	0.0	26.6	0.0	-0.0	-156.8	-156.8

Point Source, ISO 9613, Name: "C&D - Vent - 1", ID: "A_014"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466062.41	5021384.31	87.00	0	32	53.1	53.1	0.0	0.0	69.0	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.5	-11.5
2	466062.41	5021384.31	87.00	0	63	59.3	59.3	0.0	0.0	69.0	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-5.4	-5.4
3	466062.41	5021384.31	87.00	0	125	66.4	66.4	0.0	0.0	69.0	0.3	1.7	0.0	0.0	0.0	0.0	-0.0	-4.6	-4.6
4	466062.41	5021384.31	87.00	0	250	74.9	74.9	0.0	0.0	69.0	0.8	-0.2	0.0	0.0	0.0	0.0	-0.0	5.3	5.3
5	466062.41	5021384.31	87.00	0	500	78.3	78.3	0.0	0.0	69.0	1.5	-1.4	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
6	466062.41	5021384.31	87.00	0	1000	77.5	77.5	0.0	0.0	69.0	2.9	-1.4	0.0	0.0	0.0	0.0	-0.0	7.0	7.0
7	466062.41	5021384.31	87.00	0	2000	76.7	76.7	0.0	0.0	69.0	7.6	-1.4	0.0	0.0	0.0	0.0	-0.0	1.4	1.4
8	466062.41	5021384.31	87.00	0	4000	70.5	70.5	0.0	0.0	69.0	25.9	-1.4	0.0	0.0	0.0	0.0	-0.0	-23.1	-23.1
9	466062.41	5021384.31	87.00	0	8000	55.4	55.4	0.0	0.0	69.0	92.5	-1.4	0.0	0.0	0.0	0.0	-0.0	-104.7	-104.7

Point Source, ISO 9613, Name: "C&D - Vent - 2", ID: "A_015"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466072.70	5021357.08	87.00	0	32	53.1	53.1	0.0	0.0	68.8	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.4	-11.4
2	466072.70	5021357.08	87.00	0	63	59.3	59.3	0.0	0.0	68.8	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-5.3	-5.3
3	466072.70	5021357.08	87.00	0	125	66.4	66.4	0.0	0.0	68.8	0.3	1.7	0.0	0.0	0.0	0.0	-0.0	-4.4	-4.4
4	466072.70	5021357.08	87.00	0	250	74.9	74.9	0.0	0.0	68.8	0.8	-0.2	0.0	0.0	0.0	0.0	-0.0	5.5	5.5
5	466072.70	5021357.08	87.00	0	500	78.3	78.3	0.0	0.0	68.8	1.5	-1.3	0.0	0.0	0.0	0.0	-0.0	9.3	9.3
6	466072.70	5021357.08	87.00	0	1000	77.5	77.5	0.0	0.0	68.8	2.8	-1.3	0.0	0.0	0.0	0.0	-0.0	7.2	7.2
7	466072.70	5021357.08	87.00	0	2000	76.7	76.7	0.0	0.0	68.8	7.5	-1.3	0.0	0.0	0.0	0.0	-0.0	1.7	1.7
8	466072.70	5021357.08	87.00	0	4000	70.5	70.5	0.0	0.0	68.8	25.5	-1.3	0.0	0.0	0.0	0.0	-0.0	-22.5	-22.5
9	466072.70	5021357.08	87.00	0	8000	55.4	55.4	0.0	0.0	68.8	90.9	-1.3	0.0	0.0	0.0	0.0	-0.0	-103.0	-103.0

Point Source, ISO 9613, Name: "C&D - Vent - 3", ID: "A_016"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466083.78	5021327.72	87.00	0	32	53.1	53.1	0.0	0.0	68.7	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.3	-11.3
2	466083.78	5021327.72	87.00	0	63	59.3	59.3	0.0	0.0	68.7	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-5.1	-5.1
3	466083.78	5021327.72	87.00	0	125	66.4	66.4	0.0	0.0	68.7	0.3	1.7	0.0	0.0	0.0	0.0	-0.0	-4.2	-4.2
4	466083.78	5021327.72	87.00	0	250	74.9	74.9	0.0	0.0	68.7	0.8	-0.2	0.0	0.0	0.0	0.0	-0.0	5.7	5.7
5	466083.78	5021327.72	87.00	0	500	78.3	78.3	0.0	0.0	68.7	1.5	-1.3	0.0	0.0	0.0	0.0	-0.0	9.5	9.5
6	466083.78	5021327.72	87.00	0	1000	77.5	77.5	0.0	0.0	68.7	2.8	-1.3	0.0	0.0	0.0	0.0	-0.0	7.4	7.4
7	466083.78	5021327.72	87.00	0	2000	76.7	76.7	0.0	0.0	68.7	7.4	-1.3	0.0	0.0	0.0	0.0	-0.0	2.0	2.0
8	466083.78	5021327.72	87.00	0	4000	70.5	70.5	0.0	0.0	68.7	25.0	-1.3	0.0	0.0	0.0	0.0	-0.0	-21.8	-21.8
9	466083.78	5021327.72	87.00	0	8000	55.4	55.4	0.0	0.0	68.7	89.2	-1.3	0.0	0.0	0.0	0.0	-0.0	-101.2	-101.2

Point Source, ISO 9613, Name: "C&D - Vent - 4", ID: "A_017"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466113.18	5021331.72	87.00	0	32	53.1	53.1	0.0	0.0	68.9	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.5	-11.5
2	466113.18	5021331.72	87.00	0	63	59.3	59.3	0.0	0.0	68.9	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-5.4	-5.4
3	466113.18	5021331.72	87.00	0	125	66.4	66.4	0.0	0.0	68.9	0.3	1.6	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
4	466113.18	5021331.72	87.00	0	250	74.9	74.9	0.0	0.0	68.9	0.8	-0.3	0.0	0.0	0.0	0.0	-0.0	5.4	5.4
5	466113.18	5021331.72	87.00	0	500	78.3	78.3	0.0	0.0	68.9	1.5	-1.4	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
6	466113.18	5021331.72	87.00	0	1000	77.5	77.5	0.0	0.0	68.9	2.9	-1.4	0.0	0.0	0.0	0.0	-0.0	7.1	7.1
7	466113.18	5021331.72	87.00	0	2000	76.7	76.7	0.0	0.0	68.9	7.6	-1.4	0.0	0.0	0.0	0.0	-0.0	1.6	1.6
8	466113.18	5021331.72	87.00	0	4000	70.5	70.5	0.0	0.0	68.9	25.8	-1.4	0.0	0.0	0.0	0.0	-0.0	-22.8	-22.8
9	466113.18	5021331.72	87.00	0	8000	55.4	55.4	0.0	0.0	68.9	92.0	-1.4	0.0	0.0	0.0	0.0	-0.0	-104.1	-104.1

Point Source, ISO 9613, Name: "C&D - Vent - 5", ID: "A_018"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466162.26	5021350.68	87.00	0	32	53.1	53.1	0.0	0.0	69.4	0.0	-4.4	0.0	0.0	0.0	0.0	-0.0	-11.9	-11.9
2	466162.26	5021350.68	87.00	0	63	59.3	59.3	0.0	0.0	69.4	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	-5.8	-5.8
3	466162.26	5021350.68	87.00	0	125	66.4	66.4	0.0	0.0	69.4	0.3	1.6	0.0	0.0	0.0	0.0	-0.0	-5.0	-5.0
4	466162.26	5021350.68	87.00	0	250	74.9	74.9	0.0	0.0	69.4	0.9	-0.3	0.0	0.0	0.0	0.0	-0.0	4.9	4.9
5	466162.26	5021350.68	87.00	0	500	78.3	78.3	0.0	0.0	69.4	1.6	-1.4	0.0	0.0	0.0	0.0	-0.0	8.7	8.7
6	466162.26	5021350.68	87.00	0	1000	77.5	77.5	0.0	0.0	69.4	3.0	-1.4	0.0	0.0	0.0	0.0	-0.0	6.5	6.5
7	466162.26	5021350.68	87.00	0	2000	76.7	76.7	0.0	0.0	69.4	8.1	-1.4	0.0	0.0	0.0	0.0	-0.0	0.6	0.6
8	466162.26	5021350.68	87.00	0	4000	70.5	70.5	0.0	0.0	69.4	27.4	-1.4	0.0	0.0	0.0	0.0	-0.0	-24.9	-24.9
9	466162.26	5021350.68	87.00	0	8000	55.4	55.4	0.0	0.0	69.4	97.6	-1.4	0.0	0.0	0.0	0.0	-0.0	-110.2	-110.2

Point Source, ISO 9613, Name: "C&D - Vent - 6", ID: "A_019"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466206.86	5021367.91	87.00	0	32	53.1	53.1	0.0	0.0	69.9	0.0	-4.5	0.0	0.0	0.0	0.0	-0.0	-12.3	-12.3
2	466206.86	5021367.91	87.00	0	63	59.3	59.3	0.0	0.0	69.9	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	-6.2	-6.2
3	466206.86	5021367.91	87.00	0	125	66.4	66.4	0.0	0.0	69.9	0.4	1.6	0.0	0.0	0.0	0.0	-0.0	-5.4	-5.4
4	466206.86	5021367.91	87.00	0	250	74.9	74.9	0.0	0.0	69.9	0.9	-0.4	0.0	0.0	0.0	0.0	-0.0	4.5	4.5
5	466206.86	5021367.91	87.00	0	500	78.3	78.3	0.0	0.0	69.9	1.7	-1.5	0.0	0.0	0.0	0.0	-0.0	8.2	8.2
6	466206.86	5021367.91	87.00	0	1000	77.5	77.5	0.0	0.0	69.9	3.2	-1.5	0.0	0.0	0.0	0.0	-0.0	5.9	5.9
7	466206.86	5021367.91	87.00	0	2000	76.7	76.7	0.0	0.0	69.9	8.5	-1.5	0.0	0.0	0.0	0.0	-0.0	-0.2	-0.2
8	466206.86	5021367.91	87.00	0	4000	70.5	70.5	0.0	0.0	69.9	28.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-26.7	-26.7
9	466206.86	5021367.91	87.00	0	8000	55.4	55.4	0.0	0.0	69.9	102.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-115.8	-115.8

Point Source, ISO 9613, Name: "C&D - Vent - 7", ID: "A_020"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466225.47	5021384.81	87.00	0	32	53.1	53.1	0.0	0.0	70.1	0.0	-4.6	0.0	0.0	9.4	0.0	-0.0	-21.9	-21.9
2	466225.47	5021384.81	87.00	0	63	59.3	59.3	0.0	0.0	70.1	0.1	-4.6	0.0	0.0	12.1	0.0	-0.0	-18.5	-18.5
3	466225.47	5021384.81	87.00	0	125	66.4	66.4	0.0	0.0	70.1	0.4	1.5	0.0	0.0	12.6	0.0	-0.0	-18.2	-18.2
4	466225.47	5021384.81	87.00	0	250	74.9	74.9	0.0	0.0	70.1	0.9	-0.4	0.0	0.0	17.0	0.0	-0.0	-12.8	-12.8
5	466225.47	5021384.81	87.00	0	500	78.3	78.3	0.0	0.0	70.1	1.7	-1.5	0.0	0.0	20.5	0.0	-0.0	-12.6	-12.6
6	466225.47	5021384.81	87.00	0	1000	77.5	77.5	0.0	0.0	70.1	3.3	-1.5	0.0	0.0	22.9	0.0	-0.0	-17.3	-17.3
7	466225.47	5021384.81	87.00	0	2000	76.7	76.7	0.0	0.0	70.1	8.7	-1.5	0.0	0.0	24.3	0.0	-0.0	-25.0	-25.0
8	466225.47	5021384.81	87.00	0	4000	70.5	70.5	0.0	0.0	70.1	29.6	-1.5	0.0	0.0	25.3	0.0	-0.0	-53.0	-53.0
9	466225.47	5021384.81	87.00	0	8000	55.4	55.4	0.0	0.0	70.1	105.7	-1.5	0.0	0.0	25.9	0.0	-0.0	-144.8	-144.8

Point Source, ISO 9613, Name: "C&D - Vent - 8", ID: "A_021"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466214.92	5021411.84	87.00	0	32	53.1	53.1	0.0	0.0	70.2	0.0	-4.6	0.0	0.0	13.2	0.0	-0.0	-25.8	-25.8
2	466214.92	5021411.84	87.00	0	63	59.3	59.3	0.0	0.0	70.2	0.1	-4.6	0.0	0.0	16.4	0.0	-0.0	-22.9	-22.9
3	466214.92	5021411.84	87.00	0	125	66.4	66.4	0.0	0.0	70.2	0.4	1.5	0.0	0.0	15.4	0.0	-0.0	-21.1	-21.1
4	466214.92	5021411.84	87.00	0	250	74.9	74.9	0.0	0.0	70.2	1.0	-0.4	0.0	0.0	19.9	0.0	-0.0	-15.7	-15.7
5	466214.92	5021411.84	87.00	0	500	78.3	78.3	0.0	0.0	70.2	1.8	-1.5	0.0	0.0	23.6	0.0	-0.0	-15.8	-15.8
6	466214.92	5021411.84	87.00	0	1000	77.5	77.5	0.0	0.0	70.2	3.3	-1.5	0.0	0.0	25.3	0.0	-0.0	-19.9	-19.9
7	466214.92	5021411.84	87.00	0	2000	76.7	76.7	0.0	0.0	70.2	8.9	-1.5	0.0	0.0	25.9	0.0	-0.0	-26.7	-26.7
8	466214.92	5021411.84	87.00	0	4000	70.5	70.5	0.0	0.0	70.2	30.0	-1.5	0.0	0.0	26.2	0.0	-0.0	-54.4	-54.4
9	466214.92	5021411.84	87.00	0	8000	55.4	55.4	0.0	0.0	70.2	107.0	-1.5	0.0	0.0	26.4	0.0	-0.0	-146.7	-146.7

Point Source, ISO 9613, Name: "C&D - Vent - 9", ID: "A_022"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466203.46	5021441.17	87.00	0	32	53.1	53.1	0.0	0.0	70.3	0.0	-4.6	0.0	0.0	16.6	0.0	-0.0	-29.3	-29.3
2	466203.46	5021441.17	87.00	0	63	59.3	59.3	0.0	0.0	70.3	0.1	-4.6	0.0	0.0	19.6	0.0	-0.0	-26.2	-26.2
3	466203.46	5021441.17	87.00	0	125	66.4	66.4	0.0	0.0	70.3	0.4	1.5	0.0	0.0	16.4	0.0	-0.0	-22.3	-22.3
4	466203.46	5021441.17	87.00	0	250	74.9	74.9	0.0	0.0	70.3	1.0	-0.4	0.0	0.0	21.3	0.0	-0.0	-17.3	-17.3
5	466203.46	5021441.17	87.00	0	500	78.3	78.3	0.0	0.0	70.3	1.8	-1.5	0.0	0.0	25.4	0.0	-0.0	-17.7	-17.7
6	466203.46	5021441.17	87.00	0	1000	77.5	77.5	0.0	0.0	70.3	3.4	-1.5	0.0	0.0	26.5	0.0	-0.0	-21.2	-21.2
7	466203.46	5021441.17	87.00	0	2000	76.7	76.7	0.0	0.0	70.3	9.0	-1.5	0.0	0.0	26.5	0.0	-0.0	-27.6	-27.6
8	466203.46	5021441.17	87.00	0	4000	70.5	70.5	0.0	0.0	70.3	30.4	-1.5	0.0	0.0	26.5	0.0	-0.0	-55.3	-55.3
9	466203.46	5021441.17	87.00	0	8000	55.4	55.4	0.0	0.0	70.3	108.5	-1.5	0.0	0.0	26.5	0.0	-0.0	-148.4	-148.4

Point Source, ISO 9613, Name: "C&D - Vent - 10", ID: "A_023"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466188.26	5021441.96	87.00	0	32	53.1	53.1	0.0	0.0	70.3	0.0	-4.6	0.0	0.0	16.4	0.0	-0.0	-29.0	-29.0
2	466188.26	5021441.96	87.00	0	63	59.3	59.3	0.0	0.0	70.3	0.1	-4.6	0.0	0.0	19.5	0.0	-0.0	-26.0	-26.0
3	466188.26	5021441.96	87.00	0	125	66.4	66.4	0.0	0.0	70.3	0.4	1.5	0.0	0.0	16.3	0.0	-0.0	-22.1	-22.1
4	466188.26	5021441.96	87.00	0	250	74.9	74.9	0.0	0.0	70.3	1.0	-0.4	0.0	0.0	21.3	0.0	-0.0	-17.1	-17.1
5	466188.26	5021441.96	87.00	0	500	78.3	78.3	0.0	0.0	70.3	1.8	-1.5	0.0	0.0	25.3	0.0	-0.0	-17.5	-17.5
6	466188.26	5021441.96	87.00	0	1000	77.5	77.5	0.0	0.0	70.3	3.4	-1.5	0.0	0.0	26.5	0.0	-0.0	-21.1	-21.1
7	466188.26	5021441.96	87.00	0	2000	76.7	76.7	0.0	0.0	70.3	8.9	-1.5	0.0	0.0	26.5	0.0	-0.0	-27.4	-27.4
8	466188.26	5021441.96	87.00	0	4000	70.5	70.5	0.0	0.0	70.3	30.1	-1.5	0.0	0.0	26.5	0.0	-0.0	-54.8	-54.8
9	466188.26	5021441.96	87.00	0	8000	55.4	55.4	0.0	0.0	70.3	107.3	-1.5	0.0	0.0	26.5	0.0	-0.0	-147.2	-147.2

Point Source, ISO 9613, Name: "C&D - Vent - 11", ID: "A_024"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466130.99	5021419.46	87.00	0	32	53.1	53.1	0.0	0.0	69.7	0.0	-4.5	0.0	0.0	11.0	0.0	-0.0	-23.2	-23.2
2	466130.99	5021419.46	87.00	0	63	59.3	59.3	0.0	0.0	69.7	0.1	-4.5	0.0	0.0	14.0	0.0	-0.0	-20.0	-20.0
3	466130.99	5021419.46	87.00	0	125	66.4	66.4	0.0	0.0	69.7	0.4	1.6	0.0	0.0	14.2	0.0	-0.0	-19.4	-19.4
4	466130.99	5021419.46	87.00	0	250	74.9	74.9	0.0	0.0	69.7	0.9	-0.4	0.0	0.0	18.3	0.0	-0.0	-13.6	-13.6
5	466130.99	5021419.46	87.00	0	500	78.3	78.3	0.0	0.0	69.7	1.7	-1.5	0.0	0.0	21.8	0.0	-0.0	-13.4	-13.4
6	466130.99	5021419.46	87.00	0	1000	77.5	77.5	0.0	0.0	69.7	3.2	-1.5	0.0	0.0	23.8	0.0	-0.0	-17.8	-17.8
7	466130.99	5021419.46	87.00	0	2000	76.7	76.7	0.0	0.0	69.7	8.3	-1.5	0.0	0.0	24.9	0.0	-0.0	-24.9	-24.9
8	466130.99	5021419.46	87.00	0	4000	70.5	70.5	0.0	0.0	69.7	28.3	-1.5	0.0	0.0	25.6	0.0	-0.0	-51.7	-51.7
9	466130.99	5021419.46	87.00	0	8000	55.4	55.4	0.0	0.0	69.7	100.9	-1.5	0.0	0.0	26.0	0.0	-0.0	-139.8	-139.8

Point Source, ISO 9613, Name: "C&D - Vent - 12", ID: "A_025"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466087.05	5021402.20	87.00	0	32	53.1	53.1	0.0	0.0	69.3	0.0	-4.4	0.0	0.0	8.5	0.0	-0.0	-20.3	-20.3
2	466087.05	5021402.20	87.00	0	63	59.3	59.3	0.0	0.0	69.3	0.1	-4.4	0.0	0.0	11.0	0.0	-0.0	-16.7	-16.7
3	466087.05	5021402.20	87.00	0	125	66.4	66.4	0.0	0.0	69.3	0.3	1.6	0.0	0.0	12.0	0.0	-0.0	-16.9	-16.9
4	466087.05	5021402.20	87.00	0	250	74.9	74.9	0.0	0.0	69.3	0.9	-0.3	0.0	0.0	15.9	0.0	-0.0	-10.8	-10.8
5	466087.05	5021402.20	87.00	0	500	78.3	78.3	0.0	0.0	69.3	1.6	-1.4	0.0	0.0	19.2	0.0	-0.0	-10.3	-10.3
6	466087.05	5021402.20	87.00	0	1000	77.5	77.5	0.0	0.0	69.3	3.0	-1.4	0.0	0.0	21.6	0.0	-0.0	-15.0	-15.0
7	466087.05	5021402.20	87.00	0	2000	76.7	76.7	0.0	0.0	69.3	7.9	-1.4	0.0	0.0	23.4	0.0	-0.0	-22.5	-22.5
8	466087.05	5021402.20	87.00	0	4000	70.5	70.5	0.0	0.0	69.3	26.9	-1.4	0.0	0.0	24.6	0.0	-0.0	-48.9	-48.9
9	466087.05	5021402.20	87.00	0	8000	55.4	55.4	0.0	0.0	69.3	96.0	-1.4	0.0	0.0	25.4	0.0	-0.0	-133.9	-133.9

Point Source, ISO 9613, Name: "MRF - Dust Collector", ID: "A_026"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466346.41	5021494.00	94.00	0	32	66.6	66.6	0.0	0.0	71.6	0.0	-4.2	0.0	0.0	0.0	0.0	-0.0	-0.8	-0.8
2	466346.41	5021494.00	94.00	0	63	77.8	77.8	0.0	0.0	71.6	0.1	-4.2	0.0	0.0	0.0	0.0	-0.0	10.3	10.3
3	466346.41	5021494.00	94.00	0	125	85.9	85.9	0.0	0.0	71.6	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	12.3	12.3
4	466346.41	5021494.00	94.00	0	250	90.4	90.4	0.0	0.0	71.6	1.1	-0.3	0.0	0.0	0.0	0.0	-0.0	18.0	18.0
5	466346.41	5021494.00	94.00	0	500	97.8	97.8	0.0	0.0	71.6	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	25.6	25.6
6	466346.41	5021494.00	94.00	0	1000	96.0	96.0	0.0	0.0	71.6	3.9	-1.4	0.0	0.0	0.0	0.0	-0.0	21.9	21.9
7	466346.41	5021494.00	94.00	0	2000	93.2	93.2	0.0	0.0	71.6	10.3	-1.4	0.0	0.0	0.0	0.0	-0.0	12.7	12.7
8	466346.41	5021494.00	94.00	0	4000	90.0	90.0	0.0	0.0	71.6	35.0	-1.4	0.0	0.0	0.0	0.0	-0.0	-15.2	-15.2
9	466346.41	5021494.00	94.00	0	8000	80.9	80.9	0.0	0.0	71.6	124.8	-1.4	0.0	0.0	0.0	0.0	-0.0	-114.1	-114.1

Point Source, ISO 9613, Name: "C&D - Dust Collector", ID: "A_027"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466138.03	5021395.13	92.70	0	32	66.6	66.6	0.0	0.0	69.6	0.0	-3.9	0.0	0.0	0.0	0.0	-0.0	0.9	0.9
2	466138.03	5021395.13	92.70	0	63	77.8	77.8	0.0	0.0	69.6	0.1	-3.9	0.0	0.0	0.0	0.0	-0.0	12.0	12.0
3	466138.03	5021395.13	92.70	0	125	85.9	85.9	0.0	0.0	69.6	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	14.2	14.2
4	466138.03	5021395.13	92.70	0	250	90.4	90.4	0.0	0.0	69.6	0.9	-0.0	0.0	0.0	0.0	0.0	-0.0	20.0	20.0
5	466138.03	5021395.13	92.70	0	500	97.8	97.8	0.0	0.0	69.6	1.6	-1.2	0.0	0.0	0.0	0.0	-0.0	27.7	27.7
6	466138.03	5021395.13	92.70	0	1000	96.0	96.0	0.0	0.0	69.6	3.1	-1.2	0.0	0.0	0.0	0.0	-0.0	24.5	24.5
7	466138.03	5021395.13	92.70	0	2000	93.2	93.2	0.0	0.0	69.6	8.2	-1.2	0.0	0.0	0.0	0.0	-0.0	16.6	16.6
8	466138.03	5021395.13	92.70	0	4000	90.0	90.0	0.0	0.0	69.6	27.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-6.3	-6.3
9	466138.03	5021395.13	92.70	0	8000	80.9	80.9	0.0	0.0	69.6	99.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-86.8	-86.8

Point Source, ISO 9613, Name: "Mech - Welding Fume Hood", ID: "A_028"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466521.50	5021489.37	81.00	0	32	-1.4	-1.4	0.0	0.0	72.6	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-68.7	-68.7
2	466521.50	5021489.37	81.00	0	63	24.8	24.8	0.0	0.0	72.6	0.2	-5.4	0.0	0.0	0.0	0.0	-0.0	-42.6	-42.6
3	466521.50	5021489.37	81.00	0	125	47.9	47.9	0.0	0.0	72.6	0.5	3.0	0.0	0.0	0.0	0.0	-0.0	-28.2	-28.2
4	466521.50	5021489.37	81.00	0	250	63.4	63.4	0.0	0.0	72.6	1.3	0.1	0.0	0.0	0.0	0.0	-0.0	-10.6	-10.6
5	466521.50	5021489.37	81.00	0	500	79.8	79.8	0.0	0.0	72.6	2.3	-2.0	0.0	0.0	0.0	0.0	-0.0	6.9	6.9
6	466521.50	5021489.37	81.00	0	1000	88.0	88.0	0.0	0.0	72.6	4.4	-2.0	0.0	0.0	0.0	0.0	-0.0	13.0	13.0
7	466521.50	5021489.37	81.00	0	2000	87.2	87.2	0.0	0.0	72.6	11.6	-2.0	0.0	0.0	0.0	0.0	-0.0	5.0	5.0
8	466521.50	5021489.37	81.00	0	4000	77.0	77.0	0.0	0.0	72.6	39.3	-2.0	0.0	0.0	0.0	0.0	-0.0	-32.9	-32.9
9	466521.50	5021489.37	81.00	0	8000	67.9	67.9	0.0	0.0	72.6	140.2	-2.0	0.0	0.0	0.0	0.0	-0.0	-142.9	-142.9

Point Source, ISO 9613, Name: "SS Loader CAT966", ID: "A_029"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466260.94	5021063.16	84.50	0	32	76.6	76.6	0.0	0.0	68.6	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	13.1	13.1
2	466260.94	5021063.16	84.50	0	63	98.8	98.8	0.0	0.0	68.6	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	35.3	35.3
3	466260.94	5021063.16	84.50	0	125	100.9	100.9	0.0	0.0	68.6	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	28.6	28.6
4	466260.94	5021063.16	84.50	0	250	97.4	97.4	0.0	0.0	68.6	0.8	2.1	0.0	0.0	0.0	0.0	-0.0	25.9	25.9
5	466260.94	5021063.16	84.50	0	500	100.8	100.8	0.0	0.0	68.6	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	31.8	31.8
6	466260.94	5021063.16	84.50	0	1000	103.0	103.0	0.0	0.0	68.6	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	33.1	33.1
7	466260.94	5021063.16	84.50	0	2000	103.2	103.2	0.0	0.0	68.6	7.3	-1.5	0.0	0.0	0.0	0.0	-0.0	28.8	28.8
8	466260.94	5021063.16	84.50	0	4000	98.0	98.0	0.0	0.0	68.6	24.9	-1.5	0.0	0.0	0.0	0.0	-0.0	6.0	6.0
9	466260.94	5021063.16	84.50	0	8000	85.9	85.9	0.0	0.0	68.6	88.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-70.0	-70.0

Point Source, ISO 9613, Name: "HC Loader CAT966", ID: "A_030"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466285.27	5020999.62	82.00	0	32	76.6	76.6	0.0	0.0	68.6	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	13.1	13.1
2	466285.27	5020999.62	82.00	0	63	98.8	98.8	0.0	0.0	68.6	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	35.3	35.3
3	466285.27	5020999.62	82.00	0	125	100.9	100.9	0.0	0.0	68.6	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	28.5	28.5
4	466285.27	5020999.62	82.00	0	250	97.4	97.4	0.0	0.0	68.6	0.8	2.1	0.0	0.0	0.0	0.0	-0.0	25.9	25.9
5	466285.27	5020999.62	82.00	0	500	100.8	100.8	0.0	0.0	68.6	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	31.8	31.8
6	466285.27	5020999.62	82.00	0	1000	103.0	103.0	0.0	0.0	68.6	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	33.1	33.1
7	466285.27	5020999.62	82.00	0	2000	103.2	103.2	0.0	0.0	68.6	7.4	-1.5	0.0	0.0	0.0	0.0	-0.0	28.7	28.7
8	466285.27	5020999.62	82.00	0	4000	98.0	98.0	0.0	0.0	68.6	24.9	-1.5	0.0	0.0	0.0	0.0	-0.0	5.9	5.9
9	466285.27	5020999.62	82.00	0	8000	85.9	85.9	0.0	0.0	68.6	89.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-70.2	-70.2

Point Source, ISO 9613, Name: "SS Grader CAT12", ID: "A_031"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466255.73	5021075.03	84.50	0	32	78.6	78.6	0.0	0.0	68.6	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	15.1	15.1
2	466255.73	5021075.03	84.50	0	63	95.8	95.8	0.0	0.0	68.6	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	32.3	32.3
3	466255.73	5021075.03	84.50	0	125	96.9	96.9	0.0	0.0	68.6	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	24.6	24.6
4	466255.73	5021075.03	84.50	0	250	104.4	104.4	0.0	0.0	68.6	0.8	2.1	0.0	0.0	0.0	0.0	-0.0	32.9	32.9
5	466255.73	5021075.03	84.50	0	500	109.8	109.8	0.0	0.0	68.6	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	40.8	40.8
6	466255.73	5021075.03	84.50	0	1000	110.0	110.0	0.0	0.0	68.6	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	40.1	40.1
7	466255.73	5021075.03	84.50	0	2000	110.2	110.2	0.0	0.0	68.6	7.3	-1.5	0.0	0.0	0.0	0.0	-0.0	35.8	35.8
8	466255.73	5021075.03	84.50	0	4000	109.0	109.0	0.0	0.0	68.6	24.9	-1.5	0.0	0.0	0.0	0.0	-0.0	17.0	17.0
9	466255.73	5021075.03	84.50	0	8000	99.9	99.9	0.0	0.0	68.6	88.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-56.0	-56.0

Point Source, ISO 9613, Name: "SS Dozer CATD6", ID: "A_032"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466252.11	5021086.67	84.50	0	32	65.6	65.6	0.0	0.0	68.6	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	2.1	2.1
2	466252.11	5021086.67	84.50	0	63	82.8	82.8	0.0	0.0	68.6	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	19.3	19.3
3	466252.11	5021086.67	84.50	0	125	97.9	97.9	0.0	0.0	68.6	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	25.5	25.5
4	466252.11	5021086.67	84.50	0	250	103.4	103.4	0.0	0.0	68.6	0.8	2.1	0.0	0.0	0.0	0.0	-0.0	31.9	31.9
5	466252.11	5021086.67	84.50	0	500	102.8	102.8	0.0	0.0	68.6	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	33.8	33.8
6	466252.11	5021086.67	84.50	0	1000	103.0	103.0	0.0	0.0	68.6	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	33.1	33.1
7	466252.11	5021086.67	84.50	0	2000	104.2	104.2	0.0	0.0	68.6	7.3	-1.5	0.0	0.0	0.0	0.0	-0.0	29.7	29.7
8	466252.11	5021086.67	84.50	0	4000	97.0	97.0	0.0	0.0	68.6	24.9	-1.5	0.0	0.0	0.0	0.0	-0.0	4.9	4.9
9	466252.11	5021086.67	84.50	0	8000	86.9	86.9	0.0	0.0	68.6	89.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-69.2	-69.2

Point Source, ISO 9613, Name: "Compost Loader 2", ID: "A_033"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466364.48	5021125.52	83.50	0	32	76.6	76.6	0.0	0.0	69.9	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	12.0	12.0
2	466364.48	5021125.52	83.50	0	63	98.8	98.8	0.0	0.0	69.9	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	34.1	34.1
3	466364.48	5021125.52	83.50	0	125	100.9	100.9	0.0	0.0	69.9	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	27.2	27.2
4	466364.48	5021125.52	83.50	0	250	97.4	97.4	0.0	0.0	69.9	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	24.7	24.7
5	466364.48	5021125.52	83.50	0	500	100.8	100.8	0.0	0.0	69.9	1.7	-1.3	0.0	0.0	0.0	0.0	-0.0	30.5	30.5
6	466364.48	5021125.52	83.50	0	1000	103.0	103.0	0.0	0.0	69.9	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	31.5	31.5
7	466364.48	5021125.52	83.50	0	2000	103.2	103.2	0.0	0.0	69.9	8.5	-1.7	0.0	0.0	0.0	0.0	-0.0	26.5	26.5
8	466364.48	5021125.52	83.50	0	4000	98.0	98.0	0.0	0.0	69.9	28.8	-1.7	0.0	0.0	0.0	0.0	-0.0	0.9	0.9
9	466364.48	5021125.52	83.50	0	8000	85.9	85.9	0.0	0.0	69.9	102.8	-1.7	0.0	0.0	0.0	0.0	-0.0	-85.1	-85.1

Point Source, ISO 9613, Name: "Compost Loader 1", ID: "A_034"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466407.23	5021187.51	83.50	0	32	76.6	76.6	0.0	0.0	70.5	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	11.4	11.4
2	466407.23	5021187.51	83.50	0	63	98.8	98.8	0.0	0.0	70.5	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	33.5	33.5
3	466407.23	5021187.51	83.50	0	125	100.9	100.9	0.0	0.0	70.5	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	26.5	26.5
4	466407.23	5021187.51	83.50	0	250	97.4	97.4	0.0	0.0	70.5	1.0	1.9	0.0	0.0	0.0	0.0	-0.0	24.1	24.1
5	466407.23	5021187.51	83.50	0	500	100.8	100.8	0.0	0.0	70.5	1.8	-1.3	0.0	0.0	0.0	0.0	-0.0	29.8	29.8
6	466407.23	5021187.51	83.50	0	1000	103.0	103.0	0.0	0.0	70.5	3.4	-1.7	0.0	0.0	0.0	0.0	-0.0	30.7	30.7
7	466407.23	5021187.51	83.50	0	2000	103.2	103.2	0.0	0.0	70.5	9.1	-1.7	0.0	0.0	0.0	0.0	-0.0	25.3	25.3
8	466407.23	5021187.51	83.50	0	4000	98.0	98.0	0.0	0.0	70.5	30.9	-1.7	0.0	0.0	0.0	0.0	-0.0	-1.7	-1.7
9	466407.23	5021187.51	83.50	0	8000	85.9	85.9	0.0	0.0	70.5	110.4	-1.7	0.0	0.0	0.0	0.0	-0.0	-93.3	-93.3

Point Source, ISO 9613, Name: "Compost Chipper", ID: "A_035"																		
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466346.34	5021172.63	83.50	0	32	57.6	57.6	0.0	0.0	69.9	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-7.1	-7.1
2	466346.34	5021172.63	83.50	0	63	82.8	82.8	0.0	0.0	69.9	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	18.1	18.1
3	466346.34	5021172.63	83.50	0	125	89.9	89.9	0.0	0.0	69.9	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	16.1	16.1
4	466346.34	5021172.63	83.50	0	250	99.4	99.4	0.0	0.0	69.9	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	26.6	26.6
5	466346.34	5021172.63	83.50	0	500	108.8	108.8	0.0	0.0	69.9	1.7	-1.3	0.0	0.0	0.0	0.0	-0.0	38.4	38.4
6	466346.34	5021172.63	83.50	0	1000	114.0	114.0	0.0	0.0	69.9	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	42.5	42.5
7	466346.34	5021172.63	83.50	0	2000	113.2	113.2	0.0	0.0	69.9	8.5	-1.7	0.0	0.0	0.0	0.0	-0.0	36.4	36.4
8	466346.34	5021172.63	83.50	0	4000	107.0	107.0	0.0	0.0	69.9	28.9	-1.7	0.0	0.0	0.0	0.0	-0.0	9.8	9.8
9	466346.34	5021172.63	83.50	0	8000	95.9	95.9	0.0	0.0	69.9	103.2	-1.7	0.0	0.0	0.0	0.0	-0.0	-75.6	-75.6

Point Source, ISO 9613, Name: "Compost Conveyor", ID: "A_036"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466354.98	5021162.93	83.50	0	32	49.6	49.6	0.0	0.0	70.0	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-15.1	-15.1
2	466354.98	5021162.93	83.50	0	63	65.8	65.8	0.0	0.0	70.0	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	1.0	1.0
3	466354.98	5021162.93	83.50	0	125	79.9	79.9	0.0	0.0	70.0	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	6.1	6.1
4	466354.98	5021162.93	83.50	0	250	86.4	86.4	0.0	0.0	70.0	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	13.6	13.6
5	466354.98	5021162.93	83.50	0	500	88.8	88.8	0.0	0.0	70.0	1.7	-1.3	0.0	0.0	0.0	0.0	-0.0	18.4	18.4
6	466354.98	5021162.93	83.50	0	1000	88.0	88.0	0.0	0.0	70.0	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	16.4	16.4
7	466354.98	5021162.93	83.50	0	2000	86.2	86.2	0.0	0.0	70.0	8.6	-1.7	0.0	0.0	0.0	0.0	-0.0	9.3	9.3
8	466354.98	5021162.93	83.50	0	4000	79.0	79.0	0.0	0.0	70.0	29.1	-1.7	0.0	0.0	0.0	0.0	-0.0	-18.4	-18.4
9	466354.98	5021162.93	83.50	0	8000	69.9	69.9	0.0	0.0	70.0	103.6	-1.7	0.0	0.0	0.0	0.0	-0.0	-102.0	-102.0

Point Source, ISO 9613, Name: "Compost Turner", ID: "A_037"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466352.92	5021133.57	83.50	0	32	66.6	66.6	0.0	0.0	69.8	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	2.0	2.0
2	466352.92	5021133.57	83.50	0	63	89.8	89.8	0.0	0.0	69.8	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	25.2	25.2
3	466352.92	5021133.57	83.50	0	125	97.9	97.9	0.0	0.0	69.8	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	24.3	24.3
4	466352.92	5021133.57	83.50	0	250	99.4	99.4	0.0	0.0	69.8	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	26.8	26.8
5	466352.92	5021133.57	83.50	0	500	105.8	105.8	0.0	0.0	69.8	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	35.5	35.5
6	466352.92	5021133.57	83.50	0	1000	104.0	104.0	0.0	0.0	69.8	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	32.6	32.6
7	466352.92	5021133.57	83.50	0	2000	104.2	104.2	0.0	0.0	69.8	8.4	-1.6	0.0	0.0	0.0	0.0	-0.0	27.6	27.6
8	466352.92	5021133.57	83.50	0	4000	99.0	99.0	0.0	0.0	69.8	28.6	-1.6	0.0	0.0	0.0	0.0	-0.0	2.2	2.2
9	466352.92	5021133.57	83.50	0	8000	91.9	91.9	0.0	0.0	69.8	101.9	-1.6	0.0	0.0	0.0	0.0	-0.0	-78.2	-78.2

Point Source, ISO 9613, Name: "Compost Screen", ID: "A_038"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466355.50	5021145.86	83.50	0	32	65.6	65.6	0.0	0.0	69.9	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	1.0	1.0
2	466355.50	5021145.86	83.50	0	63	74.8	74.8	0.0	0.0	69.9	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	10.1	10.1
3	466355.50	5021145.86	83.50	0	125	81.9	81.9	0.0	0.0	69.9	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	8.2	8.2
4	466355.50	5021145.86	83.50	0	250	88.4	88.4	0.0	0.0	69.9	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	15.7	15.7
5	466355.50	5021145.86	83.50	0	500	92.8	92.8	0.0	0.0	69.9	1.7	-1.3	0.0	0.0	0.0	0.0	-0.0	22.5	22.5
6	466355.50	5021145.86	83.50	0	1000	98.0	98.0	0.0	0.0	69.9	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	26.5	26.5
7	466355.50	5021145.86	83.50	0	2000	100.2	100.2	0.0	0.0	69.9	8.5	-1.7	0.0	0.0	0.0	0.0	-0.0	23.5	23.5
8	466355.50	5021145.86	83.50	0	4000	98.0	98.0	0.0	0.0	69.9	28.8	-1.7	0.0	0.0	0.0	0.0	-0.0	0.9	0.9
9	466355.50	5021145.86	83.50	0	8000	91.9	91.9	0.0	0.0	69.9	102.8	-1.7	0.0	0.0	0.0	0.0	-0.0	-79.2	-79.2

Point Source, ISO 9613, Name: "Compost Air Classifier", ID: "A_039"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466342.21	5021155.99	83.50	0	32	66.6	66.6	0.0	0.0	69.8	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	2.0	2.0
2	466342.21	5021155.99	83.50	0	63	89.8	89.8	0.0	0.0	69.8	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	25.2	25.2
3	466342.21	5021155.99	83.50	0	125	97.9	97.9	0.0	0.0	69.8	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	24.3	24.3
4	466342.21	5021155.99	83.50	0	250	99.4	99.4	0.0	0.0	69.8	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	26.8	26.8
5	466342.21	5021155.99	83.50	0	500	105.8	105.8	0.0	0.0	69.8	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	35.5	35.5
6	466342.21	5021155.99	83.50	0	1000	104.0	104.0	0.0	0.0	69.8	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	32.6	32.6
7	466342.21	5021155.99	83.50	0	2000	104.2	104.2	0.0	0.0	69.8	8.4	-1.6	0.0	0.0	0.0	0.0	-0.0	27.6	27.6
8	466342.21	5021155.99	83.50	0	4000	99.0	99.0	0.0	0.0	69.8	28.6	-1.6	0.0	0.0	0.0	0.0	-0.0	2.3	2.3
9	466342.21	5021155.99	83.50	0	8000	91.9	91.9	0.0	0.0	69.8	101.9	-1.6	0.0	0.0	0.0	0.0	-0.0	-78.2	-78.2

Point Source, ISO 9613, Name: "C&D Truck Idle", ID: "A_040"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466107.70	5021414.66	79.50	0	32	59.1	59.1	0.0	0.0	69.5	0.0	-5.3	0.0	0.0	9.6	0.0	-0.0	-14.8	-14.8
2	466107.70	5021414.66	79.50	0	63	75.3	75.3	0.0	0.0	69.5	0.1	-5.3	0.0	0.0	12.3	0.0	-0.0	-1.3	-1.3
3	466107.70	5021414.66	79.50	0	125	77.4	77.4	0.0	0.0	69.5	0.4	3.3	0.0	0.0	12.5	0.0	-0.0	-8.2	-8.2
4	466107.70	5021414.66	79.50	0	250	83.9	83.9	0.0	0.0	69.5	0.9	1.7	0.0	0.0	16.3	0.0	-0.0	-4.5	-4.5
5	466107.70	5021414.66	79.50	0	500	84.3	84.3	0.0	0.0	69.5	1.6	-1.4	0.0	0.0	20.3	0.0	-0.0	-5.6	-5.6
6	466107.70	5021414.66	79.50	0	1000	90.5	90.5	0.0	0.0	69.5	3.1	-1.8	0.0	0.0	22.5	0.0	-0.0	-2.7	-2.7
7	466107.70	5021414.66	79.50	0	2000	96.7	96.7	0.0	0.0	69.5	8.2	-1.8	0.0	0.0	24.1	0.0	-0.0	-3.2	-3.2
8	466107.70	5021414.66	79.50	0	4000	85.5	85.5	0.0	0.0	69.5	27.7	-1.8	0.0	0.0	25.3	0.0	-0.0	-35.1	-35.1
9	466107.70	5021414.66	79.50	0	8000	73.4	73.4	0.0	0.0	69.5	98.6	-1.8	0.0	0.0	26.0	0.0	-0.0	-118.9	-118.9

Point Source, ISO 9613, Name: "MRF Truck Idle", ID: "A_041"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466313.08	5021495.41	79.50	0	32	59.1	59.1	0.0	0.0	71.4	0.0	-5.4	0.0	0.0	18.0	0.0	-0.0	-24.9	-24.9
2	466313.08	5021495.41	79.50	0	63	75.3	75.3	0.0	0.0	71.4	0.1	-5.4	0.0	0.0	21.0	0.0	-0.0	-11.8	-11.8
3	466313.08	5021495.41	79.50	0	125	77.4	77.4	0.0	0.0	71.4	0.4	3.3	0.0	0.0	15.2	0.0	-0.0	-12.9	-12.9
4	466313.08	5021495.41	79.50	0	250	83.9	83.9	0.0	0.0	71.4	1.1	1.6	0.0	0.0	19.9	0.0	-0.0	-10.0	-10.0
5	466313.08	5021495.41	79.50	0	500	84.3	84.3	0.0	0.0	71.4	2.0	-1.6	0.0	0.0	26.0	0.0	-0.0	-13.5	-13.5
6	466313.08	5021495.41	79.50	0	1000	90.5	90.5	0.0	0.0	71.4	3.8	-2.0	0.0	0.0	27.0	0.0	-0.0	-9.7	-9.7
7	466313.08	5021495.41	79.50	0	2000	96.7	96.7	0.0	0.0	71.4	10.1	-2.0	0.0	0.0	27.0	0.0	-0.0	-9.7	-9.7
8	466313.08	5021495.41	79.50	0	4000	85.5	85.5	0.0	0.0	71.4	34.2	-2.0	0.0	0.0	27.0	0.0	-0.0	-45.0	-45.0
9	466313.08	5021495.41	79.50	0	8000	73.4	73.4	0.0	0.0	71.4	122.0	-2.0	0.0	0.0	27.0	0.0	-0.0	-145.0	-145.0

Point Source, ISO 9613, Name: "MRF - Exhaust - 1", ID: "A_042"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466277.86	5021444.80	94.00	0	32	49.6	49.6	0.0	0.0	70.9	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-17.3	-17.3
2	466277.86	5021444.80	94.00	0	63	64.8	64.8	0.0	0.0	70.9	0.1	-4.0	0.0	0.0	0.0	0.0	-0.0	-2.1	-2.1
3	466277.86	5021444.80	94.00	0	125	75.9	75.9	0.0	0.0	70.9	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	2.9	2.9
4	466277.86	5021444.80	94.00	0	250	81.4	81.4	0.0	0.0	70.9	1.0	-0.2	0.0	0.0	0.0	0.0	-0.0	9.7	9.7
5	466277.86	5021444.80	94.00	0	500	81.8	81.8	0.0	0.0	70.9	1.9	-1.3	0.0	0.0	0.0	0.0	-0.0	10.3	10.3
6	466277.86	5021444.80	94.00	0	1000	80.0	80.0	0.0	0.0	70.9	3.6	-1.3	0.0	0.0	0.0	0.0	-0.0	6.8	6.8
7	466277.86	5021444.80	94.00	0	2000	75.2	75.2	0.0	0.0	70.9	9.5	-1.3	0.0	0.0	0.0	0.0	-0.0	-3.9	-3.9
8	466277.86	5021444.80	94.00	0	4000	74.0	74.0	0.0	0.0	70.9	32.2	-1.3	0.0	0.0	0.0	0.0	-0.0	-27.8	-27.8
9	466277.86	5021444.80	94.00	0	8000	64.9	64.9	0.0	0.0	70.9	115.0	-1.3	0.0	0.0	0.0	0.0	-0.0	-119.7	-119.7

Point Source, ISO 9613, Name: "MRF - Exhaust - 2", ID: "A_043"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466313.49	5021458.58	94.00	0	32	49.6	49.6	0.0	0.0	71.2	0.0	-4.1	0.0	0.0	0.0	0.0	-0.0	-17.5	-17.5
2	466313.49	5021458.58	94.00	0	63	64.8	64.8	0.0	0.0	71.2	0.1	-4.1	0.0	0.0	0.0	0.0	-0.0	-2.4	-2.4
3	466313.49	5021458.58	94.00	0	125	75.9	75.9	0.0	0.0	71.2	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	2.6	2.6
4	466313.49	5021458.58	94.00	0	250	81.4	81.4	0.0	0.0	71.2	1.1	-0.2	0.0	0.0	0.0	0.0	-0.0	9.4	9.4
5	466313.49	5021458.58	94.00	0	500	81.8	81.8	0.0	0.0	71.2	2.0	-1.3	0.0	0.0	0.0	0.0	-0.0	10.0	10.0
6	466313.49	5021458.58	94.00	0	1000	80.0	80.0	0.0	0.0	71.2	3.7	-1.3	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
7	466313.49	5021458.58	94.00	0	2000	75.2	75.2	0.0	0.0	71.2	9.9	-1.3	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
8	466313.49	5021458.58	94.00	0	4000	74.0	74.0	0.0	0.0	71.2	33.4	-1.3	0.0	0.0	0.0	0.0	-0.0	-29.2	-29.2
9	466313.49	5021458.58	94.00	0	8000	64.9	64.9	0.0	0.0	71.2	119.1	-1.3	0.0	0.0	0.0	0.0	-0.0	-124.1	-124.1

Point Source, ISO 9613, Name: "MRF - Exhaust - 3", ID: "A_044"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466353.82	5021474.71	94.00	0	32	49.6	49.6	0.0	0.0	71.5	0.0	-4.2	0.0	0.0	0.0	0.0	-0.0	-17.8	-17.8
2	466353.82	5021474.71	94.00	0	63	64.8	64.8	0.0	0.0	71.5	0.1	-4.2	0.0	0.0	0.0	0.0	-0.0	-2.7	-2.7
3	466353.82	5021474.71	94.00	0	125	75.9	75.9	0.0	0.0	71.5	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	2.3	2.3
4	466353.82	5021474.71	94.00	0	250	81.4	81.4	0.0	0.0	71.5	1.1	-0.3	0.0	0.0	0.0	0.0	-0.0	9.1	9.1
5	466353.82	5021474.71	94.00	0	500	81.8	81.8	0.0	0.0	71.5	2.0	-1.4	0.0	0.0	0.0	0.0	-0.0	9.6	9.6
6	466353.82	5021474.71	94.00	0	1000	80.0	80.0	0.0	0.0	71.5	3.9	-1.4	0.0	0.0	0.0	0.0	-0.0	6.0	6.0
7	466353.82	5021474.71	94.00	0	2000	75.2	75.2	0.0	0.0	71.5	10.3	-1.4	0.0	0.0	0.0	0.0	-0.0	-5.2	-5.2
8	466353.82	5021474.71	94.00	0	4000	74.0	74.0	0.0	0.0	71.5	34.7	-1.4	0.0	0.0	0.0	0.0	-0.0	-30.9	-30.9
9	466353.82	5021474.71	94.00	0	8000	64.9	64.9	0.0	0.0	71.5	123.9	-1.4	0.0	0.0	0.0	0.0	-0.0	-129.1	-129.1

Point Source, ISO 9613, Name: "MRF - Exhaust - 4", ID: "A_045"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466396.50	5021491.85	94.00	0	32	49.6	49.6	0.0	0.0	71.9	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-18.0	-18.0
2	466396.50	5021491.85	94.00	0	63	64.8	64.8	0.0	0.0	71.9	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-2.9	-2.9
3	466396.50	5021491.85	94.00	0	125	75.9	75.9	0.0	0.0	71.9	0.5	1.6	0.0	0.0	0.0	0.0	-0.0	2.0	2.0
4	466396.50	5021491.85	94.00	0	250	81.4	81.4	0.0	0.0	71.9	1.2	-0.3	0.0	0.0	0.0	0.0	-0.0	8.7	8.7
5	466396.50	5021491.85	94.00	0	500	81.8	81.8	0.0	0.0	71.9	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	9.3	9.3
6	466396.50	5021491.85	94.00	0	1000	80.0	80.0	0.0	0.0	71.9	4.0	-1.4	0.0	0.0	0.0	0.0	-0.0	5.5	5.5
7	466396.50	5021491.85	94.00	0	2000	75.2	75.2	0.0	0.0	71.9	10.7	-1.4	0.0	0.0	0.0	0.0	-0.0	-5.9	-5.9
8	466396.50	5021491.85	94.00	0	4000	74.0	74.0	0.0	0.0	71.9	36.2	-1.4	0.0	0.0	0.0	0.0	-0.0	-32.6	-32.6
9	466396.50	5021491.85	94.00	0	8000	64.9	64.9	0.0	0.0	71.9	129.0	-1.4	0.0	0.0	0.0	0.0	-0.0	-134.5	-134.5

Point Source, ISO 9613, Name: "MRF - Exhaust - 5", ID: "A_046"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466434.82	5021507.65	94.00	0	32	49.6	49.6	0.0	0.0	72.2	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-18.3	-18.3
2	466434.82	5021507.65	94.00	0	63	64.8	64.8	0.0	0.0	72.2	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-3.2	-3.2
3	466434.82	5021507.65	94.00	0	125	75.9	75.9	0.0	0.0	72.2	0.5	1.6	0.0	0.0	0.0	0.0	-0.0	1.7	1.7
4	466434.82	5021507.65	94.00	0	250	81.4	81.4	0.0	0.0	72.2	1.2	-0.4	0.0	0.0	0.0	0.0	-0.0	8.4	8.4
5	466434.82	5021507.65	94.00	0	500	81.8	81.8	0.0	0.0	72.2	2.2	-1.5	0.0	0.0	0.0	0.0	-0.0	8.9	8.9
6	466434.82	5021507.65	94.00	0	1000	80.0	80.0	0.0	0.0	72.2	4.2	-1.5	0.0	0.0	0.0	0.0	-0.0	5.1	5.1
7	466434.82	5021507.65	94.00	0	2000	75.2	75.2	0.0	0.0	72.2	11.1	-1.5	0.0	0.0	0.0	0.0	-0.0	-6.5	-6.5
8	466434.82	5021507.65	94.00	0	4000	74.0	74.0	0.0	0.0	72.2	37.5	-1.5	0.0	0.0	0.0	0.0	-0.0	-34.1	-34.1
9	466434.82	5021507.65	94.00	0	8000	64.9	64.9	0.0	0.0	72.2	133.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-139.4	-139.4

Point Source, ISO 9613, Name: "C&D - Exhaust - 1", ID: "A_047"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466090.69	5021366.46	92.70	0	32	49.6	49.6	0.0	0.0	69.0	0.0	-3.7	0.0	0.0	0.0	0.0	-0.0	-15.7	-15.7
2	466090.69	5021366.46	92.70	0	63	64.8	64.8	0.0	0.0	69.0	0.1	-3.7	0.0	0.0	0.0	0.0	-0.0	-0.6	-0.6
3	466090.69	5021366.46	92.70	0	125	75.9	75.9	0.0	0.0	69.0	0.3	1.9	0.0	0.0	0.0	0.0	-0.0	4.7	4.7
4	466090.69	5021366.46	92.70	0	250	81.4	81.4	0.0	0.0	69.0	0.8	0.0	0.0	0.0	0.0	0.0	-0.0	11.5	11.5
5	466090.69	5021366.46	92.70	0	500	81.8	81.8	0.0	0.0	69.0	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	12.3	12.3
6	466090.69	5021366.46	92.70	0	1000	80.0	80.0	0.0	0.0	69.0	2.9	-1.1	0.0	0.0	0.0	0.0	-0.0	9.1	9.1
7	466090.69	5021366.46	92.70	0	2000	75.2	75.2	0.0	0.0	69.0	7.7	-1.1	0.0	0.0	0.0	0.0	-0.0	-0.5	-0.5
8	466090.69	5021366.46	92.70	0	4000	74.0	74.0	0.0	0.0	69.0	26.1	-1.1	0.0	0.0	0.0	0.0	-0.0	-20.1	-20.1
9	466090.69	5021366.46	92.70	0	8000	64.9	64.9	0.0	0.0	69.0	93.1	-1.1	0.0	0.0	0.0	0.0	-0.0	-96.2	-96.2

Point Source, ISO 9613, Name: "C&D - Exhaust - 2", ID: "A_048"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466140.65	5021384.67	92.70	0	32	49.6	49.6	0.0	0.0	69.5	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-16.1	-16.1
2	466140.65	5021384.67	92.70	0	63	64.8	64.8	0.0	0.0	69.5	0.1	-3.8	0.0	0.0	0.0	0.0	-0.0	-1.0	-1.0
3	466140.65	5021384.67	92.70	0	125	75.9	75.9	0.0	0.0	69.5	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	4.2	4.2
4	466140.65	5021384.67	92.70	0	250	81.4	81.4	0.0	0.0	69.5	0.9	-0.0	0.0	0.0	0.0	0.0	-0.0	11.0	11.0
5	466140.65	5021384.67	92.70	0	500	81.8	81.8	0.0	0.0	69.5	1.6	-1.2	0.0	0.0	0.0	0.0	-0.0	11.8	11.8
6	466140.65	5021384.67	92.70	0	1000	80.0	80.0	0.0	0.0	69.5	3.1	-1.2	0.0	0.0	0.0	0.0	-0.0	8.5	8.5
7	466140.65	5021384.67	92.70	0	2000	75.2	75.2	0.0	0.0	69.5	8.2	-1.2	0.0	0.0	0.0	0.0	-0.0	-1.3	-1.3
8	466140.65	5021384.67	92.70	0	4000	74.0	74.0	0.0	0.0	69.5	27.7	-1.2	0.0	0.0	0.0	0.0	-0.0	-22.0	-22.0
9	466140.65	5021384.67	92.70	0	8000	64.9	64.9	0.0	0.0	69.5	98.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-102.1	-102.1

Point Source, ISO 9613, Name: "C&D - Exhaust - 3", ID: "A_049"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466192.74	5021404.57	92.70	0	32	49.6	49.6	0.0	0.0	70.0	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-16.5	-16.5
2	466192.74	5021404.57	92.70	0	63	64.8	64.8	0.0	0.0	70.0	0.1	-4.0	0.0	0.0	0.0	0.0	-0.0	-1.4	-1.4
3	466192.74	5021404.57	92.70	0	125	75.9	75.9	0.0	0.0	70.0	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	3.7	3.7
4	466192.74	5021404.57	92.70	0	250	81.4	81.4	0.0	0.0	70.0	0.9	-0.1	0.0	0.0	0.0	0.0	-0.0	10.6	10.6
5	466192.74	5021404.57	92.70	0	500	81.8	81.8	0.0	0.0	70.0	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	11.3	11.3
6	466192.74	5021404.57	92.70	0	1000	80.0	80.0	0.0	0.0	70.0	3.3	-1.2	0.0	0.0	0.0	0.0	-0.0	7.9	7.9
7	466192.74	5021404.57	92.70	0	2000	75.2	75.2	0.0	0.0	70.0	8.7	-1.2	0.0	0.0	0.0	0.0	-0.0	-2.3	-2.3
8	466192.74	5021404.57	92.70	0	4000	74.0	74.0	0.0	0.0	70.0	29.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-24.1	-24.1
9	466192.74	5021404.57	92.70	0	8000	64.9	64.9	0.0	0.0	70.0	104.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-108.5	-108.5

Point Source, ISO 9613, Name: "C&D - Exhaust - 4", ID: "A_050"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466151.24	5021358.83	92.70	0	32	49.6	49.6	0.0	0.0	69.4	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-16.0	-16.0
2	466151.24	5021358.83	92.70	0	63	64.8	64.8	0.0	0.0	69.4	0.1	-3.8	0.0	0.0	0.0	0.0	-0.0	-0.9	-0.9
3	466151.24	5021358.83	92.70	0	125	75.9	75.9	0.0	0.0	69.4	0.3	1.8	0.0	0.0	0.0	0.0	-0.0	4.3	4.3
4	466151.24	5021358.83	92.70	0	250	81.4	81.4	0.0	0.0	69.4	0.9	-0.0	0.0	0.0	0.0	0.0	-0.0	11.2	11.2
5	466151.24	5021358.83	92.70	0	500	81.8	81.8	0.0	0.0	69.4	1.6	-1.1	0.0	0.0	0.0	0.0	-0.0	11.9	11.9
6	466151.24	5021358.83	92.70	0	1000	80.0	80.0	0.0	0.0	69.4	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	8.7	8.7
7	466151.24	5021358.83	92.70	0	2000	75.2	75.2	0.0	0.0	69.4	8.1	-1.1	0.0	0.0	0.0	0.0	-0.0	-1.1	-1.1
8	466151.24	5021358.83	92.70	0	4000	74.0	74.0	0.0	0.0	69.4	27.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-21.6	-21.6
9	466151.24	5021358.83	92.70	0	8000	64.9	64.9	0.0	0.0	69.4	97.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-100.7	-100.7

Point Source, ISO 9613, Name: "C&D - Exhaust - 5", ID: "A_051"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466134.30	5021407.96	92.70	0	32	49.6	49.6	0.0	0.0	69.7	0.0	-3.9	0.0	0.0	0.0	0.0	-0.0	-16.2	-16.2
2	466134.30	5021407.96	92.70	0	63	64.8	64.8	0.0	0.0	69.7	0.1	-3.9	0.0	0.0	0.0	0.0	-0.0	-1.1	-1.1
3	466134.30	5021407.96	92.70	0	125	75.9	75.9	0.0	0.0	69.7	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	4.1	4.1
4	466134.30	5021407.96	92.70	0	250	81.4	81.4	0.0	0.0	69.7	0.9	-0.1	0.0	0.0	0.0	0.0	-0.0	10.9	10.9
5	466134.30	5021407.96	92.70	0	500	81.8	81.8	0.0	0.0	69.7	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	11.7	11.7
6	466134.30	5021407.96	92.70	0	1000	80.0	80.0	0.0	0.0	69.7	3.1	-1.2	0.0	0.0	0.0	0.0	-0.0	8.4	8.4
7	466134.30	5021407.96	92.70	0	2000	75.2	75.2	0.0	0.0	69.7	8.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-1.6	-1.6
8	466134.30	5021407.96	92.70	0	4000	74.0	74.0	0.0	0.0	69.7	28.1	-1.2	0.0	0.0	0.0	0.0	-0.0	-22.6	-22.6
9	466134.30	5021407.96	92.70	0	8000	64.9	64.9	0.0	0.0	69.7	100.1	-1.2	0.0	0.0	0.0	0.0	-0.0	-103.7	-103.7

Point Source, ISO 9613, Name: "Mech - Exhaust", ID: "A_052"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466529.70	5021498.76	88.10	0	32	49.6	49.6	0.0	0.0	72.7	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-18.3	-18.3
2	466529.70	5021498.76	88.10	0	63	64.8	64.8	0.0	0.0	72.7	0.2	-4.8	0.0	0.0	0.0	0.0	-0.0	-3.2	-3.2
3	466529.70	5021498.76	88.10	0	125	75.9	75.9	0.0	0.0	72.7	0.5	1.3	0.0	0.0	0.0	0.0	-0.0	1.4	1.4
4	466529.70	5021498.76	88.10	0	250	81.4	81.4	0.0	0.0	72.7	1.3	-0.7	0.0	0.0	0.0	0.0	-0.0	8.1	8.1
5	466529.70	5021498.76	88.10	0	500	81.8	81.8	0.0	0.0	72.7	2.3	-1.8	0.0	0.0	0.0	0.0	-0.0	8.6	8.6
6	466529.70	5021498.76	88.10	0	1000	80.0	80.0	0.0	0.0	72.7	4.4	-1.8	0.0	0.0	0.0	0.0	-0.0	4.7	4.7
7	466529.70	5021498.76	88.10	0	2000	75.2	75.2	0.0	0.0	72.7	11.7	-1.8	0.0	0.0	0.0	0.0	-0.0	-7.4	-7.4
8	466529.70	5021498.76	88.10	0	4000	74.0	74.0	0.0	0.0	72.7	39.7	-1.8	0.0	0.0	0.0	0.0	-0.0	-36.6	-36.6
9	466529.70	5021498.76	88.10	0	8000	64.9	64.9	0.0	0.0	72.7	141.7	-1.8	0.0	0.0	0.0	0.0	-0.0	-147.7	-147.7

Point Source, ISO 9613, Name: "HC Soil - Exhaust - 1", ID: "A_053"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466368.51	5020963.29	88.00	0	32	49.6	49.6	0.0	0.0	69.4	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-15.5	-15.5
2	466368.51	5020963.29	88.00	0	63	64.8	64.8	0.0	0.0	69.4	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-0.4	-0.4
3	466368.51	5020963.29	88.00	0	125	75.9	75.9	0.0	0.0	69.4	0.3	1.9	0.0	0.0	0.0	0.0	-0.0	4.3	4.3
4	466368.51	5020963.29	88.00	0	250	81.4	81.4	0.0	0.0	69.4	0.9	0.0	0.0	0.0	0.0	0.0	-0.0	11.1	11.1
5	466368.51	5020963.29	88.00	0	500	81.8	81.8	0.0	0.0	69.4	1.6	-1.1	0.0	0.0	0.0	0.0	-0.0	11.9	11.9
6	466368.51	5020963.29	88.00	0	1000	80.0	80.0	0.0	0.0	69.4	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	8.6	8.6
7	466368.51	5020963.29	88.00	0	2000	75.2	75.2	0.0	0.0	69.4	8.0	-1.1	0.0	0.0	0.0	0.0	-0.0	-1.2	-1.2
8	466368.51	5020963.29	88.00	0	4000	74.0	74.0	0.0	0.0	69.4	27.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-21.6	-21.6
9	466368.51	5020963.29	88.00	0	8000	64.9	64.9	0.0	0.0	69.4	97.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-100.7	-100.7

Point Source, ISO 9613, Name: "HC Soil - Exhaust - 2", ID: "A_054"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466353.72	5020943.17	88.00	0	32	49.6	49.6	0.0	0.0	69.2	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-15.3	-15.3
2	466353.72	5020943.17	88.00	0	63	64.8	64.8	0.0	0.0	69.2	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-0.2	-0.2
3	466353.72	5020943.17	88.00	0	125	75.9	75.9	0.0	0.0	69.2	0.3	1.9	0.0	0.0	0.0	0.0	-0.0	4.4	4.4
4	466353.72	5020943.17	88.00	0	250	81.4	81.4	0.0	0.0	69.2	0.9	0.1	0.0	0.0	0.0	0.0	-0.0	11.3	11.3
5	466353.72	5020943.17	88.00	0	500	81.8	81.8	0.0	0.0	69.2	1.6	-1.0	0.0	0.0	0.0	0.0	-0.0	12.1	12.1
6	466353.72	5020943.17	88.00	0	1000	80.0	80.0	0.0	0.0	69.2	3.0	-1.0	0.0	0.0	0.0	0.0	-0.0	8.9	8.9
7	466353.72	5020943.17	88.00	0	2000	75.2	75.2	0.0	0.0	69.2	7.9	-1.0	0.0	0.0	0.0	0.0	-0.0	-0.8	-0.8
8	466353.72	5020943.17	88.00	0	4000	74.0	74.0	0.0	0.0	69.2	26.7	-1.0	0.0	0.0	0.0	0.0	-0.0	-20.8	-20.8
9	466353.72	5020943.17	88.00	0	8000	64.9	64.9	0.0	0.0	69.2	95.0	-1.0	0.0	0.0	0.0	0.0	-0.0	-98.3	-98.3

Point Source, ISO 9613, Name: "Organic Pre Processing - Exhaust - 1", ID: "A_055"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466472.70	5021218.88	91.00	0	32	49.6	49.6	0.0	0.0	71.1	0.0	-4.4	0.0	0.0	0.0	0.0	-0.0	-17.2	-17.2
2	466472.70	5021218.88	91.00	0	63	64.8	64.8	0.0	0.0	71.1	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	-2.1	-2.1
3	466472.70	5021218.88	91.00	0	125	75.9	75.9	0.0	0.0	71.1	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	2.6	2.6
4	466472.70	5021218.88	91.00	0	250	81.4	81.4	0.0	0.0	71.1	1.1	-0.1	0.0	0.0	0.0	0.0	-0.0	9.3	9.3
5	466472.70	5021218.88	91.00	0	500	81.8	81.8	0.0	0.0	71.1	2.0	-1.2	0.0	0.0	0.0	0.0	-0.0	9.9	9.9
6	466472.70	5021218.88	91.00	0	1000	80.0	80.0	0.0	0.0	71.1	3.7	-1.2	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
7	466472.70	5021218.88	91.00	0	2000	75.2	75.2	0.0	0.0	71.1	9.8	-1.2	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
8	466472.70	5021218.88	91.00	0	4000	74.0	74.0	0.0	0.0	71.1	33.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-29.2	-29.2
9	466472.70	5021218.88	91.00	0	8000	64.9	64.9	0.0	0.0	71.1	118.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-123.9	-123.9

Point Source, ISO 9613, Name: "Organic Pre Processing - Exhaust - 2", ID: "A_056"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466501.09	5021198.97	91.00	0	32	49.6	49.6	0.0	0.0	71.3	0.0	-4.4	0.0	0.0	0.0	0.0	-0.0	-17.3	-17.3
2	466501.09	5021198.97	91.00	0	63	64.8	64.8	0.0	0.0	71.3	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	-2.2	-2.2
3	466501.09	5021198.97	91.00	0	125	75.9	75.9	0.0	0.0	71.3	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	2.4	2.4
4	466501.09	5021198.97	91.00	0	250	81.4	81.4	0.0	0.0	71.3	1.1	-0.2	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
5	466501.09	5021198.97	91.00	0	500	81.8	81.8	0.0	0.0	71.3	2.0	-1.3	0.0	0.0	0.0	0.0	-0.0	9.8	9.8
6	466501.09	5021198.97	91.00	0	1000	80.0	80.0	0.0	0.0	71.3	3.8	-1.3	0.0	0.0	0.0	0.0	-0.0	6.2	6.2
7	466501.09	5021198.97	91.00	0	2000	75.2	75.2	0.0	0.0	71.3	10.0	-1.3	0.0	0.0	0.0	0.0	-0.0	-4.8	-4.8
8	466501.09	5021198.97	91.00	0	4000	74.0	74.0	0.0	0.0	71.3	33.9	-1.3	0.0	0.0	0.0	0.0	-0.0	-29.9	-29.9
9	466501.09	5021198.97	91.00	0	8000	64.9	64.9	0.0	0.0	71.3	120.9	-1.3	0.0	0.0	0.0	0.0	-0.0	-126.0	-126.0

Point Source, ISO 9613, Name: "Leachate - Exhaust - 1", ID: "A_057"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466482.13	5021032.42	91.00	0	32	49.6	49.6	0.0	0.0	70.6	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-16.8	-16.8
2	466482.13	5021032.42	91.00	0	63	64.8	64.8	0.0	0.0	70.6	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-1.7	-1.7
3	466482.13	5021032.42	91.00	0	125	75.9	75.9	0.0	0.0	70.6	0.4	1.9	0.0	0.0	0.0	0.0	-0.0	3.0	3.0
4	466482.13	5021032.42	91.00	0	250	81.4	81.4	0.0	0.0	70.6	1.0	-0.1	0.0	0.0	0.0	0.0	-0.0	9.8	9.8
5	466482.13	5021032.42	91.00	0	500	81.8	81.8	0.0	0.0	70.6	1.9	-1.2	0.0	0.0	0.0	0.0	-0.0	10.5	10.5
6	466482.13	5021032.42	91.00	0	1000	80.0	80.0	0.0	0.0	70.6	3.5	-1.2	0.0	0.0	0.0	0.0	-0.0	7.0	7.0
7	466482.13	5021032.42	91.00	0	2000	75.2	75.2	0.0	0.0	70.6	9.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-3.5	-3.5
8	466482.13	5021032.42	91.00	0	4000	74.0	74.0	0.0	0.0	70.6	31.4	-1.2	0.0	0.0	0.0	0.0	-0.0	-26.9	-26.9
9	466482.13	5021032.42	91.00	0	8000	64.9	64.9	0.0	0.0	70.6	112.1	-1.2	0.0	0.0	0.0	0.0	-0.0	-116.7	-116.7

Point Source, ISO 9613, Name: "Leachate - Exhaust - 2", ID: "A_058"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466521.10	5021046.82	91.00	0	32	49.6	49.6	0.0	0.0	71.0	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-17.1	-17.1
2	466521.10	5021046.82	91.00	0	63	64.8	64.8	0.0	0.0	71.0	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-2.0	-2.0
3	466521.10	5021046.82	91.00	0	125	75.9	75.9	0.0	0.0	71.0	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	2.7	2.7
4	466521.10	5021046.82	91.00	0	250	81.4	81.4	0.0	0.0	71.0	1.0	-0.1	0.0	0.0	0.0	0.0	-0.0	9.5	9.5
5	466521.10	5021046.82	91.00	0	500	81.8	81.8	0.0	0.0	71.0	1.9	-1.2	0.0	0.0	0.0	0.0	-0.0	10.1	10.1
6	466521.10	5021046.82	91.00	0	1000	80.0	80.0	0.0	0.0	71.0	3.7	-1.2	0.0	0.0	0.0	0.0	-0.0	6.6	6.6
7	466521.10	5021046.82	91.00	0	2000	75.2	75.2	0.0	0.0	71.0	9.7	-1.2	0.0	0.0	0.0	0.0	-0.0	-4.3	-4.3
8	466521.10	5021046.82	91.00	0	4000	74.0	74.0	0.0	0.0	71.0	32.8	-1.2	0.0	0.0	0.0	0.0	-0.0	-28.6	-28.6
9	466521.10	5021046.82	91.00	0	8000	64.9	64.9	0.0	0.0	71.0	117.0	-1.2	0.0	0.0	0.0	0.0	-0.0	-121.8	-121.8

Point Source, ISO 9613, Name: "Compost Aerator", ID: "A_060"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466346.19	5021095.86	78.50	0	32	59.6	59.6	0.0	0.0	69.6	0.0	-5.4	0.0	0.0	10.4	0.0	-0.0	-15.1	-15.1
2	466346.19	5021095.86	78.50	0	63	72.8	72.8	0.0	0.0	69.6	0.1	-5.4	0.0	0.0	10.8	0.0	-0.0	-2.3	-2.3
3	466346.19	5021095.86	78.50	0	125	82.9	82.9	0.0	0.0	69.6	0.4	3.7	0.0	0.0	2.5	0.0	-0.0	6.8	6.8
4	466346.19	5021095.86	78.50	0	250	89.4	89.4	0.0	0.0	69.6	0.9	2.9	0.0	0.0	4.3	0.0	-0.0	11.7	11.7
5	466346.19	5021095.86	78.50	0	500	89.8	89.8	0.0	0.0	69.6	1.6	0.8	0.0	0.0	8.0	0.0	-0.0	9.7	9.7
6	466346.19	5021095.86	78.50	0	1000	89.0	89.0	0.0	0.0	69.6	3.1	-1.3	0.0	0.0	12.2	0.0	-0.0	5.4	5.4
7	466346.19	5021095.86	78.50	0	2000	84.2	84.2	0.0	0.0	69.6	8.2	-1.7	0.0	0.0	15.0	0.0	-0.0	-7.0	-7.0
8	466346.19	5021095.86	78.50	0	4000	79.0	79.0	0.0	0.0	69.6	27.9	-1.7	0.0	0.0	17.7	0.0	-0.0	-34.5	-34.5
9	466346.19	5021095.86	78.50	0	8000	74.9	74.9	0.0	0.0	69.6	99.5	-1.7	0.0	0.0	20.6	0.0	-0.0	-113.1	-113.1

Point Source, ISO 9613, Name: "Pre Processing - Biofilter", ID: "A_062"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466486.53	5021209.07	91.50	0	32	52.6	52.6	0.0	0.0	71.2	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-14.3	-14.3
2	466486.53	5021209.07	91.50	0	63	67.8	67.8	0.0	0.0	71.2	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	0.8	0.8
3	466486.53	5021209.07	91.50	0	125	78.9	78.9	0.0	0.0	71.2	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	5.5	5.5
4	466486.53	5021209.07	91.50	0	250	84.4	84.4	0.0	0.0	71.2	1.1	-0.1	0.0	0.0	0.0	0.0	-0.0	12.2	12.2
5	466486.53	5021209.07	91.50	0	500	84.8	84.8	0.0	0.0	71.2	2.0	-1.2	0.0	0.0	0.0	0.0	-0.0	12.8	12.8
6	466486.53	5021209.07	91.50	0	1000	83.0	83.0	0.0	0.0	71.2	3.8	-1.2	0.0	0.0	0.0	0.0	-0.0	9.3	9.3
7	466486.53	5021209.07	91.50	0	2000	78.2	78.2	0.0	0.0	71.2	9.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-1.7	-1.7
8	466486.53	5021209.07	91.50	0	4000	77.0	77.0	0.0	0.0	71.2	33.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-26.6	-26.6
9	466486.53	5021209.07	91.50	0	8000	67.9	67.9	0.0	0.0	71.2	119.8	-1.2	0.0	0.0	0.0	0.0	-0.0	-121.9	-121.9

Point Source, ISO 9613, Name: "HC Soil - Biofilter", ID: "A_063"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466340.50	5020944.19	88.50	0	32	52.6	52.6	0.0	0.0	69.1	0.0	-4.2	0.0	0.0	0.0	0.0	-0.0	-12.3	-12.3
2	466340.50	5020944.19	88.50	0	63	67.8	67.8	0.0	0.0	69.1	0.1	-4.2	0.0	0.0	0.0	0.0	-0.0	2.8	2.8
3	466340.50	5020944.19	88.50	0	125	78.9	78.9	0.0	0.0	69.1	0.3	2.0	0.0	0.0	0.0	0.0	-0.0	7.5	7.5
4	466340.50	5020944.19	88.50	0	250	84.4	84.4	0.0	0.0	69.1	0.8	0.1	0.0	0.0	0.0	0.0	-0.0	14.4	14.4
5	466340.50	5020944.19	88.50	0	500	84.8	84.8	0.0	0.0	69.1	1.5	-1.0	0.0	0.0	0.0	0.0	-0.0	15.2	15.2
6	466340.50	5020944.19	88.50	0	1000	83.0	83.0	0.0	0.0	69.1	2.9	-1.0	0.0	0.0	0.0	0.0	-0.0	12.0	12.0
7	466340.50	5020944.19	88.50	0	2000	78.2	78.2	0.0	0.0	69.1	7.7	-1.0	0.0	0.0	0.0	0.0	-0.0	2.4	2.4
8	466340.50	5020944.19	88.50	0	4000	77.0	77.0	0.0	0.0	69.1	26.2	-1.0	0.0	0.0	0.0	0.0	-0.0	-17.3	-17.3
9	466340.50	5020944.19	88.50	0	8000	67.9	67.9	0.0	0.0	69.1	93.6	-1.0	0.0	0.0	0.0	0.0	-0.0	-93.7	-93.7

Point Source, ISO 9613, Name: "Generator - 1", ID: "A_064"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466699.91	5021357.41	79.01	0	32	58.6	58.6	0.0	0.0	73.2	0.0	-5.5	0.0	0.0	10.3	0.0	-0.0	-19.4	-19.4
2	466699.91	5021357.41	79.01	0	63	78.8	78.8	0.0	0.0	73.2	0.2	-5.5	0.0	0.0	10.4	0.0	-0.0	0.7	0.7
3	466699.91	5021357.41	79.01	0	125	76.9	76.9	0.0	0.0	73.2	0.5	3.6	0.0	0.0	1.3	0.0	-0.0	-1.7	-1.7
4	466699.91	5021357.41	79.01	0	250	71.4	71.4	0.0	0.0	73.2	1.3	2.2	0.0	0.0	2.9	0.0	-0.0	-8.2	-8.2
5	466699.91	5021357.41	79.01	0	500	62.8	62.8	0.0	0.0	73.2	2.5	-0.9	0.0	0.0	6.2	0.0	-0.0	-18.2	-18.2
6	466699.91	5021357.41	79.01	0	1000	61.0	61.0	0.0	0.0	73.2	4.7	-1.9	0.0	0.0	7.7	0.0	-0.0	-22.7	-22.7
7	466699.91	5021357.41	79.01	0	2000	60.2	60.2	0.0	0.0	73.2	12.4	-1.9	0.0	0.0	8.6	0.0	-0.0	-32.0	-32.0
8	466699.91	5021357.41	79.01	0	4000	81.0	81.0	0.0	0.0	73.2	42.0	-1.9	0.0	0.0	9.9	0.0	-0.0	-42.1	-42.1
9	466699.91	5021357.41	79.01	0	8000	81.9	81.9	0.0	0.0	73.2	149.9	-1.9	0.0	0.0	11.8	0.0	-0.0	-150.9	-150.9

Point Source, ISO 9613, Name: "Generator - 2", ID: "A_065"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466701.76	5021352.35	79.01	0	32	48.6	48.6	0.0	0.0	73.1	0.0	-5.5	0.0	0.0	10.4	0.0	-0.0	-29.4	-29.4
2	466701.76	5021352.35	79.01	0	63	66.8	66.8	0.0	0.0	73.1	0.2	-5.5	0.0	0.0	10.4	0.0	-0.0	-11.4	-11.4
3	466701.76	5021352.35	79.01	0	125	84.9	84.9	0.0	0.0	73.1	0.5	3.6	0.0	0.0	1.4	0.0	-0.0	6.2	6.2
4	466701.76	5021352.35	79.01	0	250	83.4	83.4	0.0	0.0	73.1	1.3	2.2	0.0	0.0	3.1	0.0	-0.0	3.7	3.7
5	466701.76	5021352.35	79.01	0	500	74.8	74.8	0.0	0.0	73.1	2.5	-0.9	0.0	0.0	6.5	0.0	-0.0	-6.5	-6.5
6	466701.76	5021352.35	79.01	0	1000	62.0	62.0	0.0	0.0	73.1	4.7	-1.9	0.0	0.0	8.3	0.0	-0.0	-22.2	-22.2
7	466701.76	5021352.35	79.01	0	2000	59.2	59.2	0.0	0.0	73.1	12.4	-1.9	0.0	0.0	9.5	0.0	-0.0	-33.9	-33.9
8	466701.76	5021352.35	79.01	0	4000	63.0	63.0	0.0	0.0	73.1	42.0	-1.9	0.0	0.0	11.2	0.0	-0.0	-61.4	-61.4
9	466701.76	5021352.35	79.01	0	8000	57.9	57.9	0.0	0.0	73.1	149.8	-1.9	0.0	0.0	13.4	0.0	-0.0	-176.4	-176.4

Point Source, ISO 9613, Name: "Generator - 3", ID: "A_066"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466703.20	5021347.77	79.01	0	32	48.6	48.6	0.0	0.0	73.1	0.0	-5.5	0.0	0.0	10.4	0.0	-0.0	-29.4	-29.4
2	466703.20	5021347.77	79.01	0	63	66.8	66.8	0.0	0.0	73.1	0.2	-5.5	0.0	0.0	10.4	0.0	-0.0	-11.4	-11.4
3	466703.20	5021347.77	79.01	0	125	84.9	84.9	0.0	0.0	73.1	0.5	3.6	0.0	0.0	1.4	0.0	-0.0	6.2	6.2
4	466703.20	5021347.77	79.01	0	250	83.4	83.4	0.0	0.0	73.1	1.3	2.2	0.0	0.0	3.1	0.0	-0.0	3.7	3.7
5	466703.20	5021347.77	79.01	0	500	74.8	74.8	0.0	0.0	73.1	2.5	-0.9	0.0	0.0	6.5	0.0	-0.0	-6.5	-6.5
6	466703.20	5021347.77	79.01	0	1000	62.0	62.0	0.0	0.0	73.1	4.7	-1.9	0.0	0.0	8.3	0.0	-0.0	-22.3	-22.3
7	466703.20	5021347.77	79.01	0	2000	59.2	59.2	0.0	0.0	73.1	12.4	-1.9	0.0	0.0	9.6	0.0	-0.0	-34.0	-34.0
8	466703.20	5021347.77	79.01	0	4000	63.0	63.0	0.0	0.0	73.1	42.0	-1.9	0.0	0.0	11.4	0.0	-0.0	-61.5	-61.5
9	466703.20	5021347.77	79.01	0	8000	57.9	57.9	0.0	0.0	73.1	149.7	-1.9	0.0	0.0	13.5	0.0	-0.0	-176.5	-176.5

Point Source, ISO 9613, Name: "Generator - 4", ID: "A_067"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466705.01	5021342.74	79.01	0	32	48.6	48.6	0.0	0.0	73.1	0.0	-5.5	0.0	0.0	10.4	0.0	-0.0	-29.4	-29.4
2	466705.01	5021342.74	79.01	0	63	66.8	66.8	0.0	0.0	73.1	0.2	-5.5	0.0	0.0	10.4	0.0	-0.0	-11.4	-11.4
3	466705.01	5021342.74	79.01	0	125	84.9	84.9	0.0	0.0	73.1	0.5	3.6	0.0	0.0	1.4	0.0	-0.0	6.2	6.2
4	466705.01	5021342.74	79.01	0	250	83.4	83.4	0.0	0.0	73.1	1.3	2.2	0.0	0.0	3.1	0.0	-0.0	3.7	3.7
5	466705.01	5021342.74	79.01	0	500	74.8	74.8	0.0	0.0	73.1	2.5	-0.9	0.0	0.0	6.6	0.0	-0.0	-6.5	-6.5
6	466705.01	5021342.74	79.01	0	1000	62.0	62.0	0.0	0.0	73.1	4.7	-1.9	0.0	0.0	8.4	0.0	-0.0	-22.3	-22.3
7	466705.01	5021342.74	79.01	0	2000	59.2	59.2	0.0	0.0	73.1	12.4	-1.9	0.0	0.0	9.6	0.0	-0.0	-34.0	-34.0
8	466705.01	5021342.74	79.01	0	4000	63.0	63.0	0.0	0.0	73.1	41.9	-1.9	0.0	0.0	11.4	0.0	-0.0	-61.5	-61.5
9	466705.01	5021342.74	79.01	0	8000	57.9	57.9	0.0	0.0	73.1	149.6	-1.9	0.0	0.0	13.6	0.0	-0.0	-176.5	-176.5

Point Source, ISO 9613, Name: "Generator - 5", ID: "A_068"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466706.52	5021337.92	79.01	0	32	48.6	48.6	0.0	0.0	73.1	0.0	-5.5	0.0	0.0	10.4	0.0	-0.0	-29.4	-29.4
2	466706.52	5021337.92	79.01	0	63	66.8	66.8	0.0	0.0	73.1	0.2	-5.5	0.0	0.0	10.4	0.0	-0.0	-11.4	-11.4
3	466706.52	5021337.92	79.01	0	125	84.9	84.9	0.0	0.0	73.1	0.5	3.6	0.0	0.0	1.4	0.0	-0.0	6.2	6.2
4	466706.52	5021337.92	79.01	0	250	83.4	83.4	0.0	0.0	73.1	1.3	2.2	0.0	0.0	3.1	0.0	-0.0	3.6	3.6
5	466706.52	5021337.92	79.01	0	500	74.8	74.8	0.0	0.0	73.1	2.5	-0.9	0.0	0.0	6.6	0.0	-0.0	-6.5	-6.5
6	466706.52	5021337.92	79.01	0	1000	62.0	62.0	0.0	0.0	73.1	4.7	-1.9	0.0	0.0	8.4	0.0	-0.0	-22.3	-22.3
7	466706.52	5021337.92	79.01	0	2000	59.2	59.2	0.0	0.0	73.1	12.4	-1.9	0.0	0.0	9.7	0.0	-0.0	-34.1	-34.1
8	466706.52	5021337.92	79.01	0	4000	63.0	63.0	0.0	0.0	73.1	41.9	-1.9	0.0	0.0	11.5	0.0	-0.0	-61.6	-61.6
9	466706.52	5021337.92	79.01	0	8000	57.9	57.9	0.0	0.0	73.1	149.5	-1.9	0.0	0.0	13.7	0.0	-0.0	-176.5	-176.5

Point Source, ISO 9613, Name: "Generator - 6", ID: "A_069"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466707.88	5021334.22	79.01	0	32	48.6	48.6	0.0	0.0	73.1	0.0	-5.5	0.0	0.0	10.4	0.0	-0.0	-29.4	-29.4
2	466707.88	5021334.22	79.01	0	63	66.8	66.8	0.0	0.0	73.1	0.2	-5.5	0.0	0.0	10.4	0.0	-0.0	-11.4	-11.4
3	466707.88	5021334.22	79.01	0	125	84.9	84.9	0.0	0.0	73.1	0.5	3.6	0.0	0.0	1.4	0.0	-0.0	6.2	6.2
4	466707.88	5021334.22	79.01	0	250	83.4	83.4	0.0	0.0	73.1	1.3	2.2	0.0	0.0	3.1	0.0	-0.0	3.6	3.6
5	466707.88	5021334.22	79.01	0	500	74.8	74.8	0.0	0.0	73.1	2.5	-0.9	0.0	0.0	6.6	0.0	-0.0	-6.5	-6.5
6	466707.88	5021334.22	79.01	0	1000	62.0	62.0	0.0	0.0	73.1	4.7	-1.9	0.0	0.0	8.4	0.0	-0.0	-22.3	-22.3
7	466707.88	5021334.22	79.01	0	2000	59.2	59.2	0.0	0.0	73.1	12.4	-1.9	0.0	0.0	9.7	0.0	-0.0	-34.1	-34.1
8	466707.88	5021334.22	79.01	0	4000	63.0	63.0	0.0	0.0	73.1	41.9	-1.9	0.0	0.0	11.5	0.0	-0.0	-61.6	-61.6
9	466707.88	5021334.22	79.01	0	8000	57.9	57.9	0.0	0.0	73.1	149.5	-1.9	0.0	0.0	13.7	0.0	-0.0	-176.5	-176.5

Point Source, ISO 9613, Name: "Generator - 7", ID: "A_070"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466709.35	5021329.13	79.01	0	32	48.6	48.6	0.0	0.0	73.1	0.0	-5.5	0.0	0.0	10.4	0.0	-0.0	-29.4	-29.4
2	466709.35	5021329.13	79.01	0	63	66.8	66.8	0.0	0.0	73.1	0.2	-5.5	0.0	0.0	10.5	0.0	-0.0	-11.4	-11.4
3	466709.35	5021329.13	79.01	0	125	84.9	84.9	0.0	0.0	73.1	0.5	3.6	0.0	0.0	1.5	0.0	-0.0	6.2	6.2
4	466709.35	5021329.13	79.01	0	250	83.4	83.4	0.0	0.0	73.1	1.3	2.2	0.0	0.0	3.1	0.0	-0.0	3.6	3.6
5	466709.35	5021329.13	79.01	0	500	74.8	74.8	0.0	0.0	73.1	2.5	-0.9	0.0	0.0	6.6	0.0	-0.0	-6.6	-6.6
6	466709.35	5021329.13	79.01	0	1000	62.0	62.0	0.0	0.0	73.1	4.7	-1.9	0.0	0.0	8.5	0.0	-0.0	-22.4	-22.4
7	466709.35	5021329.13	79.01	0	2000	59.2	59.2	0.0	0.0	73.1	12.4	-1.9	0.0	0.0	9.8	0.0	-0.0	-34.1	-34.1
8	466709.35	5021329.13	79.01	0	4000	63.0	63.0	0.0	0.0	73.1	41.9	-1.9	0.0	0.0	11.6	0.0	-0.0	-61.6	-61.6
9	466709.35	5021329.13	79.01	0	8000	57.9	57.9	0.0	0.0	73.1	149.4	-1.9	0.0	0.0	13.8	0.0	-0.0	-176.5	-176.5

Point Source, ISO 9613, Name: "EGP - Exhaust", ID: "A_071"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466686.02	5021396.01	85.00	0	32	49.6	49.6	0.0	0.0	73.2	0.0	-5.1	0.0	0.0	9.9	0.0	-0.0	-28.4	-28.4
2	466686.02	5021396.01	85.00	0	63	64.8	64.8	0.0	0.0	73.2	0.2	-5.1	0.0	0.0	9.9	0.0	-0.0	-13.4	-13.4
3	466686.02	5021396.01	85.00	0	125	75.9	75.9	0.0	0.0	73.2	0.5	1.8	0.0	0.0	3.0	0.0	-0.0	-2.7	-2.7
4	466686.02	5021396.01	85.00	0	250	81.4	81.4	0.0	0.0	73.2	1.3	-0.6	0.0	0.0	5.7	0.0	-0.0	1.8	1.8
5	466686.02	5021396.01	85.00	0	500	81.8	81.8	0.0	0.0	73.2	2.5	-1.7	0.0	0.0	7.2	0.0	-0.0	0.6	0.6
6	466686.02	5021396.01	85.00	0	1000	80.0	80.0	0.0	0.0	73.2	4.7	-1.7	0.0	0.0	7.9	0.0	-0.0	-4.0	-4.0
7	466686.02	5021396.01	85.00	0	2000	75.2	75.2	0.0	0.0	73.2	12.5	-1.7	0.0	0.0	8.9	0.0	-0.0	-17.6	-17.6
8	466686.02	5021396.01	85.00	0	4000	74.0	74.0	0.0	0.0	73.2	42.2	-1.7	0.0	0.0	10.5	0.0	-0.0	-50.1	-50.1
9	466686.02	5021396.01	85.00	0	8000	64.9	64.9	0.0	0.0	73.2	150.5	-1.7	0.0	0.0	12.5	0.0	-0.0	-169.6	-169.6

Point Source, ISO 9613, Name: "MRF - HVAC - 1", ID: "A_072"																		
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466301.18	5021469.84	93.50	0	32	40.6	40.6	0.0	0.0	71.1	0.0	-4.1	0.0	0.0	0.0	0.0	-0.0	-26.5	-26.5
2	466301.18	5021469.84	93.50	0	63	55.8	55.8	0.0	0.0	71.1	0.1	-4.1	0.0	0.0	0.0	0.0	-0.0	-11.4	-11.4
3	466301.18	5021469.84	93.50	0	125	66.9	66.9	0.0	0.0	71.1	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	-6.4	-6.4
4	466301.18	5021469.84	93.50	0	250	73.4	73.4	0.0	0.0	71.1	1.1	-0.2	0.0	0.0	0.0	0.0	-0.0	1.4	1.4
5	466301.18	5021469.84	93.50	0	500	75.8	75.8	0.0	0.0	71.1	2.0	-1.4	0.0	0.0	0.0	0.0	-0.0	4.0	4.0
6	466301.18	5021469.84	93.50	0	1000	79.0	79.0	0.0	0.0	71.1	3.7	-1.4	0.0	0.0	0.0	0.0	-0.0	5.5	5.5
7	466301.18	5021469.84	93.50	0	2000	75.2	75.2	0.0	0.0	71.1	9.8	-1.4	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
8	466301.18	5021469.84	93.50	0	4000	72.0	72.0	0.0	0.0	71.1	33.4	-1.4	0.0	0.0	0.0	0.0	-0.0	-31.2	-31.2
9	466301.18	5021469.84	93.50	0	8000	60.9	60.9	0.0	0.0	71.1	119.0	-1.4	0.0	0.0	0.0	0.0	-0.0	-127.9	-127.9

Point Source, ISO 9613, Name: "MRF - HVAC - 2", ID: "A_073"																		
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466313.84	5021440.31	93.50	0	32	40.6	40.6	0.0	0.0	71.1	0.0	-4.1	0.0	0.0	0.0	0.0	-0.0	-26.4	-26.4
2	466313.84	5021440.31	93.50	0	63	55.8	55.8	0.0	0.0	71.1	0.1	-4.1	0.0	0.0	0.0	0.0	-0.0	-11.3	-11.3
3	466313.84	5021440.31	93.50	0	125	66.9	66.9	0.0	0.0	71.1	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	-6.3	-6.3
4	466313.84	5021440.31	93.50	0	250	73.4	73.4	0.0	0.0	71.1	1.1	-0.2	0.0	0.0	0.0	0.0	-0.0	1.5	1.5
5	466313.84	5021440.31	93.50	0	500	75.8	75.8	0.0	0.0	71.1	1.9	-1.3	0.0	0.0	0.0	0.0	-0.0	4.1	4.1
6	466313.84	5021440.31	93.50	0	1000	79.0	79.0	0.0	0.0	71.1	3.7	-1.4	0.0	0.0	0.0	0.0	-0.0	5.6	5.6
7	466313.84	5021440.31	93.50	0	2000	75.2	75.2	0.0	0.0	71.1	9.7	-1.4	0.0	0.0	0.0	0.0	-0.0	-4.3	-4.3
8	466313.84	5021440.31	93.50	0	4000	72.0	72.0	0.0	0.0	71.1	33.0	-1.4	0.0	0.0	0.0	0.0	-0.0	-30.8	-30.8
9	466313.84	5021440.31	93.50	0	8000	60.9	60.9	0.0	0.0	71.1	117.8	-1.4	0.0	0.0	0.0	0.0	-0.0	-126.6	-126.6

Point Source, ISO 9613, Name: "MRF - HVAC - 3", ID: "A_074"																		
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466396.79	5021471.27	93.50	0	32	40.6	40.6	0.0	0.0	71.8	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-26.9	-26.9
2	466396.79	5021471.27	93.50	0	63	55.8	55.8	0.0	0.0	71.8	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.8	-11.8
3	466396.79	5021471.27	93.50	0	125	66.9	66.9	0.0	0.0	71.8	0.5	1.6	0.0	0.0	0.0	0.0	-0.0	-6.9	-6.9
4	466396.79	5021471.27	93.50	0	250	73.4	73.4	0.0	0.0	71.8	1.1	-0.3	0.0	0.0	0.0	0.0	-0.0	0.8	0.8
5	466396.79	5021471.27	93.50	0	500	75.8	75.8	0.0	0.0	71.8	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	3.4	3.4
6	466396.79	5021471.27	93.50	0	1000	79.0	79.0	0.0	0.0	71.8	4.0	-1.4	0.0	0.0	0.0	0.0	-0.0	4.7	4.7
7	466396.79	5021471.27	93.50	0	2000	75.2	75.2	0.0	0.0	71.8	10.5	-1.4	0.0	0.0	0.0	0.0	-0.0	-5.7	-5.7
8	466396.79	5021471.27	93.50	0	4000	72.0	72.0	0.0	0.0	71.8	35.7	-1.4	0.0	0.0	0.0	0.0	-0.0	-34.1	-34.1
9	466396.79	5021471.27	93.50	0	8000	60.9	60.9	0.0	0.0	71.8	127.5	-1.4	0.0	0.0	0.0	0.0	-0.0	-136.9	-136.9

Point Source, ISO 9613, Name: "MRF - HVAC - 4", ID: "A_075"																		
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466385.75	5021503.62	93.50	0	32	40.6	40.6	0.0	0.0	71.8	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-27.0	-27.0
2	466385.75	5021503.62	93.50	0	63	55.8	55.8	0.0	0.0	71.8	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.9	-11.9
3	466385.75	5021503.62	93.50	0	125	66.9	66.9	0.0	0.0	71.8	0.5	1.6	0.0	0.0	0.0	0.0	-0.0	-7.0	-7.0
4	466385.75	5021503.62	93.50	0	250	73.4	73.4	0.0	0.0	71.8	1.2	-0.3	0.0	0.0	0.0	0.0	-0.0	0.7	0.7
5	466385.75	5021503.62	93.50	0	500	75.8	75.8	0.0	0.0	71.8	2.1	-1.5	0.0	0.0	0.0	0.0	-0.0	3.3	3.3
6	466385.75	5021503.62	93.50	0	1000	79.0	79.0	0.0	0.0	71.8	4.0	-1.5	0.0	0.0	0.0	0.0	-0.0	4.5	4.5
7	466385.75	5021503.62	93.50	0	2000	75.2	75.2	0.0	0.0	71.8	10.7	-1.5	0.0	0.0	0.0	0.0	-0.0	-5.9	-5.9
8	466385.75	5021503.62	93.50	0	4000	72.0	72.0	0.0	0.0	71.8	36.1	-1.5	0.0	0.0	0.0	0.0	-0.0	-34.6	-34.6
9	466385.75	5021503.62	93.50	0	8000	60.9	60.9	0.0	0.0	71.8	129.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-138.5	-138.5

Point Source, ISO 9613, Name: "C&D - HVAC - 1", ID: "A_076"																		
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466105.54	5021388.96	92.20	0	32	40.6	40.6	0.0	0.0	69.3	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-24.9	-24.9
2	466105.54	5021388.96	92.20	0	63	55.8	55.8	0.0	0.0	69.3	0.1	-3.8	0.0	0.0	0.0	0.0	-0.0	-9.8	-9.8
3	466105.54	5021388.96	92.20	0	125	66.9	66.9	0.0	0.0	69.3	0.3	1.8	0.0	0.0	0.0	0.0	-0.0	-4.6	-4.6
4	466105.54	5021388.96	92.20	0	250	73.4	73.4	0.0	0.0	69.3	0.9	-0.0	0.0	0.0	0.0	0.0	-0.0	3.2	3.2
5	466105.54	5021388.96	92.20	0	500	75.8	75.8	0.0	0.0	69.3	1.6	-1.1	0.0	0.0	0.0	0.0	-0.0	6.0	6.0
6	466105.54	5021388.96	92.20	0	1000	79.0	79.0	0.0	0.0	69.3	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	7.8	7.8
7	466105.54	5021388.96	92.20	0	2000	75.2	75.2	0.0	0.0	69.3	8.0	-1.1	0.0	0.0	0.0	0.0	-0.0	-1.0	-1.0
8	466105.54	5021388.96	92.20	0	4000	72.0	72.0	0.0	0.0	69.3	27.0	-1.1	0.0	0.0	0.0	0.0	-0.0	-23.2	-23.2
9	466105.54	5021388.96	92.20	0	8000	60.9	60.9	0.0	0.0	69.3	96.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-103.5	-103.5

Point Source, ISO 9613, Name: "C&D - HVAC - 2", ID: "A_077"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466116.55	5021358.47	92.20	0	32	40.6	40.6	0.0	0.0	69.1	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-24.8	-24.8
2	466116.55	5021358.47	92.20	0	63	55.8	55.8	0.0	0.0	69.1	0.1	-3.8	0.0	0.0	0.0	0.0	-0.0	-9.7	-9.7
3	466116.55	5021358.47	92.20	0	125	66.9	66.9	0.0	0.0	69.1	0.3	1.8	0.0	0.0	0.0	0.0	-0.0	-4.4	-4.4
4	466116.55	5021358.47	92.20	0	250	73.4	73.4	0.0	0.0	69.1	0.8	-0.0	0.0	0.0	0.0	0.0	-0.0	3.4	3.4
5	466116.55	5021358.47	92.20	0	500	75.8	75.8	0.0	0.0	69.1	1.6	-1.1	0.0	0.0	0.0	0.0	-0.0	6.2	6.2
6	466116.55	5021358.47	92.20	0	1000	79.0	79.0	0.0	0.0	69.1	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	8.0	8.0
7	466116.55	5021358.47	92.20	0	2000	75.2	75.2	0.0	0.0	69.1	7.8	-1.1	0.0	0.0	0.0	0.0	-0.0	-0.7	-0.7
8	466116.55	5021358.47	92.20	0	4000	72.0	72.0	0.0	0.0	69.1	26.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-22.5	-22.5
9	466116.55	5021358.47	92.20	0	8000	60.9	60.9	0.0	0.0	69.1	94.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-101.6	-101.6

Point Source, ISO 9613, Name: "C&D - HVAC - 3", ID: "A_078"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466178.38	5021382.18	92.20	0	32	40.6	40.6	0.0	0.0	69.8	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-25.3	-25.3
2	466178.38	5021382.18	92.20	0	63	55.8	55.8	0.0	0.0	69.8	0.1	-4.0	0.0	0.0	0.0	0.0	-0.0	-10.1	-10.1
3	466178.38	5021382.18	92.20	0	125	66.9	66.9	0.0	0.0	69.8	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	-5.0	-5.0
4	466178.38	5021382.18	92.20	0	250	73.4	73.4	0.0	0.0	69.8	0.9	-0.1	0.0	0.0	0.0	0.0	-0.0	2.8	2.8
5	466178.38	5021382.18	92.20	0	500	75.8	75.8	0.0	0.0	69.8	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	5.5	5.5
6	466178.38	5021382.18	92.20	0	1000	79.0	79.0	0.0	0.0	69.8	3.2	-1.2	0.0	0.0	0.0	0.0	-0.0	7.2	7.2
7	466178.38	5021382.18	92.20	0	2000	75.2	75.2	0.0	0.0	69.8	8.4	-1.2	0.0	0.0	0.0	0.0	-0.0	-1.8	-1.8
8	466178.38	5021382.18	92.20	0	4000	72.0	72.0	0.0	0.0	69.8	28.5	-1.2	0.0	0.0	0.0	0.0	-0.0	-25.1	-25.1
9	466178.38	5021382.18	92.20	0	8000	60.9	60.9	0.0	0.0	69.8	101.5	-1.2	0.0	0.0	0.0	0.0	-0.0	-109.2	-109.2

Point Source, ISO 9613, Name: "C&D - HVAC - 4", ID: "A_079"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466168.64	5021413.10	92.20	0	32	40.6	40.6	0.0	0.0	69.9	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-25.4	-25.4
2	466168.64	5021413.10	92.20	0	63	55.8	55.8	0.0	0.0	69.9	0.1	-4.0	0.0	0.0	0.0	0.0	-0.0	-10.3	-10.3
3	466168.64	5021413.10	92.20	0	125	66.9	66.9	0.0	0.0	69.9	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	-5.2	-5.2
4	466168.64	5021413.10	92.20	0	250	73.4	73.4	0.0	0.0	69.9	0.9	-0.1	0.0	0.0	0.0	0.0	-0.0	2.6	2.6
5	466168.64	5021413.10	92.20	0	500	75.8	75.8	0.0	0.0	69.9	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	5.4	5.4
6	466168.64	5021413.10	92.20	0	1000	79.0	79.0	0.0	0.0	69.9	3.2	-1.2	0.0	0.0	0.0	0.0	-0.0	7.0	7.0
7	466168.64	5021413.10	92.20	0	2000	75.2	75.2	0.0	0.0	69.9	8.5	-1.2	0.0	0.0	0.0	0.0	-0.0	-2.1	-2.1
8	466168.64	5021413.10	92.20	0	4000	72.0	72.0	0.0	0.0	69.9	29.0	-1.2	0.0	0.0	0.0	0.0	-0.0	-25.7	-25.7
9	466168.64	5021413.10	92.20	0	8000	60.9	60.9	0.0	0.0	69.9	103.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-111.1	-111.1

Point Source, ISO 9613, Name: "Mech - HVAC ", ID: "A_080"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466542.40	5021491.66	87.60	0	32	40.6	40.6	0.0	0.0	72.7	0.0	-4.9	0.0	0.0	0.0	0.0	-0.0	-27.3	-27.3
2	466542.40	5021491.66	87.60	0	63	55.8	55.8	0.0	0.0	72.7	0.2	-4.9	0.0	0.0	0.0	0.0	-0.0	-12.2	-12.2
3	466542.40	5021491.66	87.60	0	125	66.9	66.9	0.0	0.0	72.7	0.5	1.3	0.0	0.0	0.0	0.0	-0.0	-7.6	-7.6
4	466542.40	5021491.66	87.60	0	250	73.4	73.4	0.0	0.0	72.7	1.3	-0.7	0.0	0.0	0.0	0.0	-0.0	0.1	0.1
5	466542.40	5021491.66	87.60	0	500	75.8	75.8	0.0	0.0	72.7	2.3	-1.8	0.0	0.0	0.0	0.0	-0.0	2.5	2.5
6	466542.40	5021491.66	87.60	0	1000	79.0	79.0	0.0	0.0	72.7	4.5	-1.8	0.0	0.0	0.0	0.0	-0.0	3.6	3.6
7	466542.40	5021491.66	87.60	0	2000	75.2	75.2	0.0	0.0	72.7	11.8	-1.8	0.0	0.0	0.0	0.0	-0.0	-7.5	-7.5
8	466542.40	5021491.66	87.60	0	4000	72.0	72.0	0.0	0.0	72.7	39.9	-1.8	0.0	0.0	0.0	0.0	-0.0	-38.9	-38.9
9	466542.40	5021491.66	87.60	0	8000	60.9	60.9	0.0	0.0	72.7	142.4	-1.8	0.0	0.0	0.0	0.0	-0.0	-152.4	-152.4

Point Source, ISO 9613, Name: "HC Soil - HVAC - 1", ID: "A_081"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466349.50	5020956.25	87.50	0	32	40.6	40.6	0.0	0.0	69.2	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-24.3	-24.3
2	466349.50	5020956.25	87.50	0	63	55.8	55.8	0.0	0.0	69.2	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	-9.2	-9.2
3	466349.50	5020956.25	87.50	0	125	66.9	66.9	0.0	0.0	69.2	0.3	1.9	0.0	0.0	0.0	0.0	-0.0	-4.6	-4.6
4	466349.50	5020956.25	87.50	0	250	73.4	73.4	0.0	0.0	69.2	0.9	0.1	0.0	0.0	0.0	0.0	-0.0	3.3	3.3
5	466349.50	5020956.25	87.50	0	500	75.8	75.8	0.0	0.0	69.2	1.6	-1.1	0.0	0.0	0.0	0.0	-0.0	6.1	6.1
6	466349.50	5020956.25	87.50	0	1000	79.0	79.0	0.0	0.0	69.2	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	7.9	7.9
7	466349.50	5020956.25	87.50	0	2000	75.2	75.2	0.0	0.0	69.2	7.8	-1.1	0.0	0.0	0.0	0.0	-0.0	-0.8	-0.8
8	466349.50	5020956.25	87.50	0	4000	72.0	72.0	0.0	0.0	69.2	26.6	-1.1	0.0	0.0	0.0	0.0	-0.0	-22.8	-22.8
9	466349.50	5020956.25	87.50	0	8000	60.9	60.9	0.0	0.0	69.2	94.9	-1.1	0.0	0.0	0.0	0.0	-0.0	-102.1	-102.1

Point Source, ISO 9613, Name: "HC Soil - HVAC - 2", ID: "A_082"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466372.39	5020950.13	87.50	0	32	40.6	40.6	0.0	0.0	69.4	0.0	-4.4	0.0	0.0	0.0	0.0	-0.0	-24.5	-24.5
2	466372.39	5020950.13	87.50	0	63	55.8	55.8	0.0	0.0	69.4	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	-9.4	-9.4
3	466372.39	5020950.13	87.50	0	125	66.9	66.9	0.0	0.0	69.4	0.3	1.9	0.0	0.0	0.0	0.0	-0.0	-4.8	-4.8
4	466372.39	5020950.13	87.50	0	250	73.4	73.4	0.0	0.0	69.4	0.9	0.0	0.0	0.0	0.0	0.0	-0.0	3.1	3.1
5	466372.39	5020950.13	87.50	0	500	75.8	75.8	0.0	0.0	69.4	1.6	-1.1	0.0	0.0	0.0	0.0	-0.0	5.9	5.9
6	466372.39	5020950.13	87.50	0	1000	79.0	79.0	0.0	0.0	69.4	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	7.6	7.6
7	466372.39	5020950.13	87.50	0	2000	75.2	75.2	0.0	0.0	69.4	8.1	-1.1	0.0	0.0	0.0	0.0	-0.0	-1.2	-1.2
8	466372.39	5020950.13	87.50	0	4000	72.0	72.0	0.0	0.0	69.4	27.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-23.6	-23.6
9	466372.39	5020950.13	87.50	0	8000	60.9	60.9	0.0	0.0	69.4	97.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-104.8	-104.8

Point Source, ISO 9613, Name: "Leachate - HVAC - 1", ID: "A_083"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466442.01	5021016.96	90.50	0	32	40.6	40.6	0.0	0.0	70.2	0.0	-4.2	0.0	0.0	0.0	0.0	-0.0	-25.5	-25.5
2	466442.01	5021016.96	90.50	0	63	55.8	55.8	0.0	0.0	70.2	0.1	-4.2	0.0	0.0	0.0	0.0	-0.0	-10.3	-10.3
3	466442.01	5021016.96	90.50	0	125	66.9	66.9	0.0	0.0	70.2	0.4	1.9	0.0	0.0	0.0	0.0	-0.0	-5.6	-5.6
4	466442.01	5021016.96	90.50	0	250	73.4	73.4	0.0	0.0	70.2	1.0	-0.0	0.0	0.0	0.0	0.0	-0.0	2.2	2.2
5	466442.01	5021016.96	90.50	0	500	75.8	75.8	0.0	0.0	70.2	1.8	-1.1	0.0	0.0	0.0	0.0	-0.0	4.9	4.9
6	466442.01	5021016.96	90.50	0	1000	79.0	79.0	0.0	0.0	70.2	3.3	-1.1	0.0	0.0	0.0	0.0	-0.0	6.5	6.5
7	466442.01	5021016.96	90.50	0	2000	75.2	75.2	0.0	0.0	70.2	8.9	-1.1	0.0	0.0	0.0	0.0	-0.0	-2.8	-2.8
8	466442.01	5021016.96	90.50	0	4000	72.0	72.0	0.0	0.0	70.2	30.0	-1.1	0.0	0.0	0.0	0.0	-0.0	-27.2	-27.2
9	466442.01	5021016.96	90.50	0	8000	60.9	60.9	0.0	0.0	70.2	107.1	-1.1	0.0	0.0	0.0	0.0	-0.0	-115.4	-115.4

Point Source, ISO 9613, Name: "Organic Pre Processing - HVAC - 2", ID: "A_084"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466480.57	5021193.62	90.50	0	32	40.6	40.6	0.0	0.0	71.1	0.0	-4.4	0.0	0.0	0.0	0.0	-0.0	-26.2	-26.2
2	466480.57	5021193.62	90.50	0	63	55.8	55.8	0.0	0.0	71.1	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	-11.1	-11.1
3	466480.57	5021193.62	90.50	0	125	66.9	66.9	0.0	0.0	71.1	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	-6.4	-6.4
4	466480.57	5021193.62	90.50	0	250	73.4	73.4	0.0	0.0	71.1	1.1	-0.2	0.0	0.0	0.0	0.0	-0.0	1.4	1.4
5	466480.57	5021193.62	90.50	0	500	75.8	75.8	0.0	0.0	71.1	2.0	-1.3	0.0	0.0	0.0	0.0	-0.0	4.0	4.0
6	466480.57	5021193.62	90.50	0	1000	79.0	79.0	0.0	0.0	71.1	3.7	-1.3	0.0	0.0	0.0	0.0	-0.0	5.4	5.4
7	466480.57	5021193.62	90.50	0	2000	75.2	75.2	0.0	0.0	71.1	9.8	-1.3	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
8	466480.57	5021193.62	90.50	0	4000	72.0	72.0	0.0	0.0	71.1	33.2	-1.3	0.0	0.0	0.0	0.0	-0.0	-31.1	-31.1
9	466480.57	5021193.62	90.50	0	8000	60.9	60.9	0.0	0.0	71.1	118.4	-1.3	0.0	0.0	0.0	0.0	-0.0	-127.4	-127.4

Point Source, ISO 9613, Name: "Organic Pre Processing - HVAC - 1", ID: "A_086"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466491.24	5021225.65	90.50	0	32	40.6	40.6	0.0	0.0	71.3	0.0	-4.4	0.0	0.0	0.0	0.0	-0.0	-26.3	-26.3
2	466491.24	5021225.65	90.50	0	63	55.8	55.8	0.0	0.0	71.3	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	-11.2	-11.2
3	466491.24	5021225.65	90.50	0	125	66.9	66.9	0.0	0.0	71.3	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	-6.6	-6.6
4	466491.24	5021225.65	90.50	0	250	73.4	73.4	0.0	0.0	71.3	1.1	-0.2	0.0	0.0	0.0	0.0	-0.0	1.2	1.2
5	466491.24	5021225.65	90.50	0	500	75.8	75.8	0.0	0.0	71.3	2.0	-1.3	0.0	0.0	0.0	0.0	-0.0	3.8	3.8
6	466491.24	5021225.65	90.50	0	1000	79.0	79.0	0.0	0.0	71.3	3.8	-1.3	0.0	0.0	0.0	0.0	-0.0	5.2	5.2
7	466491.24	5021225.65	90.50	0	2000	75.2	75.2	0.0	0.0	71.3	10.0	-1.3	0.0	0.0	0.0	0.0	-0.0	-4.8	-4.8
8	466491.24	5021225.65	90.50	0	4000	72.0	72.0	0.0	0.0	71.3	34.0	-1.3	0.0	0.0	0.0	0.0	-0.0	-32.0	-32.0
9	466491.24	5021225.65	90.50	0	8000	60.9	60.9	0.0	0.0	71.3	121.2	-1.3	0.0	0.0	0.0	0.0	-0.0	-130.3	-130.3

Point Source, ISO 9613, Name: "EGP - HVAC ", ID: "A_087"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466691.98	5021389.85	84.50	0	32	40.6	40.6	0.0	0.0	73.2	0.0	-5.2	0.0	0.0	10.0	0.0	-0.0	-37.5	-37.5
2	466691.98	5021389.85	84.50	0	63	55.8	55.8	0.0	0.0	73.2	0.2	-5.2	0.0	0.0	10.0	0.0	-0.0	-22.4	-22.4
3	466691.98	5021389.85	84.50	0	125	66.9	66.9	0.0	0.0	73.2	0.5	2.0	0.0	0.0	2.9	0.0	-0.0	-11.8	-11.8
4	466691.98	5021389.85	84.50	0	250	73.4	73.4	0.0	0.0	73.2	1.4	-0.6	0.0	0.0	5.7	0.0	-0.0	-6.3	-6.3
5	466691.98	5021389.85	84.50	0	500	75.8	75.8	0.0	0.0	73.2	2.5	-1.8	0.0	0.0	7.2	0.0	-0.0	-5.4	-5.4
6	466691.98	5021389.85	84.50	0	1000	79.0	79.0	0.0	0.0	73.2	4.7	-1.8	0.0	0.0	7.9	0.0	-0.0	-5.1	-5.1
7	466691.98	5021389.85	84.50	0	2000	75.2	75.2	0.0	0.0	73.2	12.5	-1.8	0.0	0.0	8.9	0.0	-0.0	-17.7	-17.7
8	466691.98	5021389.85	84.50	0	4000	72.0	72.0	0.0	0.0	73.2	42.3	-1.8	0.0	0.0	10.5	0.0	-0.0	-52.3	-52.3
9	466691.98	5021389.85	84.50	0	8000	60.9	60.9	0.0	0.0	73.2	150.8	-1.8	0.0	0.0	12.5	0.0	-0.0	-173.9	-173.9

Point Source, ISO 9613, Name: "Soil Facility Truck Idle", ID: "A_088"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466282.56	5021185.11	79.50	0	32	59.1	59.1	0.0	0.0	69.4	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-5.0	-5.0
2	466282.56	5021185.11	79.50	0	63	75.3	75.3	0.0	0.0	69.4	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	11.1	11.1
3	466282.56	5021185.11	79.50	0	125	77.4	77.4	0.0	0.0	69.4	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	4.2	4.2
4	466282.56	5021185.11	79.50	0	250	83.9	83.9	0.0	0.0	69.4	0.9	2.0	0.0	0.0	0.0	0.0	-0.0	11.7	11.7
5	466282.56	5021185.11	79.50	0	500	84.3	84.3	0.0	0.0	69.4	1.6	-1.2	0.0	0.0	0.0	0.0	-0.0	14.5	14.5
6	466282.56	5021185.11	79.50	0	1000	90.5	90.5	0.0	0.0	69.4	3.0	-1.6	0.0	0.0	0.0	0.0	-0.0	19.7	19.7
7	466282.56	5021185.11	79.50	0	2000	96.7	96.7	0.0	0.0	69.4	8.1	-1.6	0.0	0.0	0.0	0.0	-0.0	20.9	20.9
8	466282.56	5021185.11	79.50	0	4000	85.5	85.5	0.0	0.0	69.4	27.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-9.6	-9.6
9	466282.56	5021185.11	79.50	0	8000	73.4	73.4	0.0	0.0	69.4	97.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-91.7	-91.7

Point Source, ISO 9613, Name: "Organics Facility Truck Idle", ID: "A_089"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466441.95	5021247.85	79.50	0	32	59.1	59.1	0.0	0.0	71.0	0.0	-5.4	0.0	0.0	10.1	0.0	-0.0	-16.7	-16.7
2	466441.95	5021247.85	79.50	0	63	75.3	75.3	0.0	0.0	71.0	0.1	-5.4	0.0	0.0	10.1	0.0	-0.0	-0.6	-0.6
3	466441.95	5021247.85	79.50	0	125	77.4	77.4	0.0	0.0	71.0	0.4	3.5	0.0	0.0	1.3	0.0	-0.0	1.2	1.2
4	466441.95	5021247.85	79.50	0	250	83.9	83.9	0.0	0.0	71.0	1.1	1.8	0.0	0.0	3.0	0.0	-0.0	7.1	7.1
5	466441.95	5021247.85	79.50	0	500	84.3	84.3	0.0	0.0	71.0	1.9	-1.4	0.0	0.0	6.1	0.0	-0.0	6.6	6.6
6	466441.95	5021247.85	79.50	0	1000	90.5	90.5	0.0	0.0	71.0	3.7	-1.7	0.0	0.0	6.5	0.0	-0.0	11.1	11.1
7	466441.95	5021247.85	79.50	0	2000	96.7	96.7	0.0	0.0	71.0	9.7	-1.8	0.0	0.0	6.5	0.0	-0.0	11.3	11.3
8	466441.95	5021247.85	79.50	0	4000	85.5	85.5	0.0	0.0	71.0	32.9	-1.8	0.0	0.0	6.5	0.0	-0.0	-23.1	-23.1
9	466441.95	5021247.85	79.50	0	8000	73.4	73.4	0.0	0.0	71.0	117.2	-1.8	0.0	0.0	6.5	0.0	-0.0	-119.6	-119.6

Point Source, ISO 9613, Name: "Secondary Reactor - Exhaust", ID: "A_090"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466667.79	5021386.47	89.00	0	32	49.6	49.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-18.7	-18.7
2	466667.79	5021386.47	89.00	0	63	64.8	64.8	0.0	0.0	73.1	0.2	-4.8	0.0	0.0	0.0	0.0	-0.0	-3.6	-3.6
3	466667.79	5021386.47	89.00	0	125	75.9	75.9	0.0	0.0	73.1	0.5	1.5	0.0	0.0	0.0	0.0	-0.0	0.8	0.8
4	466667.79	5021386.47	89.00	0	250	81.4	81.4	0.0	0.0	73.1	1.3	-0.5	0.0	0.0	0.0	0.0	-0.0	7.5	7.5
5	466667.79	5021386.47	89.00	0	500	81.8	81.8	0.0	0.0	73.1	2.4	-1.6	0.0	0.0	0.0	0.0	-0.0	7.9	7.9
6	466667.79	5021386.47	89.00	0	1000	80.0	80.0	0.0	0.0	73.1	4.6	-1.6	0.0	0.0	0.0	0.0	-0.0	3.9	3.9
7	466667.79	5021386.47	89.00	0	2000	75.2	75.2	0.0	0.0	73.1	12.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-8.5	-8.5
8	466667.79	5021386.47	89.00	0	4000	74.0	74.0	0.0	0.0	73.1	41.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-39.0	-39.0
9	466667.79	5021386.47	89.00	0	8000	64.9	64.9	0.0	0.0	73.1	148.1	-1.6	0.0	0.0	0.0	0.0	-0.0	-154.7	-154.7

Point Source, ISO 9613, Name: "Secondary Reactor - HVAC ", ID: "A_091"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466672.48	5021373.85	88.50	0	32	40.6	40.6	0.0	0.0	73.0	0.0	-4.9	0.0	0.0	0.0	0.0	-0.0	-27.6	-27.6
2	466672.48	5021373.85	88.50	0	63	55.8	55.8	0.0	0.0	73.0	0.2	-4.9	0.0	0.0	0.0	0.0	-0.0	-12.6	-12.6
3	466672.48	5021373.85	88.50	0	125	66.9	66.9	0.0	0.0	73.0	0.5	1.5	0.0	0.0	0.0	0.0	-0.0	-8.2	-8.2
4	466672.48	5021373.85	88.50	0	250	73.4	73.4	0.0	0.0	73.0	1.3	-0.5	0.0	0.0	0.0	0.0	-0.0	-0.5	-0.5
5	466672.48	5021373.85	88.50	0	500	75.8	75.8	0.0	0.0	73.0	2.4	-1.6	0.0	0.0	0.0	0.0	-0.0	1.9	1.9
6	466672.48	5021373.85	88.50	0	1000	79.0	79.0	0.0	0.0	73.0	4.6	-1.6	0.0	0.0	0.0	0.0	-0.0	2.9	2.9
7	466672.48	5021373.85	88.50	0	2000	75.2	75.2	0.0	0.0	73.0	12.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-8.5	-8.5
8	466672.48	5021373.85	88.50	0	4000	72.0	72.0	0.0	0.0	73.0	41.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-40.9	-40.9
9	466672.48	5021373.85	88.50	0	8000	60.9	60.9	0.0	0.0	73.0	147.9	-1.6	0.0	0.0	0.0	0.0	-0.0	-158.5	-158.5

Point Source, ISO 9613, Name: "Leachate Truck Pump", ID: "A_092"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466464.52	5020979.69	79.50	0	32	63.6	63.6	0.0	0.0	70.4	0.0	-5.3	0.0	0.0	5.3	0.0	-0.0	-6.8	-6.8
2	466464.52	5020979.69	79.50	0	63	77.8	77.8	0.0	0.0	70.4	0.1	-5.3	0.0	0.0	5.6	0.0	-0.0	7.0	7.0
3	466464.52	5020979.69	79.50	0	125	90.9	90.9	0.0	0.0	70.4	0.4	3.5	0.0	0.0	0.8	0.0	-0.0	15.9	15.9
4	466464.52	5020979.69	79.50	0	250	90.4	90.4	0.0	0.0	70.4	1.0	1.9	0.0	0.0	2.5	0.0	-0.0	14.7	14.7
5	466464.52	5020979.69	79.50	0	500	98.8	98.8	0.0	0.0	70.4	1.8	-1.3	0.0	0.0	5.7	0.0	-0.0	22.2	22.2
6	466464.52	5020979.69	79.50	0	1000	105.0	105.0	0.0	0.0	70.4	3.4	-1.7	0.0	0.0	6.4	0.0	-0.0	26.5	26.5
7	466464.52	5020979.69	79.50	0	2000	107.2	107.2	0.0	0.0	70.4	9.0	-1.7	0.0	0.0	6.8	0.0	-0.0	22.7	22.7
8	466464.52	5020979.69	79.50	0	4000	102.0	102.0	0.0	0.0	70.4	30.4	-1.7	0.0	0.0	7.4	0.0	-0.0	-4.5	-4.5
9	466464.52	5020979.69	79.50	0	8000	97.9	97.9	0.0	0.0	70.4	108.6	-1.7	0.0	0.0	8.2	0.0	-0.0	-87.6	-87.6

Point Source, ISO 9613, Name: "Admin - HVAC - 1", ID: "A_093"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	465945.28	5021093.87	84.60	0	32	40.6	40.6	0.0	0.0	65.0	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-20.6	-20.6
2	465945.28	5021093.87	84.60	0	63	55.8	55.8	0.0	0.0	65.0	0.1	-3.8	0.0	0.0	0.0	0.0	-0.0	-5.5	-5.5
3	465945.28	5021093.87	84.60	0	125	66.9	66.9	0.0	0.0	65.0	0.2	2.7	0.0	0.0	0.0	0.0	-0.0	-1.1	-1.1
4	465945.28	5021093.87	84.60	0	250	73.4	73.4	0.0	0.0	65.0	0.5	0.2	0.0	0.0	0.0	0.0	-0.0	7.6	7.6
5	465945.28	5021093.87	84.60	0	500	75.8	75.8	0.0	0.0	65.0	1.0	-0.9	0.0	0.0	0.0	0.0	-0.0	10.7	10.7
6	465945.28	5021093.87	84.60	0	1000	79.0	79.0	0.0	0.0	65.0	1.8	-0.9	0.0	0.0	0.0	0.0	-0.0	13.0	13.0
7	465945.28	5021093.87	84.60	0	2000	75.2	75.2	0.0	0.0	65.0	4.8	-0.9	0.0	0.0	0.0	0.0	-0.0	6.2	6.2
8	465945.28	5021093.87	84.60	0	4000	72.0	72.0	0.0	0.0	65.0	16.4	-0.9	0.0	0.0	0.0	0.0	-0.0	-8.6	-8.6
9	465945.28	5021093.87	84.60	0	8000	60.9	60.9	0.0	0.0	65.0	58.7	-0.9	0.0	0.0	0.0	0.0	-0.0	-61.9	-61.9

Point Source, ISO 9613, Name: "LeachateTruck Idle", ID: "A_094"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466458.31	5020977.67	79.50	0	32	59.1	59.1	0.0	0.0	70.3	0.0	-5.3	0.0	0.0	5.3	0.0	-0.0	-11.2	-11.2
2	466458.31	5020977.67	79.50	0	63	75.3	75.3	0.0	0.0	70.3	0.1	-5.3	0.0	0.0	5.8	0.0	-0.0	4.4	4.4
3	466458.31	5020977.67	79.50	0	125	77.4	77.4	0.0	0.0	70.3	0.4	3.5	0.0	0.0	0.8	0.0	-0.0	2.4	2.4
4	466458.31	5020977.67	79.50	0	250	83.9	83.9	0.0	0.0	70.3	1.0	1.9	0.0	0.0	2.6	0.0	-0.0	8.2	8.2
5	466458.31	5020977.67	79.50	0	500	84.3	84.3	0.0	0.0	70.3	1.8	-1.3	0.0	0.0	5.8	0.0	-0.0	7.7	7.7
6	466458.31	5020977.67	79.50	0	1000	90.5	90.5	0.0	0.0	70.3	3.4	-1.7	0.0	0.0	6.6	0.0	-0.0	11.9	11.9
7	466458.31	5020977.67	79.50	0	2000	96.7	96.7	0.0	0.0	70.3	8.9	-1.7	0.0	0.0	7.1	0.0	-0.0	12.1	12.1
8	466458.31	5020977.67	79.50	0	4000	85.5	85.5	0.0	0.0	70.3	30.2	-1.7	0.0	0.0	7.9	0.0	-0.0	-21.2	-21.2
9	466458.31	5020977.67	79.50	0	8000	73.4	73.4	0.0	0.0	70.3	107.9	-1.7	0.0	0.0	9.1	0.0	-0.0	-112.1	-112.1

Point Source, ISO 9613, Name: "Generator Exhaust - 1", ID: "A_095"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466695.31	5021355.38	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-9.8	-9.8
2	466695.31	5021355.38	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	0.0	0.0	-0.0	9.9	9.9
3	466695.31	5021355.38	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	0.0	0.0	-0.0	-0.5	-0.5
4	466695.31	5021355.38	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	0.0	0.0	-0.0	-6.5	-6.5
5	466695.31	5021355.38	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-15.5	-15.5
6	466695.31	5021355.38	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	0.0	0.0	-0.0	-21.1	-21.1
7	466695.31	5021355.38	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-31.5	-31.5
8	466695.31	5021355.38	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	0.0	0.0	-0.0	-41.0	-41.0
9	466695.31	5021355.38	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	149.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-148.4	-148.4

Point Source, ISO 9613, Name: "Generator Exhaust - 2", ID: "A_096"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466697.18	5021350.52	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-19.3	-19.3
2	466697.18	5021350.52	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	0.3	0.3
3	466697.18	5021350.52	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-3.8	-3.8
4	466697.18	5021350.52	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-11.8	-11.8
5	466697.18	5021350.52	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	6.3	0.0	-0.0	-21.8	-21.8
6	466697.18	5021350.52	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	6.3	0.0	-0.0	-27.5	-27.5
7	466697.18	5021350.52	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	6.3	0.0	-0.0	-37.9	-37.9
8	466697.18	5021350.52	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	6.3	0.0	-0.0	-47.4	-47.4
9	466697.18	5021350.52	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	149.2	-1.6	0.0	0.0	6.3	0.0	-0.0	-154.7	-154.7

Point Source, ISO 9613, Name: "Generator Exhaust - 3", ID: "A_097"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466698.85	5021346.36	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-19.3	-19.3
2	466698.85	5021346.36	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	0.3	0.3
3	466698.85	5021346.36	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-3.8	-3.8
4	466698.85	5021346.36	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-11.8	-11.8
5	466698.85	5021346.36	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	6.3	0.0	-0.0	-21.8	-21.8
6	466698.85	5021346.36	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	6.3	0.0	-0.0	-27.5	-27.5
7	466698.85	5021346.36	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	6.3	0.0	-0.0	-37.8	-37.8
8	466698.85	5021346.36	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	6.3	0.0	-0.0	-47.3	-47.3
9	466698.85	5021346.36	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	149.2	-1.6	0.0	0.0	6.3	0.0	-0.0	-154.6	-154.6

Point Source, ISO 9613, Name: "Generator Exhaust - 4", ID: "A_098"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466700.56	5021341.41	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-19.3	-19.3
2	466700.56	5021341.41	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	0.3	0.3
3	466700.56	5021341.41	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-3.8	-3.8
4	466700.56	5021341.41	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-11.7	-11.7
5	466700.56	5021341.41	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	6.3	0.0	-0.0	-21.8	-21.8
6	466700.56	5021341.41	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	6.3	0.0	-0.0	-27.5	-27.5
7	466700.56	5021341.41	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	6.3	0.0	-0.0	-37.8	-37.8
8	466700.56	5021341.41	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	6.3	0.0	-0.0	-47.3	-47.3
9	466700.56	5021341.41	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	149.1	-1.6	0.0	0.0	6.3	0.0	-0.0	-154.5	-154.5

Point Source, ISO 9613, Name: "Generator Exhaust - 5", ID: "A_099"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466702.50	5021336.45	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-19.3	-19.3
2	466702.50	5021336.45	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	0.3	0.3
3	466702.50	5021336.45	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-3.8	-3.8
4	466702.50	5021336.45	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-11.7	-11.7
5	466702.50	5021336.45	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	6.3	0.0	-0.0	-21.8	-21.8
6	466702.50	5021336.45	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	6.3	0.0	-0.0	-27.4	-27.4
7	466702.50	5021336.45	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	6.3	0.0	-0.0	-37.8	-37.8
8	466702.50	5021336.45	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	6.3	0.0	-0.0	-47.3	-47.3
9	466702.50	5021336.45	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	149.0	-1.6	0.0	0.0	6.3	0.0	-0.0	-154.5	-154.5

Point Source, ISO 9613, Name: "Generator Exhaust - 6", ID: "A_100"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466704.06	5021332.51	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-19.3	-19.3
2	466704.06	5021332.51	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	0.3	0.3
3	466704.06	5021332.51	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-3.8	-3.8
4	466704.06	5021332.51	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-11.7	-11.7
5	466704.06	5021332.51	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	6.3	0.0	-0.0	-21.8	-21.8
6	466704.06	5021332.51	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	6.3	0.0	-0.0	-27.4	-27.4
7	466704.06	5021332.51	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	6.3	0.0	-0.0	-37.8	-37.8
8	466704.06	5021332.51	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	6.3	0.0	-0.0	-47.3	-47.3
9	466704.06	5021332.51	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	149.0	-1.6	0.0	0.0	6.3	0.0	-0.0	-154.5	-154.5

Point Source, ISO 9613, Name: "Generator Exhaust - 7", ID: "A_101"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466705.76	5021327.84	89.50	0	32	58.6	58.6	0.0	0.0	73.1	0.0	-4.8	0.0	0.0	9.6	0.0	-0.0	-19.3	-19.3
2	466705.76	5021327.84	89.50	0	63	78.8	78.8	0.0	-0.4	73.1	0.2	-4.8	0.0	0.0	9.6	0.0	-0.0	0.4	0.4
3	466705.76	5021327.84	89.50	0	125	76.9	76.9	0.0	-2.3	73.1	0.5	1.5	0.0	0.0	3.3	0.0	-0.0	-3.8	-3.8
4	466705.76	5021327.84	89.50	0	250	71.4	71.4	0.0	-3.9	73.1	1.3	-0.5	0.0	0.0	5.2	0.0	-0.0	-11.7	-11.7
5	466705.76	5021327.84	89.50	0	500	62.8	62.8	0.0	-4.3	73.1	2.5	-1.6	0.0	0.0	6.3	0.0	-0.0	-21.8	-21.8
6	466705.76	5021327.84	89.50	0	1000	61.0	61.0	0.0	-5.9	73.1	4.7	-1.6	0.0	0.0	6.3	0.0	-0.0	-27.4	-27.4
7	466705.76	5021327.84	89.50	0	2000	60.2	60.2	0.0	-7.8	73.1	12.3	-1.6	0.0	0.0	6.3	0.0	-0.0	-37.8	-37.8
8	466705.76	5021327.84	89.50	0	4000	81.0	81.0	0.0	-8.6	73.1	41.8	-1.6	0.0	0.0	6.3	0.0	-0.0	-47.3	-47.3
9	466705.76	5021327.84	89.50	0	8000	81.9	81.9	0.0	-9.5	73.1	148.9	-1.6	0.0	0.0	6.3	0.0	-0.0	-154.4	-154.4

Point Source, ISO 9613, Name: "Compost Excavator", ID: "A_102"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466363.94	5021106.28	83.50	0	32	61.6	61.6	0.0	0.0	69.8	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-3.0	-3.0
2	466363.94	5021106.28	83.50	0	63	79.8	79.8	0.0	0.0	69.8	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	15.2	15.2
3	466363.94	5021106.28	83.50	0	125	86.9	86.9	0.0	0.0	69.8	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	13.3	13.3
4	466363.94	5021106.28	83.50	0	250	96.4	96.4	0.0	0.0	69.8	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	23.8	23.8
5	466363.94	5021106.28	83.50	0	500	96.8	96.8	0.0	0.0	69.8	1.7	-1.2	0.0	0.0	0.0	0.0	-0.0	26.6	26.6
6	466363.94	5021106.28	83.50	0	1000	96.0	96.0	0.0	0.0	69.8	3.2	-1.6	0.0	0.0	0.0	0.0	-0.0	24.6	24.6
7	466363.94	5021106.28	83.50	0	2000	98.2	98.2	0.0	0.0	69.8	8.4	-1.6	0.0	0.0	0.0	0.0	-0.0	21.6	21.6
8	466363.94	5021106.28	83.50	0	4000	92.0	92.0	0.0	0.0	69.8	28.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-4.7	-4.7
9	466363.94	5021106.28	83.50	0	8000	81.9	81.9	0.0	0.0	69.8	101.9	-1.6	0.0	0.0	0.0	0.0	-0.0	-88.1	-88.1

Point Source, ISO 9613, Name: "Organics Loader", ID: "A_103"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466524.80	5021294.93	88.25	0	32	65.8	-88.0	0.0	0.0	71.8	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-0.6	-88.0
2	466524.80	5021294.93	88.25	0	63	88.0	-88.0	0.0	0.0	71.8	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	21.5	-88.0
3	466524.80	5021294.93	88.25	0	125	90.1	-88.0	0.0	0.0	71.8	0.5	3.5	0.0	0.0	0.0	0.0	-0.0	14.4	-88.0
4	466524.80	5021294.93	88.25	0	250	86.6	-88.0	0.0	0.0	71.8	1.2	1.7	0.0	0.0	0.0	0.0	-0.0	11.9	-88.0
5	466524.80	5021294.93	88.25	0	500	90.0	-88.0	0.0	0.0	71.8	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	17.5	-88.0
6	466524.80	5021294.93	88.25	0	1000	92.2	-88.0	0.0	0.0	71.8	4.0	-1.8	0.0	0.0	0.0	0.0	-0.0	18.2	-88.0
7	466524.80	5021294.93	88.25	0	2000	92.4	-88.0	0.0	0.0	71.8	10.6	-1.8	0.0	0.0	0.0	0.0	-0.0	11.8	-88.0
8	466524.80	5021294.93	88.25	0	4000	87.2	-88.0	0.0	0.0	71.8	36.0	-1.8	0.0	0.0	0.0	0.0	-0.0	-18.8	-88.0
9	466524.80	5021294.93	88.25	0	8000	75.1	-88.0	0.0	0.0	71.8	128.3	-1.8	0.0	0.0	0.0	0.0	-0.0	-123.2	-88.0

Point Source, ISO 9613, Name: "Organics Excavator", ID: "A_104"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466572.36	5021166.67	88.25	0	32	50.8	-88.0	0.0	0.0	71.7	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-15.5	-88.0
2	466572.36	5021166.67	88.25	0	63	69.0	-88.0	0.0	0.0	71.7	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	2.6	-88.0
3	466572.36	5021166.67	88.25	0	125	76.1	-88.0	0.0	0.0	71.7	0.5	3.5	0.0	0.0	0.0	0.0	-0.0	0.4	-88.0
4	466572.36	5021166.67	88.25	0	250	85.6	-88.0	0.0	0.0	71.7	1.1	1.7	0.0	0.0	0.0	0.0	-0.0	11.0	-88.0
5	466572.36	5021166.67	88.25	0	500	86.0	-88.0	0.0	0.0	71.7	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	13.6	-88.0
6	466572.36	5021166.67	88.25	0	1000	85.2	-88.0	0.0	0.0	71.7	4.0	-1.8	0.0	0.0	0.0	0.0	-0.0	11.3	-88.0
7	466572.36	5021166.67	88.25	0	2000	87.4	-88.0	0.0	0.0	71.7	10.5	-1.8	0.0	0.0	0.0	0.0	-0.0	7.0	-88.0
8	466572.36	5021166.67	88.25	0	4000	81.2	-88.0	0.0	0.0	71.7	35.6	-1.8	0.0	0.0	0.0	0.0	-0.0	-24.3	-88.0
9	466572.36	5021166.67	88.25	0	8000	71.1	-88.0	0.0	0.0	71.7	127.1	-1.8	0.0	0.0	0.0	0.0	-0.0	-125.9	-88.0

Point Source, ISO 9613, Name: "Organics Skidsteer (backhoe)", ID: "A_105"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466568.09	5021179.49	88.25	0	32	53.8	-88.0	0.0	0.0	71.7	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-12.5	-88.0
2	466568.09	5021179.49	88.25	0	63	66.0	-88.0	0.0	0.0	71.7	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-0.4	-88.0
3	466568.09	5021179.49	88.25	0	125	70.1	-88.0	0.0	0.0	71.7	0.5	3.5	0.0	0.0	0.0	0.0	-0.0	-5.6	-88.0
4	466568.09	5021179.49	88.25	0	250	65.6	-88.0	0.0	0.0	71.7	1.1	1.7	0.0	0.0	0.0	0.0	-0.0	-9.0	-88.0
5	466568.09	5021179.49	88.25	0	500	73.0	-88.0	0.0	0.0	71.7	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	0.6	-88.0
6	466568.09	5021179.49	88.25	0	1000	77.2	-88.0	0.0	0.0	71.7	4.0	-1.8	0.0	0.0	0.0	0.0	-0.0	3.3	-88.0
7	466568.09	5021179.49	88.25	0	2000	76.4	-88.0	0.0	0.0	71.7	10.5	-1.8	0.0	0.0	0.0	0.0	-0.0	-4.0	-88.0
8	466568.09	5021179.49	88.25	0	4000	68.2	-88.0	0.0	0.0	71.7	35.7	-1.8	0.0	0.0	0.0	0.0	-0.0	-37.4	-88.0
9	466568.09	5021179.49	88.25	0	8000	55.1	-88.0	0.0	0.0	71.7	127.2	-1.8	0.0	0.0	0.0	0.0	-0.0	-142.0	-88.0

Point Source, ISO 9613, Name: "Organics Dump Truck", ID: "A_106"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466528.54	5021285.30	88.25	0	32	52.3	-88.0	0.0	0.0	71.8	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-14.1	-88.0
2	466528.54	5021285.30	88.25	0	63	67.5	-88.0	0.0	0.0	71.8	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	1.0	-88.0
3	466528.54	5021285.30	88.25	0	125	84.6	-88.0	0.0	0.0	71.8	0.5	3.5	0.0	0.0	0.0	0.0	-0.0	8.9	-88.0
4	466528.54	5021285.30	88.25	0	250	87.1	-88.0	0.0	0.0	71.8	1.1	1.7	0.0	0.0	0.0	0.0	-0.0	12.4	-88.0
5	466528.54	5021285.30	88.25	0	500	89.5	-88.0	0.0	0.0	71.8	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	17.0	-88.0
6	466528.54	5021285.30	88.25	0	1000	91.7	-88.0	0.0	0.0	71.8	4.0	-1.8	0.0	0.0	0.0	0.0	-0.0	17.7	-88.0
7	466528.54	5021285.30	88.25	0	2000	91.9	-88.0	0.0	0.0	71.8	10.6	-1.8	0.0	0.0	0.0	0.0	-0.0	11.3	-88.0
8	466528.54	5021285.30	88.25	0	4000	82.7	-88.0	0.0	0.0	71.8	35.9	-1.8	0.0	0.0	0.0	0.0	-0.0	-23.2	-88.0
9	466528.54	5021285.30	88.25	0	8000	79.6	-88.0	0.0	0.0	71.8	128.2	-1.8	0.0	0.0	0.0	0.0	-0.0	-118.6	-88.0

Point Source, ISO 9613, Name: "Organics Conveyor", ID: "A_107"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466532.41	5021274.09	88.25	0	32	38.8	-88.0	0.0	0.0	71.8	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-27.6	-88.0
2	466532.41	5021274.09	88.25	0	63	55.0	-88.0	0.0	0.0	71.8	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-11.5	-88.0
3	466532.41	5021274.09	88.25	0	125	69.1	-88.0	0.0	0.0	71.8	0.5	3.5	0.0	0.0	0.0	0.0	-0.0	-6.6	-88.0
4	466532.41	5021274.09	88.25	0	250	75.6	-88.0	0.0	0.0	71.8	1.1	1.7	0.0	0.0	0.0	0.0	-0.0	0.9	-88.0
5	466532.41	5021274.09	88.25	0	500	78.0	-88.0	0.0	0.0	71.8	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	5.5	-88.0
6	466532.41	5021274.09	88.25	0	1000	77.2	-88.0	0.0	0.0	71.8	4.0	-1.8	0.0	0.0	0.0	0.0	-0.0	3.2	-88.0
7	466532.41	5021274.09	88.25	0	2000	75.4	-88.0	0.0	0.0	71.8	10.6	-1.8	0.0	0.0	0.0	0.0	-0.0	-5.1	-88.0
8	466532.41	5021274.09	88.25	0	4000	68.2	-88.0	0.0	0.0	71.8	35.9	-1.8	0.0	0.0	0.0	0.0	-0.0	-37.6	-88.0
9	466532.41	5021274.09	88.25	0	8000	59.1	-88.0	0.0	0.0	71.8	128.0	-1.8	0.0	0.0	0.0	0.0	-0.0	-138.9	-88.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 01", ID: "A_108"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	465498.98	5020874.84	79.50	0	32	39.9	38.4	0.0	0.0	52.4	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-9.4	-11.0
2	465498.98	5020874.84	79.50	0	63	63.1	61.6	0.0	0.0	52.4	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	13.8	12.2
3	465498.98	5020874.84	79.50	0	125	74.2	72.7	0.0	0.0	52.4	0.1	2.6	0.0	0.0	0.0	0.0	-0.0	19.2	17.6
4	465498.98	5020874.84	79.50	0	250	77.7	76.2	0.0	0.0	52.4	0.1	3.9	0.0	0.0	0.0	0.0	-0.0	21.3	19.8
5	465498.98	5020874.84	79.50	0	500	85.1	83.6	0.0	0.0	52.4	0.2	-0.0	0.0	0.0	0.0	0.0	-0.0	32.6	31.1
6	465498.98	5020874.84	79.50	0	1000	86.3	84.8	0.0	0.0	52.4	0.4	-0.6	0.0	0.0	0.0	0.0	-0.0	34.1	32.6
7	465498.98	5020874.84	79.50	0	2000	85.5	84.0	0.0	0.0	52.4	1.1	-0.6	0.0	0.0	0.0	0.0	-0.0	32.6	31.1
8	465498.98	5020874.84	79.50	0	4000	80.3	78.8	0.0	0.0	52.4	3.8	-0.6	0.0	0.0	0.0	0.0	-0.0	24.8	23.2
9	465498.98	5020874.84	79.50	0	8000	74.2	72.7	0.0	0.0	52.4	13.7	-0.6	0.0	0.0	0.0	0.0	-0.0	8.8	7.3
10	465529.22	5020886.17	79.50	0	32	39.9	38.4	0.0	0.0	52.3	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-9.3	-10.9
11	465529.22	5020886.17	79.50	0	63	63.1	61.6	0.0	0.0	52.3	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	13.9	12.3
12	465529.22	5020886.17	79.50	0	125	74.2	72.7	0.0	0.0	52.3	0.1	2.6	0.0	0.0	0.0	0.0	-0.0	19.3	17.7
13	465529.22	5020886.17	79.50	0	250	77.7	76.2	0.0	0.0	52.3	0.1	3.9	0.0	0.0	0.0	0.0	-0.0	21.4	19.9
14	465529.22	5020886.17	79.50	0	500	85.1	83.6	0.0	0.0	52.3	0.2	-0.0	0.0	0.0	0.0	0.0	-0.0	32.7	31.1
15	465529.22	5020886.17	79.50	0	1000	86.3	84.8	0.0	0.0	52.3	0.4	-0.6	0.0	0.0	0.0	0.0	-0.0	34.2	32.7
16	465529.22	5020886.17	79.50	0	2000	85.5	84.0	0.0	0.0	52.3	1.1	-0.6	0.0	0.0	0.0	0.0	-0.0	32.8	31.2
17	465529.22	5020886.17	79.50	0	4000	80.3	78.8	0.0	0.0	52.3	3.8	-0.6	0.0	0.0	0.0	0.0	-0.0	24.9	23.3
18	465529.22	5020886.17	79.50	0	8000	74.2	72.7	0.0	0.0	52.3	13.6	-0.6	0.0	0.0	0.0	0.0	-0.0	9.0	7.5
19	465574.58	5020903.16	79.50	0	32	43.0	41.4	0.0	0.0	53.3	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-7.3	-8.9
20	465574.58	5020903.16	79.50	0	63	66.2	64.6	0.0	0.0	53.3	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	15.9	14.3
21	465574.58	5020903.16	79.50	0	125	77.3	75.7	0.0	0.0	53.3	0.1	2.8	0.0	0.0	0.0	0.0	-0.0	21.2	19.6
22	465574.58	5020903.16	79.50	0	250	80.8	79.2	0.0	0.0	53.3	0.1	4.1	0.0	0.0	0.0	0.0	-0.0	23.3	21.7
23	465574.58	5020903.16	79.50	0	500	88.2	86.6	0.0	0.0	53.3	0.3	-0.0	0.0	0.0	0.0	0.0	-0.0	34.6	33.1
24	465574.58	5020903.16	79.50	0	1000	89.4	87.8	0.0	0.0	53.3	0.5	-0.6	0.0	0.0	0.0	0.0	-0.0	36.2	34.6
25	465574.58	5020903.16	79.50	0	2000	88.6	87.0	0.0	0.0	53.3	1.3	-0.6	0.0	0.0	0.0	0.0	-0.0	34.6	33.1
26	465574.58	5020903.16	79.50	0	4000	83.4	81.8	0.0	0.0	53.3	4.3	-0.6	0.0	0.0	0.0	0.0	-0.0	26.4	24.9
27	465574.58	5020903.16	79.50	0	8000	77.3	75.7	0.0	0.0	53.3	15.2	-0.6	0.0	0.0	0.0	0.0	-0.0	9.4	7.8
28	465635.06	5020925.82	79.50	0	32	43.0	41.4	0.0	0.0	55.6	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-9.7	-11.2
29	465635.06	5020925.82	79.50	0	63	66.2	64.6	0.0	0.0	55.6	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	13.5	12.0
30	465635.06	5020925.82	79.50	0	125	77.3	75.7	0.0	0.0	55.6	0.1	3.0	0.0	0.0	0.0	0.0	-0.0	18.6	17.0
31	465635.06	5020925.82	79.50	0	250	80.8	79.2	0.0	0.0	55.6	0.2	4.3	0.0	0.0	0.0	0.0	-0.0	20.7	19.2
32	465635.06	5020925.82	79.50	0	500	88.2	86.6	0.0	0.0	55.6	0.3	0.0	0.0	0.0	0.0	0.0	-0.0	32.2	30.7
33	465635.06	5020925.82	79.50	0	1000	89.4	87.8	0.0	0.0	55.6	0.6	-0.6	0.0	0.0	0.0	0.0	-0.0	33.7	32.2
34	465635.06	5020925.82	79.50	0	2000	88.6	87.0	0.0	0.0	55.6	1.6	-0.6	0.0	0.0	0.0	0.0	-0.0	31.9	30.4
35	465635.06	5020925.82	79.50	0	4000	83.4	81.8	0.0	0.0	55.6	5.6	-0.6	0.0	0.0	0.0	0.0	-0.0	22.8	21.2
36	465635.06	5020925.82	79.50	0	8000	77.3	75.7	0.0	0.0	55.6	19.9	-0.6	0.0	0.0	0.0	0.0	-0.0	2.4	0.8
37	465695.53	5020948.47	79.50	0	32	43.0	41.4	0.0	0.0	57.9	0.0	-3.2	0.0	0.0	0.0	0.0	-0.0	-11.8	-13.4
38	465695.53	5020948.47	79.50	0	63	66.2	64.6	0.0	0.0	57.9	0.0	-3.2	0.0	0.0	0.0	0.0	-0.0	11.4	9.8
39	465695.53	5020948.47	79.50	0	125	77.3	75.7	0.0	0.0	57.9	0.1	3.2	0.0	0.0	0.0	0.0	-0.0	16.0	14.5
40	465695.53	5020948.47	79.50	0	250	80.8	79.2	0.0	0.0	57.9	0.2	4.3	0.0	0.0	0.0	0.0	-0.0	18.3	16.7
41	465695.53	5020948.47	79.50	0	500	88.2	86.6	0.0	0.0	57.9	0.4	-0.0	0.0	0.0	0.0	0.0	-0.0	29.8	28.3
42	465695.53	5020948.47	79.50	0	1000	89.4	87.8	0.0	0.0	57.9	0.8	-0.6	0.0	0.0	0.0	0.0	-0.0	31.2	29.7
43	465695.53	5020948.47	79.50	0	2000	88.6	87.0	0.0	0.0	57.9	2.1	-0.6	0.0	0.0	0.0	0.0	-0.0	29.1	27.6
44	465695.53	5020948.47	79.50	0	4000	83.4	81.8	0.0	0.0	57.9	7.3	-0.6	0.0	0.0	0.0	0.0	-0.0	18.8	17.3
45	465695.53	5020948.47	79.50	0	8000	77.3	75.7	0.0	0.0	57.9	25.9	-0.6	0.0	0.0	0.0	0.0	-0.0	-6.0	-7.5
46	465786.25	5020982.46	79.50	0	32	46.0	44.4	0.0	0.0	60.8	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-10.9	-12.4
47	465786.25	5020982.46	79.50	0	63	69.2	67.6	0.0	0.0	60.8	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	12.3	10.8
48	465786.25	5020982.46	79.50	0	125	80.3	78.7	0.0	0.0	60.8	0.1	3.4	0.0	0.0	0.0	0.0	-0.0	15.9	14.4
49	465786.25	5020982.46	79.50	0	250	83.8	82.2	0.0	0.0	60.8	0.3	4.2	0.0	0.0	0.0	0.0	-0.0	18.4	16.9
50	465786.25	5020982.46	79.50	0	500	91.2	89.6	0.0	0.0	60.8	0.6	-0.2	0.0	0.0	0.0	0.0	-0.0	29.9	28.4
51	465786.25	5020982.46	79.50	0	1000	92.4	90.8	0.0	0.0	60.8	1.1	-0.8	0.0	0.0	0.0	0.0	-0.0	31.2	29.7
52	465786.25	5020982.46	79.50	0	2000	91.6	90.0	0.0	0.0	60.8	3.0	-0.8	0.0	0.0	0.0	0.0	-0.0	28.6	27.0
53	465786.25	5020982.46	79.50	0	4000	86.4	84.8	0.0	0.0	60.8	10.1	-0.8	0.0	0.0	0.0	0.0	-0.0	16.2	14.7
54	465786.25	5020982.46	79.50	0	8000	80.3	78.7	0.0	0.0	60.8	36.1	-0.8	0.0	0.0	0.0	0.0	-0.0	-15.8	-17.4
55	465907.21	5021027.77	79.50	0	32	46.0	44.4	0.0	0.0	63.7	0.0	-4.5	0.0	0.0	0.0	0.0	-0.0	-13.2	-14.7
56	465907.21	5021027.77	79.50	0	63	69.2	67.6	0.0	0.0	63.7	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	10.0	8.4
57	465907.21	5021027.77	79.50	0	125	80.3	78.7	0.0	0.0	63.7	0.2	3.7	0.0	0.0	0.0	0.0	-0.0	12.7	11.1
58	465907.21	5021027.77	79.50	0	250	83.8	82.2	0.0	0.0	63.7	0.5	3.8	0.0	0.0	0.0	0.0	-0.0	15.8	14.2
59	465907.21	5021027.77	79.50	0	500	91.2	89.6	0.0	0.0	63.7	0.8	-0.4	0.0	0.0	0.0	0.0	-0.0	27.0	25.5
60	465907.21	5021027.77	79.50	0	1000	92.4	90.8	0.0	0.0	63.7	1.6	-1.0	0.0	0.0	0.0	0.0	-0.0	28.1	26.5
61	465907.21	5021027.77	79.50	0	2000	91.6	90.0	0.0	0.0	63.7	4.2	-1.0	0.0	0.0	0.0	0.0	-0.0	24.7	23.1
62	465907.21	5021027.77	79.50	0	4000	86.4	84.8	0.0	0.0	63.7	14.1	-1.0	0.0	0.0	0.0	0.0	-0.0	9.5	8.0
63	465907.21	5021027.77	79.50	0	8000	80.3	78.7	0.0	0.0	63.7	50.4	-1.0	0.0	0.0	0.0	0.0	-0.0	-32.9	-34.4

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 01", ID: "A_108"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
64	466064.59	5021099.26	79.50	0	32	47.7	46.1	0.0	0.0	66.6	0.0	-5.0	0.0	0.0	0.0	0.0	-0.0	-14.0	-15.5
65	466064.59	5021099.26	79.50	0	63	70.9	69.3	0.0	0.0	66.6	0.1	-5.0	0.0	0.0	0.0	0.0	-0.0	9.2	7.6
66	466064.59	5021099.26	79.50	0	125	82.0	80.4	0.0	0.0	66.6	0.3	3.1	0.0	0.0	0.0	0.0	-0.0	12.0	10.5
67	466064.59	5021099.26	79.50	0	250	85.5	83.9	0.0	0.0	66.6	0.6	2.1	0.0	0.0	0.0	0.0	-0.0	16.1	14.6
68	466064.59	5021099.26	79.50	0	500	92.9	91.3	0.0	0.0	66.6	1.2	-1.1	0.0	0.0	0.0	0.0	-0.0	26.2	24.6
69	466064.59	5021099.26	79.50	0	1000	94.1	92.5	0.0	0.0	66.6	2.2	-1.4	0.0	0.0	0.0	0.0	-0.0	26.7	25.2
70	466064.59	5021099.26	79.50	0	2000	93.3	91.7	0.0	0.0	66.6	5.8	-1.5	0.0	0.0	0.0	0.0	-0.0	22.3	20.8
71	466064.59	5021099.26	79.50	0	4000	88.1	86.5	0.0	0.0	66.6	19.7	-1.5	0.0	0.0	0.0	0.0	-0.0	3.2	1.7
72	466064.59	5021099.26	79.50	0	8000	82.0	80.4	0.0	0.0	66.6	70.3	-1.5	0.0	0.0	0.0	0.0	-0.0	-53.5	-55.0
73	465974.99	5021053.16	79.50	0	32	35.1	33.5	0.0	0.0	65.0	0.0	-4.7	0.0	0.0	0.0	0.0	-0.0	-25.2	-26.7
74	465974.99	5021053.16	79.50	0	63	58.3	56.7	0.0	0.0	65.0	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	-2.0	-3.6
75	465974.99	5021053.16	79.50	0	125	69.4	67.8	0.0	0.0	65.0	0.2	3.7	0.0	0.0	0.0	0.0	-0.0	0.4	-1.1
76	465974.99	5021053.16	79.50	0	250	72.9	71.3	0.0	0.0	65.0	0.5	3.4	0.0	0.0	0.0	0.0	-0.0	3.9	2.4
77	465974.99	5021053.16	79.50	0	500	80.3	78.7	0.0	0.0	65.0	1.0	-0.6	0.0	0.0	0.0	0.0	-0.0	14.9	13.3
78	465974.99	5021053.16	79.50	0	1000	81.5	79.9	0.0	0.0	65.0	1.8	-1.1	0.0	0.0	0.0	0.0	-0.0	15.7	14.2
79	465974.99	5021053.16	79.50	0	2000	80.7	79.1	0.0	0.0	65.0	4.8	-1.1	0.0	0.0	0.0	0.0	-0.0	11.9	10.4
80	465974.99	5021053.16	79.50	0	4000	75.5	73.9	0.0	0.0	65.0	16.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-4.9	-6.4
81	465974.99	5021053.16	79.50	0	8000	69.4	67.8	0.0	0.0	65.0	58.6	-1.1	0.0	0.0	0.0	0.0	-0.0	-53.1	-54.7
82	465968.87	5021050.87	79.50	0	32	28.9	27.4	0.0	0.0	64.9	0.0	-4.7	0.0	0.0	0.0	0.0	-0.0	-31.3	-32.8
83	465968.87	5021050.87	79.50	0	63	52.1	50.6	0.0	0.0	64.9	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	-8.1	-9.7
84	465968.87	5021050.87	79.50	0	125	63.2	61.7	0.0	0.0	64.9	0.2	3.7	0.0	0.0	0.0	0.0	-0.0	-5.6	-7.2
85	465968.87	5021050.87	79.50	0	250	66.7	65.2	0.0	0.0	64.9	0.5	3.4	0.0	0.0	0.0	0.0	-0.0	-2.2	-3.7
86	465968.87	5021050.87	79.50	0	500	74.1	72.6	0.0	0.0	64.9	1.0	-0.5	0.0	0.0	0.0	0.0	-0.0	8.8	7.2
87	465968.87	5021050.87	79.50	0	1000	75.3	73.8	0.0	0.0	64.9	1.8	-1.1	0.0	0.0	0.0	0.0	-0.0	9.7	8.1
88	465968.87	5021050.87	79.50	0	2000	74.5	73.0	0.0	0.0	64.9	4.8	-1.1	0.0	0.0	0.0	0.0	-0.0	5.9	4.4
89	465968.87	5021050.87	79.50	0	4000	69.3	67.8	0.0	0.0	64.9	16.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-10.7	-12.3
90	465968.87	5021050.87	79.50	0	8000	63.2	61.7	0.0	0.0	64.9	57.9	-1.1	0.0	0.0	0.0	0.0	-0.0	-58.5	-60.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 02", ID: "A_109"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466136.16	5021177.76	79.50	0	32	40.0	38.5	0.0	0.0	68.0	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-22.9	-24.3
2	466136.16	5021177.76	79.50	0	63	63.2	61.7	0.0	0.0	68.0	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	0.3	-1.2
3	466136.16	5021177.76	79.50	0	125	74.3	72.8	0.0	0.0	68.0	0.3	3.1	0.0	0.0	0.0	0.0	-0.0	3.0	1.5
4	466136.16	5021177.76	79.50	0	250	77.8	76.3	0.0	0.0	68.0	0.7	1.9	0.0	0.0	0.0	0.0	-0.0	7.3	5.8
5	466136.16	5021177.76	79.50	0	500	85.2	83.7	0.0	0.0	68.0	1.4	-1.3	0.0	0.0	0.0	0.0	-0.0	17.2	15.7
6	466136.16	5021177.76	79.50	0	1000	86.4	84.9	0.0	0.0	68.0	2.6	-1.7	0.0	0.0	0.0	0.0	-0.0	17.6	16.1
7	466136.16	5021177.76	79.50	0	2000	85.6	84.1	0.0	0.0	68.0	6.8	-1.7	0.0	0.0	0.0	0.0	-0.0	12.6	11.1
8	466136.16	5021177.76	79.50	0	4000	80.4	78.9	0.0	0.0	68.0	23.1	-1.7	0.0	0.0	0.0	0.0	-0.0	-8.9	-10.4
9	466136.16	5021177.76	79.50	0	8000	74.3	72.8	0.0	0.0	68.0	82.4	-1.7	0.0	0.0	0.0	0.0	-0.0	-74.3	-75.8
10	466119.02	5021222.53	79.50	0	32	34.9	33.4	0.0	0.0	68.1	0.0	-5.1	0.0	0.0	5.1	0.0	-0.0	-33.3	-34.7
11	466119.02	5021222.53	79.50	0	63	58.1	56.6	0.0	0.0	68.1	0.1	-5.1	0.0	0.0	5.1	0.0	-0.0	-10.1	-11.6
12	466119.02	5021222.53	79.50	0	125	69.2	67.7	0.0	0.0	68.1	0.3	3.1	0.0	0.0	0.5	0.0	-0.0	-2.8	-4.3
13	466119.02	5021222.53	79.50	0	250	72.7	71.2	0.0	0.0	68.1	0.8	1.8	0.0	0.0	1.8	0.0	-0.0	0.2	-1.3
14	466119.02	5021222.53	79.50	0	500	80.1	78.6	0.0	0.0	68.1	1.4	-1.4	0.0	0.0	4.6	0.0	-0.0	7.3	5.9
15	466119.02	5021222.53	79.50	0	1000	81.3	79.8	0.0	0.0	68.1	2.6	-1.7	0.0	0.0	5.5	0.0	-0.0	6.8	5.3
16	466119.02	5021222.53	79.50	0	2000	80.5	79.0	0.0	0.0	68.1	6.9	-1.8	0.0	0.0	5.9	0.0	-0.0	1.3	-0.2
17	466119.02	5021222.53	79.50	0	4000	75.3	73.8	0.0	0.0	68.1	23.5	-1.8	0.0	0.0	6.2	0.0	-0.0	-20.8	-22.3
18	466119.02	5021222.53	79.50	0	8000	69.2	67.7	0.0	0.0	68.1	83.9	-1.8	0.0	0.0	6.3	0.0	-0.0	-87.5	-88.9

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 03", ID: "A_110"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466092.22	5021289.82	79.50	0	32	42.2	40.8	0.0	0.0	68.4	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-21.1	-22.5
2	466092.22	5021289.82	79.50	0	63	65.4	64.0	0.0	0.0	68.4	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	2.1	0.6
3	466092.22	5021289.82	79.50	0	125	76.5	75.1	0.0	0.0	68.4	0.3	3.1	0.0	0.0	0.0	0.0	-0.0	4.7	3.2
4	466092.22	5021289.82	79.50	0	250	80.0	78.6	0.0	0.0	68.4	0.8	1.8	0.0	0.0	0.0	0.0	-0.0	9.0	7.6
5	466092.22	5021289.82	79.50	0	500	87.4	86.0	0.0	0.0	68.4	1.4	-1.4	0.0	0.0	0.0	0.0	-0.0	18.9	17.5
6	466092.22	5021289.82	79.50	0	1000	88.6	87.2	0.0	0.0	68.4	2.7	-1.8	0.0	0.0	0.0	0.0	-0.0	19.2	17.8
7	466092.22	5021289.82	79.50	0	2000	87.8	86.4	0.0	0.0	68.4	7.2	-1.8	0.0	0.0	0.0	0.0	-0.0	14.0	12.5
8	466092.22	5021289.82	79.50	0	4000	82.6	81.2	0.0	0.0	68.4	24.3	-1.8	0.0	0.0	0.0	0.0	-0.0	-8.4	-9.8
9	466092.22	5021289.82	79.50	0	8000	76.5	75.1	0.0	0.0	68.4	86.8	-1.8	0.0	0.0	0.0	0.0	-0.0	-76.9	-78.4
10	466052.89	5021387.78	79.50	0	32	39.0	37.5	0.0	0.0	68.9	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-24.8	-26.2

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 03", ID: "A_110"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
11	466052.89	5021387.78	79.50	0	63	62.2	60.7	0.0	0.0	68.9	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-1.6	-3.1
12	466052.89	5021387.78	79.50	0	125	73.3	71.8	0.0	0.0	68.9	0.3	3.2	0.0	0.0	0.0	0.0	-0.0	0.8	-0.6
13	466052.89	5021387.78	79.50	0	250	76.8	75.3	0.0	0.0	68.9	0.8	1.8	0.0	0.0	0.0	0.0	-0.0	5.3	3.8
14	466052.89	5021387.78	79.50	0	500	84.2	82.7	0.0	0.0	68.9	1.5	-1.4	0.0	0.0	0.0	0.0	-0.0	15.1	13.7
15	466052.89	5021387.78	79.50	0	1000	85.4	83.9	0.0	0.0	68.9	2.9	-1.8	0.0	0.0	0.0	0.0	-0.0	15.3	13.9
16	466052.89	5021387.78	79.50	0	2000	84.6	83.1	0.0	0.0	68.9	7.6	-1.8	0.0	0.0	0.0	0.0	-0.0	9.8	8.4
17	466052.89	5021387.78	79.50	0	4000	79.4	77.9	0.0	0.0	68.9	25.8	-1.8	0.0	0.0	0.0	0.0	-0.0	-13.6	-15.1
18	466052.89	5021387.78	79.50	0	8000	73.3	71.8	0.0	0.0	68.9	92.1	-1.8	0.0	0.0	0.0	0.0	-0.0	-86.0	-87.5
19	466069.07	5021425.41	79.50	0	32	39.0	37.5	0.0	0.0	69.4	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-25.2	-26.6
20	466069.07	5021425.41	79.50	0	63	62.2	60.7	0.0	0.0	69.4	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-2.0	-3.5
21	466069.07	5021425.41	79.50	0	125	73.3	71.8	0.0	0.0	69.4	0.3	3.3	0.0	0.0	0.0	0.0	-0.0	0.4	-1.1
22	466069.07	5021425.41	79.50	0	250	76.8	75.3	0.0	0.0	69.4	0.9	1.8	0.0	0.0	0.0	0.0	-0.0	4.8	3.3
23	466069.07	5021425.41	79.50	0	500	84.2	82.7	0.0	0.0	69.4	1.6	-1.4	0.0	0.0	0.0	0.0	-0.0	14.7	13.2
24	466069.07	5021425.41	79.50	0	1000	85.4	83.9	0.0	0.0	69.4	3.0	-1.8	0.0	0.0	0.0	0.0	-0.0	14.8	13.3
25	466069.07	5021425.41	79.50	0	2000	84.6	83.1	0.0	0.0	69.4	8.0	-1.8	0.0	0.0	0.0	0.0	-0.0	9.0	7.6
26	466069.07	5021425.41	79.50	0	4000	79.4	77.9	0.0	0.0	69.4	27.1	-1.8	0.0	0.0	0.0	0.0	-0.0	-15.3	-16.8
27	466069.07	5021425.41	79.50	0	8000	73.3	71.8	0.0	0.0	69.4	96.8	-1.8	0.0	0.0	0.0	0.0	-0.0	-91.0	-92.5
28	466097.29	5021436.59	79.50	0	32	25.6	24.1	0.0	0.0	69.6	0.0	-5.3	0.0	0.0	5.3	0.0	-0.0	-44.1	-45.5
29	466097.29	5021436.59	79.50	0	63	48.8	47.3	0.0	0.0	69.6	0.1	-5.3	0.0	0.0	5.3	0.0	-0.0	-20.9	-22.4
30	466097.29	5021436.59	79.50	0	125	59.9	58.4	0.0	0.0	69.6	0.4	3.3	0.0	0.0	0.7	0.0	-0.0	-14.0	-15.5
31	466097.29	5021436.59	79.50	0	250	63.4	61.9	0.0	0.0	69.6	0.9	1.7	0.0	0.0	2.1	0.0	-0.0	-10.9	-12.4
32	466097.29	5021436.59	79.50	0	500	70.8	69.3	0.0	0.0	69.6	1.7	-1.4	0.0	0.0	3.8	0.0	-0.0	-2.8	-4.3
33	466097.29	5021436.59	79.50	0	1000	72.0	70.5	0.0	0.0	69.6	3.1	-1.8	0.0	0.0	4.5	0.0	-0.0	-3.4	-4.8
34	466097.29	5021436.59	79.50	0	2000	71.2	69.7	0.0	0.0	69.6	8.3	-1.8	0.0	0.0	5.0	0.0	-0.0	-9.9	-11.4
35	466097.29	5021436.59	79.50	0	4000	66.0	64.5	0.0	0.0	69.6	28.0	-1.8	0.0	0.0	5.7	0.0	-0.0	-35.5	-36.9
36	466097.29	5021436.59	79.50	0	8000	59.9	58.4	0.0	0.0	69.6	99.8	-1.8	0.0	0.0	6.5	0.0	-0.0	-114.3	-115.7
37	466066.59	5021353.67	79.50	0	32	33.2	31.8	0.0	0.0	68.7	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-30.4	-31.8
38	466066.59	5021353.67	79.50	0	63	56.4	55.0	0.0	0.0	68.7	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-7.2	-8.7
39	466066.59	5021353.67	79.50	0	125	67.5	66.1	0.0	0.0	68.7	0.3	3.2	0.0	0.0	0.0	0.0	-0.0	-4.7	-6.2
40	466066.59	5021353.67	79.50	0	250	71.0	69.6	0.0	0.0	68.7	0.8	1.8	0.0	0.0	0.0	0.0	-0.0	-0.3	-1.8
41	466066.59	5021353.67	79.50	0	500	78.4	77.0	0.0	0.0	68.7	1.5	-1.4	0.0	0.0	0.0	0.0	-0.0	9.6	8.1
42	466066.59	5021353.67	79.50	0	1000	79.6	78.2	0.0	0.0	68.7	2.8	-1.8	0.0	0.0	0.0	0.0	-0.0	9.8	8.4
43	466066.59	5021353.67	79.50	0	2000	78.8	77.4	0.0	0.0	68.7	7.5	-1.8	0.0	0.0	0.0	0.0	-0.0	4.4	2.9
44	466066.59	5021353.67	79.50	0	4000	73.6	72.2	0.0	0.0	68.7	25.3	-1.8	0.0	0.0	0.0	0.0	-0.0	-18.6	-20.1
45	466066.59	5021353.67	79.50	0	8000	67.5	66.1	0.0	0.0	68.7	90.1	-1.8	0.0	0.0	0.0	0.0	-0.0	-89.5	-91.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 04", ID: "A_111"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466103.95	5021424.18	79.50	0	32	34.9	33.4	0.0	0.0	69.6	0.0	-5.3	0.0	0.0	6.3	0.0	-0.0	-35.7	-37.3
2	466103.95	5021424.18	79.50	0	63	58.1	56.6	0.0	0.0	69.6	0.1	-5.3	0.0	0.0	8.1	0.0	-0.0	-14.4	-15.9
3	466103.95	5021424.18	79.50	0	125	69.2	67.7	0.0	0.0	69.6	0.4	3.3	0.0	0.0	6.6	0.0	-0.0	-10.6	-12.1
4	466103.95	5021424.18	79.50	0	250	72.7	71.2	0.0	0.0	69.6	0.9	1.7	0.0	0.0	10.6	0.0	-0.0	-10.1	-11.6
5	466103.95	5021424.18	79.50	0	500	80.1	78.6	0.0	0.0	69.6	1.6	-1.4	0.0	0.0	15.0	0.0	-0.0	-4.6	-6.2
6	466103.95	5021424.18	79.50	0	1000	81.3	79.8	0.0	0.0	69.6	3.1	-1.8	0.0	0.0	18.0	0.0	-0.0	-7.6	-9.1
7	466103.95	5021424.18	79.50	0	2000	80.5	79.0	0.0	0.0	69.6	8.2	-1.8	0.0	0.0	21.0	0.0	-0.0	-16.4	-17.9
8	466103.95	5021424.18	79.50	0	4000	75.3	73.8	0.0	0.0	69.6	27.8	-1.8	0.0	0.0	23.3	0.0	-0.0	-43.5	-45.0
9	466103.95	5021424.18	79.50	0	8000	69.2	67.7	0.0	0.0	69.6	99.2	-1.8	0.0	0.0	24.7	0.0	-0.0	-122.4	-124.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 05", ID: "A_112"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466201.43	5021476.97	79.50	0	32	44.3	42.9	0.0	0.0	70.6	0.0	-5.3	0.0	0.0	8.2	0.0	-0.0	-29.2	-30.6
2	466201.43	5021476.97	79.50	0	63	67.5	66.1	0.0	0.0	70.6	0.1	-5.3	0.0	0.0	9.6	0.0	-0.0	-7.5	-8.9
3	466201.43	5021476.97	79.50	0	125	78.6	77.2	0.0	0.0	70.6	0.4	3.3	0.0	0.0	3.6	0.0	-0.0	0.8	-0.7
4	466201.43	5021476.97	79.50	0	250	82.1	80.7	0.0	0.0	70.6	1.0	1.6	0.0	0.0	6.7	0.0	-0.0	2.2	0.7
5	466201.43	5021476.97	79.50	0	500	89.5	88.1	0.0	0.0	70.6	1.8	-1.5	0.0	0.0	11.8	0.0	-0.0	6.8	5.4
6	466201.43	5021476.97	79.50	0	1000	90.7	89.3	0.0	0.0	70.6	3.5	-1.9	0.0	0.0	14.6	0.0	-0.0	4.0	2.5
7	466201.43	5021476.97	79.50	0	2000	89.9	88.5	0.0	0.0	70.6	9.2	-1.9	0.0	0.0	17.3	0.0	-0.0	-5.2	-6.7
8	466201.43	5021476.97	79.50	0	4000	84.7	83.3	0.0	0.0	70.6	31.2	-1.9	0.0	0.0	20.1	0.0	-0.0	-35.3	-36.7
9	466201.43	5021476.97	79.50	0	8000	78.6	77.2	0.0	0.0	70.6	111.4	-1.9	0.0	0.0	23.0	0.0	-0.0	-124.4	-125.9
10	466299.40	5021514.82	79.50	0	32	32.2	30.7	0.0	0.0	71.4	0.0	-5.4	0.0	0.0	10.8	0.0	-0.0	-44.7	-46.1
11	466299.40	5021514.82	79.50	0	63	55.4	53.9	0.0	0.0	71.4	0.1	-5.4	0.0	0.0	11.5	0.0	-0.0	-22.3	-23.7

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 05", ID: "A_112"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
12	466299.40	5021514.82	79.50	0	125	66.5	65.0	0.0	0.0	71.4	0.4	3.3	0.0	0.0	3.9	0.0	-0.0	-12.6	-14.0
13	466299.40	5021514.82	79.50	0	250	70.0	68.5	0.0	0.0	71.4	1.1	1.6	0.0	0.0	7.2	0.0	-0.0	-11.3	-12.7
14	466299.40	5021514.82	79.50	0	500	77.4	75.9	0.0	0.0	71.4	2.0	-1.6	0.0	0.0	12.4	0.0	-0.0	-6.9	-8.3
15	466299.40	5021514.82	79.50	0	1000	78.6	77.1	0.0	0.0	71.4	3.8	-2.0	0.0	0.0	15.2	0.0	-0.0	-9.9	-11.4
16	466299.40	5021514.82	79.50	0	2000	77.8	76.3	0.0	0.0	71.4	10.1	-2.0	0.0	0.0	17.9	0.0	-0.0	-19.7	-21.2
17	466299.40	5021514.82	79.50	0	4000	72.6	71.1	0.0	0.0	71.4	34.3	-2.0	0.0	0.0	20.8	0.0	-0.0	-51.9	-53.4
18	466299.40	5021514.82	79.50	0	8000	66.5	65.0	0.0	0.0	71.4	122.5	-2.0	0.0	0.0	23.7	0.0	-0.0	-149.1	-150.6
19	466104.10	5021439.37	79.50	0	32	31.7	30.2	0.0	0.0	69.7	0.0	-5.3	0.0	0.0	5.3	0.0	-0.0	-38.0	-39.5
20	466104.10	5021439.37	79.50	0	63	54.9	53.4	0.0	0.0	69.7	0.1	-5.3	0.0	0.0	5.3	0.0	-0.0	-14.9	-16.4
21	466104.10	5021439.37	79.50	0	125	66.0	64.5	0.0	0.0	69.7	0.4	3.3	0.0	0.0	1.2	0.0	-0.0	-8.6	-10.0
22	466104.10	5021439.37	79.50	0	250	69.5	68.0	0.0	0.0	69.7	0.9	1.7	0.0	0.0	3.6	0.0	-0.0	-6.4	-7.9
23	466104.10	5021439.37	79.50	0	500	76.9	75.4	0.0	0.0	69.7	1.7	-1.4	0.0	0.0	6.8	0.0	-0.0	0.1	-1.3
24	466104.10	5021439.37	79.50	0	1000	78.1	76.6	0.0	0.0	69.7	3.1	-1.8	0.0	0.0	9.1	0.0	-0.0	-2.0	-3.5
25	466104.10	5021439.37	79.50	0	2000	77.3	75.8	0.0	0.0	69.7	8.3	-1.8	0.0	0.0	11.5	0.0	-0.0	-10.4	-11.9
26	466104.10	5021439.37	79.50	0	4000	72.1	70.6	0.0	0.0	69.7	28.2	-1.8	0.0	0.0	14.2	0.0	-0.0	-38.2	-39.7
27	466104.10	5021439.37	79.50	0	8000	66.0	64.5	0.0	0.0	69.7	100.6	-1.8	0.0	0.0	17.0	0.0	-0.0	-119.5	-121.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 06", ID: "A_113"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466309.64	5021504.22	79.50	0	32	28.5	27.2	0.0	0.0	71.4	0.0	-5.4	0.0	0.0	13.0	0.0	-0.0	-50.5	-51.8
2	466309.64	5021504.22	79.50	0	63	51.7	50.4	0.0	0.0	71.4	0.1	-5.4	0.0	0.0	15.0	0.0	-0.0	-29.4	-30.7
3	466309.64	5021504.22	79.50	0	125	62.8	61.5	0.0	0.0	71.4	0.4	3.3	0.0	0.0	8.6	0.0	-0.0	-20.9	-22.2
4	466309.64	5021504.22	79.50	0	250	66.3	65.0	0.0	0.0	71.4	1.1	1.6	0.0	0.0	12.9	0.0	-0.0	-20.7	-21.9
5	466309.64	5021504.22	79.50	0	500	73.7	72.4	0.0	0.0	71.4	2.0	-1.6	0.0	0.0	18.8	0.0	-0.0	-17.0	-18.2
6	466309.64	5021504.22	79.50	0	1000	74.9	73.6	0.0	0.0	71.4	3.8	-2.0	0.0	0.0	22.1	0.0	-0.0	-20.5	-21.7
7	466309.64	5021504.22	79.50	0	2000	74.1	72.8	0.0	0.0	71.4	10.1	-2.0	0.0	0.0	25.1	0.0	-0.0	-30.5	-31.8
8	466309.64	5021504.22	79.50	0	4000	68.9	67.6	0.0	0.0	71.4	34.3	-2.0	0.0	0.0	27.0	0.0	-0.0	-61.8	-63.1
9	466309.64	5021504.22	79.50	0	8000	62.8	61.5	0.0	0.0	71.4	122.5	-2.0	0.0	0.0	27.0	0.0	-0.0	-156.1	-157.3

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 07", ID: "A_114"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466374.29	5021543.95	79.50	0	32	43.1	41.6	0.0	0.0	72.0	0.0	-5.4	0.0	0.0	10.5	0.0	-0.0	-34.0	-35.5
2	466374.29	5021543.95	79.50	0	63	66.3	64.8	0.0	0.0	72.0	0.1	-5.4	0.0	0.0	10.9	0.0	-0.0	-11.4	-12.8
3	466374.29	5021543.95	79.50	0	125	77.4	75.9	0.0	0.0	72.0	0.5	3.3	0.0	0.0	2.9	0.0	-0.0	-1.3	-2.8
4	466374.29	5021543.95	79.50	0	250	80.9	79.4	0.0	0.0	72.0	1.2	1.5	0.0	0.0	5.8	0.0	-0.0	0.3	-1.1
5	466374.29	5021543.95	79.50	0	500	88.3	86.8	0.0	0.0	72.0	2.2	-1.6	0.0	0.0	10.6	0.0	-0.0	5.1	3.6
6	466374.29	5021543.95	79.50	0	1000	89.5	88.0	0.0	0.0	72.0	4.1	-2.0	0.0	0.0	13.1	0.0	-0.0	2.2	0.8
7	466374.29	5021543.95	79.50	0	2000	88.7	87.2	0.0	0.0	72.0	10.8	-2.0	0.0	0.0	15.6	0.0	-0.0	-7.8	-9.2
8	466374.29	5021543.95	79.50	0	4000	83.5	82.0	0.0	0.0	72.0	36.8	-2.0	0.0	0.0	18.4	0.0	-0.0	-41.6	-43.1
9	466374.29	5021543.95	79.50	0	8000	77.4	75.9	0.0	0.0	72.0	131.1	-2.0	0.0	0.0	21.2	0.0	-0.0	-144.9	-146.4
10	466456.15	5021536.87	79.50	0	32	40.0	38.5	0.0	0.0	72.4	0.0	-5.5	0.0	0.0	18.3	0.0	-0.0	-45.3	-46.8
11	466456.15	5021536.87	79.50	0	63	63.2	61.7	0.0	0.0	72.4	0.1	-5.5	0.0	0.0	21.5	0.0	-0.0	-25.4	-26.9
12	466456.15	5021536.87	79.50	0	125	74.3	72.8	0.0	0.0	72.4	0.5	3.3	0.0	0.0	15.8	0.0	-0.0	-17.7	-19.1
13	466456.15	5021536.87	79.50	0	250	77.8	76.3	0.0	0.0	72.4	1.2	1.5	0.0	0.0	20.5	0.0	-0.0	-17.9	-19.4
14	466456.15	5021536.87	79.50	0	500	85.2	83.7	0.0	0.0	72.4	2.3	-1.7	0.0	0.0	26.7	0.0	-0.0	-14.5	-16.0
15	466456.15	5021536.87	79.50	0	1000	86.4	84.9	0.0	0.0	72.4	4.3	-2.0	0.0	0.0	27.1	0.0	-0.0	-15.4	-16.8
16	466456.15	5021536.87	79.50	0	2000	85.6	84.1	0.0	0.0	72.4	11.4	-2.1	0.0	0.0	27.1	0.0	-0.0	-23.2	-24.7
17	466456.15	5021536.87	79.50	0	4000	80.4	78.9	0.0	0.0	72.4	38.6	-2.1	0.0	0.0	27.1	0.0	-0.0	-55.7	-57.1
18	466456.15	5021536.87	79.50	0	8000	74.3	72.8	0.0	0.0	72.4	137.7	-2.1	0.0	0.0	27.1	0.0	-0.0	-160.9	-162.3
19	466484.10	5021461.76	79.50	0	32	40.8	39.3	0.0	0.0	72.2	0.0	-5.5	0.0	0.0	0.0	0.0	-0.0	-26.0	-27.5
20	466484.10	5021461.76	79.50	0	63	64.0	62.5	0.0	0.0	72.2	0.1	-5.5	0.0	0.0	0.0	0.0	-0.0	-2.9	-4.4
21	466484.10	5021461.76	79.50	0	125	75.1	73.6	0.0	0.0	72.2	0.5	3.3	0.0	0.0	0.0	0.0	-0.0	-0.9	-2.4
22	466484.10	5021461.76	79.50	0	250	78.6	77.1	0.0	0.0	72.2	1.2	1.5	0.0	0.0	0.0	0.0	-0.0	3.6	2.2
23	466484.10	5021461.76	79.50	0	500	86.0	84.5	0.0	0.0	72.2	2.2	-1.7	0.0	0.0	0.0	0.0	-0.0	13.2	11.7
24	466484.10	5021461.76	79.50	0	1000	87.2	85.7	0.0	0.0	72.2	4.2	-2.0	0.0	0.0	0.0	0.0	-0.0	12.8	11.3
25	466484.10	5021461.76	79.50	0	2000	86.4	84.9	0.0	0.0	72.2	11.2	-2.0	0.0	0.0	0.0	0.0	-0.0	5.0	3.6
26	466484.10	5021461.76	79.50	0	4000	81.2	79.7	0.0	0.0	72.2	37.8	-2.0	0.0	0.0	0.0	0.0	-0.0	-26.8	-28.3
27	466484.10	5021461.76	79.50	0	8000	75.1	73.6	0.0	0.0	72.2	134.8	-2.0	0.0	0.0	0.0	0.0	-0.0	-129.9	-131.4
28	466468.45	5021409.23	79.50	0	32	39.5	38.1	0.0	0.0	71.9	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-27.0	-28.4
29	466468.45	5021409.23	79.50	0	63	62.7	61.3	0.0	0.0	71.9	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-3.9	-5.3
30	466468.45	5021409.23	79.50	0	125	73.8	72.4	0.0	0.0	71.9	0.5	3.3	0.0	0.0	0.0	0.0	-0.0	-1.8	-3.3

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 07", ID: "A_114"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
31	466468.45	5021409.23	79.50	0	250	77.3	75.9	0.0	0.0	71.9	1.2	1.5	0.0	0.0	0.0	0.0	-0.0	2.7	1.3
32	466468.45	5021409.23	79.50	0	500	84.7	83.3	0.0	0.0	71.9	2.1	-1.6	0.0	0.0	0.0	0.0	-0.0	12.3	10.9
33	466468.45	5021409.23	79.50	0	1000	85.9	84.5	0.0	0.0	71.9	4.1	-2.0	0.0	0.0	0.0	0.0	-0.0	12.0	10.5
34	466468.45	5021409.23	79.50	0	2000	85.1	83.7	0.0	0.0	71.9	10.7	-2.0	0.0	0.0	0.0	0.0	-0.0	4.5	3.1
35	466468.45	5021409.23	79.50	0	4000	79.9	78.5	0.0	0.0	71.9	36.4	-2.0	0.0	0.0	0.0	0.0	-0.0	-26.3	-27.8
36	466468.45	5021409.23	79.50	0	8000	73.8	72.4	0.0	0.0	71.9	129.7	-2.0	0.0	0.0	0.0	0.0	-0.0	-125.8	-127.2
37	466448.27	5021371.57	79.50	0	32	38.9	37.4	0.0	0.0	71.6	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-27.3	-28.8
38	466448.27	5021371.57	79.50	0	63	62.1	60.6	0.0	0.0	71.6	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-4.2	-5.7
39	466448.27	5021371.57	79.50	0	125	73.2	71.7	0.0	0.0	71.6	0.4	3.3	0.0	0.0	0.0	0.0	-0.0	-2.2	-3.6
40	466448.27	5021371.57	79.50	0	250	76.7	75.2	0.0	0.0	71.6	1.1	1.6	0.0	0.0	0.0	0.0	-0.0	2.4	0.9
41	466448.27	5021371.57	79.50	0	500	84.1	82.6	0.0	0.0	71.6	2.1	-1.6	0.0	0.0	0.0	0.0	-0.0	12.0	10.5
42	466448.27	5021371.57	79.50	0	1000	85.3	83.8	0.0	0.0	71.6	3.9	-2.0	0.0	0.0	0.0	0.0	-0.0	11.7	10.3
43	466448.27	5021371.57	79.50	0	2000	84.5	83.0	0.0	0.0	71.6	10.4	-2.0	0.0	0.0	0.0	0.0	-0.0	4.5	3.0
44	466448.27	5021371.57	79.50	0	4000	79.3	77.8	0.0	0.0	71.6	35.1	-2.0	0.0	0.0	0.0	0.0	-0.0	-25.5	-26.9
45	466448.27	5021371.57	79.50	0	8000	73.2	71.7	0.0	0.0	71.6	125.3	-2.0	0.0	0.0	0.0	0.0	-0.0	-121.7	-123.2
46	466445.51	5021303.56	79.50	0	32	38.0	36.6	0.0	0.0	71.3	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-27.9	-29.4
47	466445.51	5021303.56	79.50	0	63	61.2	59.8	0.0	0.0	71.3	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-4.8	-6.3
48	466445.51	5021303.56	79.50	0	125	72.3	70.9	0.0	0.0	71.3	0.4	3.4	0.0	0.0	0.0	0.0	-0.0	-2.8	-4.3
49	466445.51	5021303.56	79.50	0	250	75.8	74.4	0.0	0.0	71.3	1.1	1.7	0.0	0.0	0.0	0.0	-0.0	1.7	0.3
50	466445.51	5021303.56	79.50	0	500	83.2	81.8	0.0	0.0	71.3	2.0	-1.4	0.0	0.0	0.0	0.0	-0.0	11.4	9.9
51	466445.51	5021303.56	79.50	0	1000	84.4	83.0	0.0	0.0	71.3	3.8	-1.8	0.0	0.0	0.0	0.0	-0.0	11.2	9.7
52	466445.51	5021303.56	79.50	0	2000	83.6	82.2	0.0	0.0	71.3	10.0	-1.8	0.0	0.0	0.0	0.0	-0.0	4.2	2.7
53	466445.51	5021303.56	79.50	0	4000	78.4	77.0	0.0	0.0	71.3	33.9	-1.8	0.0	0.0	0.0	0.0	-0.0	-24.9	-26.4
54	466445.51	5021303.56	79.50	0	8000	72.3	70.9	0.0	0.0	71.3	120.8	-1.8	0.0	0.0	0.0	0.0	-0.0	-117.9	-119.4
55	466461.72	5021331.22	79.50	0	32	35.9	34.5	0.0	0.0	71.5	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-30.2	-31.7
56	466461.72	5021331.22	79.50	0	63	59.1	57.7	0.0	0.0	71.5	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-7.1	-8.6
57	466461.72	5021331.22	79.50	0	125	70.2	68.8	0.0	0.0	71.5	0.4	3.4	0.0	0.0	0.0	0.0	-0.0	-5.1	-6.6
58	466461.72	5021331.22	79.50	0	250	73.7	72.3	0.0	0.0	71.5	1.1	1.7	0.0	0.0	0.0	0.0	-0.0	-0.6	-2.0
59	466461.72	5021331.22	79.50	0	500	81.1	79.7	0.0	0.0	71.5	2.0	-1.5	0.0	0.0	0.0	0.0	-0.0	9.1	7.6
60	466461.72	5021331.22	79.50	0	1000	82.3	80.9	0.0	0.0	71.5	3.9	-1.9	0.0	0.0	0.0	0.0	-0.0	8.8	7.4
61	466461.72	5021331.22	79.50	0	2000	81.5	80.1	0.0	0.0	71.5	10.3	-1.9	0.0	0.0	0.0	0.0	-0.0	1.7	0.2
62	466461.72	5021331.22	79.50	0	4000	76.3	74.9	0.0	0.0	71.5	34.8	-1.9	0.0	0.0	0.0	0.0	-0.0	-28.1	-29.5
63	466461.72	5021331.22	79.50	0	8000	70.2	68.8	0.0	0.0	71.5	124.1	-1.9	0.0	0.0	0.0	0.0	-0.0	-123.5	-124.9

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 08", ID: "A_115"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466433.69	5021268.80	79.50	0	32	32.4	30.6	0.0	0.0	71.0	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-33.3	-35.1
2	466433.69	5021268.80	79.50	0	63	55.6	53.8	0.0	0.0	71.0	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-10.2	-12.0
3	466433.69	5021268.80	79.50	0	125	66.7	64.9	0.0	0.0	71.0	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	-8.3	-10.0
4	466433.69	5021268.80	79.50	0	250	70.2	68.4	0.0	0.0	71.0	1.1	1.8	0.0	0.0	0.0	0.0	-0.0	-3.7	-5.5
5	466433.69	5021268.80	79.50	0	500	77.6	75.8	0.0	0.0	71.0	1.9	-1.4	0.0	0.0	0.0	0.0	-0.0	6.0	4.2
6	466433.69	5021268.80	79.50	0	1000	78.8	77.0	0.0	0.0	71.0	3.7	-1.7	0.0	0.0	0.0	0.0	-0.0	5.8	4.0
7	466433.69	5021268.80	79.50	0	2000	78.0	76.2	0.0	0.0	71.0	9.7	-1.8	0.0	0.0	0.0	0.0	-0.0	-1.0	-2.8
8	466433.69	5021268.80	79.50	0	4000	72.8	71.0	0.0	0.0	71.0	32.9	-1.8	0.0	0.0	0.0	0.0	-0.0	-29.5	-31.2
9	466433.69	5021268.80	79.50	0	8000	66.7	64.9	0.0	0.0	71.0	117.5	-1.8	0.0	0.0	0.0	0.0	-0.0	-120.1	-121.9

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 09", ID: "A_116"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466335.13	5021241.27	79.50	0	32	43.1	41.6	0.0	0.0	70.1	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-21.8	-23.2
2	466335.13	5021241.27	79.50	0	63	66.3	64.8	0.0	0.0	70.1	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	1.4	-0.1
3	466335.13	5021241.27	79.50	0	125	77.4	75.9	0.0	0.0	70.1	0.4	3.4	0.0	0.0	0.0	0.0	-0.0	3.5	2.0
4	466335.13	5021241.27	79.50	0	250	80.9	79.4	0.0	0.0	70.1	1.0	1.8	0.0	0.0	0.0	0.0	-0.0	8.0	6.5
5	466335.13	5021241.27	79.50	0	500	88.3	86.8	0.0	0.0	70.1	1.8	-1.3	0.0	0.0	0.0	0.0	-0.0	17.8	16.3
6	466335.13	5021241.27	79.50	0	1000	89.5	88.0	0.0	0.0	70.1	3.3	-1.7	0.0	0.0	0.0	0.0	-0.0	17.8	16.3
7	466335.13	5021241.27	79.50	0	2000	88.7	87.2	0.0	0.0	70.1	8.8	-1.7	0.0	0.0	0.0	0.0	-0.0	11.5	10.1
8	466335.13	5021241.27	79.50	0	4000	83.5	82.0	0.0	0.0	70.1	29.7	-1.7	0.0	0.0	0.0	0.0	-0.0	-14.6	-16.1
9	466335.13	5021241.27	79.50	0	8000	77.4	75.9	0.0	0.0	70.1	106.0	-1.7	0.0	0.0	0.0	0.0	-0.0	-97.0	-98.4
10	466405.37	5021278.73	79.50	0	32	39.3	37.9	0.0	0.0	70.9	0.0	-5.4	0.0	0.0	0.0	0.0	-0.0	-26.2	-27.7
11	466405.37	5021278.73	79.50	0	63	62.5	61.1	0.0	0.0	70.9	0.1	-5.4	0.0	0.0	0.0	0.0	-0.0	-3.1	-4.6
12	466405.37	5021278.73	79.50	0	125	73.6	72.2	0.0	0.0	70.9	0.4	3.4	0.0	0.0	0.0	0.0	-0.0	-1.1	-2.6
13	466405.37	5021278.73	79.50	0	250	77.1	75.7	0.0	0.0	70.9	1.0	1.8	0.0	0.0	0.0	0.0	-0.0	3.4	2.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 09", ID: "A_116"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
14	466405.37	5021278.73	79.50	0	500	84.5	83.1	0.0	0.0	70.9	1.9	-1.4	0.0	0.0	0.0	0.0	-0.0	13.1	11.7
15	466405.37	5021278.73	79.50	0	1000	85.7	84.3	0.0	0.0	70.9	3.6	-1.8	0.0	0.0	0.0	0.0	-0.0	13.0	11.6
16	466405.37	5021278.73	79.50	0	2000	84.9	83.5	0.0	0.0	70.9	9.5	-1.8	0.0	0.0	0.0	0.0	-0.0	6.3	4.8
17	466405.37	5021278.73	79.50	0	4000	79.7	78.3	0.0	0.0	70.9	32.3	-1.8	0.0	0.0	0.0	0.0	-0.0	-21.7	-23.1
18	466405.37	5021278.73	79.50	0	8000	73.6	72.2	0.0	0.0	70.9	115.3	-1.8	0.0	0.0	0.0	0.0	-0.0	-110.7	-112.2
19	466280.93	5021212.37	79.50	0	32	32.8	31.4	0.0	0.0	69.5	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-31.5	-32.9
20	466280.93	5021212.37	79.50	0	63	56.0	54.6	0.0	0.0	69.5	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	-8.4	-9.8
21	466280.93	5021212.37	79.50	0	125	67.1	65.7	0.0	0.0	69.5	0.4	3.4	0.0	0.0	0.0	0.0	-0.0	-6.1	-7.6
22	466280.93	5021212.37	79.50	0	250	70.6	69.2	0.0	0.0	69.5	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	-1.7	-3.1
23	466280.93	5021212.37	79.50	0	500	78.0	76.6	0.0	0.0	69.5	1.6	-1.3	0.0	0.0	0.0	0.0	-0.0	8.2	6.7
24	466280.93	5021212.37	79.50	0	1000	79.2	77.8	0.0	0.0	69.5	3.1	-1.7	0.0	0.0	0.0	0.0	-0.0	8.3	6.8
25	466280.93	5021212.37	79.50	0	2000	78.4	77.0	0.0	0.0	69.5	8.2	-1.7	0.0	0.0	0.0	0.0	-0.0	2.4	1.0
26	466280.93	5021212.37	79.50	0	4000	73.2	71.8	0.0	0.0	69.5	27.7	-1.7	0.0	0.0	0.0	0.0	-0.0	-22.3	-23.8
27	466280.93	5021212.37	79.50	0	8000	67.1	65.7	0.0	0.0	69.5	98.8	-1.7	0.0	0.0	0.0	0.0	-0.0	-99.5	-101.0
28	466273.55	5021208.43	79.50	0	32	30.5	29.1	0.0	0.0	69.5	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-33.7	-35.2
29	466273.55	5021208.43	79.50	0	63	53.7	52.3	0.0	0.0	69.5	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	-10.6	-12.1
30	466273.55	5021208.43	79.50	0	125	64.8	63.4	0.0	0.0	69.5	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	-8.4	-9.8
31	466273.55	5021208.43	79.50	0	250	68.3	66.9	0.0	0.0	69.5	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	-3.9	-5.3
32	466273.55	5021208.43	79.50	0	500	75.7	74.3	0.0	0.0	69.5	1.6	-1.3	0.0	0.0	0.0	0.0	-0.0	5.9	4.5
33	466273.55	5021208.43	79.50	0	1000	76.9	75.5	0.0	0.0	69.5	3.1	-1.7	0.0	0.0	0.0	0.0	-0.0	6.1	4.6
34	466273.55	5021208.43	79.50	0	2000	76.1	74.7	0.0	0.0	69.5	8.1	-1.7	0.0	0.0	0.0	0.0	-0.0	0.3	-1.2
35	466273.55	5021208.43	79.50	0	4000	70.9	69.5	0.0	0.0	69.5	27.4	-1.7	0.0	0.0	0.0	0.0	-0.0	-24.3	-25.7
36	466273.55	5021208.43	79.50	0	8000	64.8	63.4	0.0	0.0	69.5	97.8	-1.7	0.0	0.0	0.0	0.0	-0.0	-100.8	-102.2

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 10", ID: "A_117"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466274.80	5021196.09	79.50	0	32	33.2	31.8	0.0	0.0	69.4	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-31.0	-32.4
2	466274.80	5021196.09	79.50	0	63	56.4	55.0	0.0	0.0	69.4	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-7.8	-9.3
3	466274.80	5021196.09	79.50	0	125	67.5	66.1	0.0	0.0	69.4	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	-5.6	-7.1
4	466274.80	5021196.09	79.50	0	250	71.0	69.6	0.0	0.0	69.4	0.9	1.9	0.0	0.0	0.0	0.0	-0.0	-1.2	-2.6
5	466274.80	5021196.09	79.50	0	500	78.4	77.0	0.0	0.0	69.4	1.6	-1.2	0.0	0.0	0.0	0.0	-0.0	8.7	7.2
6	466274.80	5021196.09	79.50	0	1000	79.6	78.2	0.0	0.0	69.4	3.0	-1.6	0.0	0.0	0.0	0.0	-0.0	8.8	7.3
7	466274.80	5021196.09	79.50	0	2000	78.8	77.4	0.0	0.0	69.4	8.0	-1.6	0.0	0.0	0.0	0.0	-0.0	3.0	1.6
8	466274.80	5021196.09	79.50	0	4000	73.6	72.2	0.0	0.0	69.4	27.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-21.4	-22.9
9	466274.80	5021196.09	79.50	0	8000	67.5	66.1	0.0	0.0	69.4	97.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-97.4	-98.9

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 11", ID: "A_118"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466230.89	5021186.14	79.50	0	32	43.9	42.3	0.0	0.0	68.9	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-19.9	-21.5
2	466230.89	5021186.14	79.50	0	63	67.1	65.5	0.0	0.0	68.9	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	3.3	1.7
3	466230.89	5021186.14	79.50	0	125	78.2	76.6	0.0	0.0	68.9	0.3	3.3	0.0	0.0	0.0	0.0	-0.0	5.6	4.0
4	466230.89	5021186.14	79.50	0	250	81.7	80.1	0.0	0.0	68.9	0.8	1.9	0.0	0.0	0.0	0.0	-0.0	10.0	8.4
5	466230.89	5021186.14	79.50	0	500	89.1	87.5	0.0	0.0	68.9	1.5	-1.3	0.0	0.0	0.0	0.0	-0.0	19.9	18.3
6	466230.89	5021186.14	79.50	0	1000	90.3	88.7	0.0	0.0	68.9	2.9	-1.6	0.0	0.0	0.0	0.0	-0.0	20.1	18.5
7	466230.89	5021186.14	79.50	0	2000	89.5	87.9	0.0	0.0	68.9	7.6	-1.7	0.0	0.0	0.0	0.0	-0.0	14.6	13.0
8	466230.89	5021186.14	79.50	0	4000	84.3	82.7	0.0	0.0	68.9	25.9	-1.7	0.0	0.0	0.0	0.0	-0.0	-8.8	-10.5
9	466230.89	5021186.14	79.50	0	8000	78.2	76.6	0.0	0.0	68.9	92.2	-1.7	0.0	0.0	0.0	0.0	-0.0	-81.3	-82.9
10	466170.18	5021154.43	79.50	0	32	41.1	39.5	0.0	0.0	68.1	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-21.9	-23.6
11	466170.18	5021154.43	79.50	0	63	64.3	62.7	0.0	0.0	68.1	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	1.2	-0.4
12	466170.18	5021154.43	79.50	0	125	75.4	73.8	0.0	0.0	68.1	0.3	3.3	0.0	0.0	0.0	0.0	-0.0	3.7	2.1
13	466170.18	5021154.43	79.50	0	250	78.9	77.3	0.0	0.0	68.1	0.8	2.0	0.0	0.0	0.0	0.0	-0.0	8.0	6.4
14	466170.18	5021154.43	79.50	0	500	86.3	84.7	0.0	0.0	68.1	1.4	-1.2	0.0	0.0	0.0	0.0	-0.0	17.9	16.3
15	466170.18	5021154.43	79.50	0	1000	87.5	85.9	0.0	0.0	68.1	2.6	-1.6	0.0	0.0	0.0	0.0	-0.0	18.3	16.7
16	466170.18	5021154.43	79.50	0	2000	86.7	85.1	0.0	0.0	68.1	7.0	-1.6	0.0	0.0	0.0	0.0	-0.0	13.2	11.6
17	466170.18	5021154.43	79.50	0	4000	81.5	79.9	0.0	0.0	68.1	23.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-8.7	-10.3
18	466170.18	5021154.43	79.50	0	8000	75.4	73.8	0.0	0.0	68.1	84.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-75.4	-77.0

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 13", ID: "A_119"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	466071.56	5021215.34	79.50	0	32	26.1	26.1	0.0	0.0	67.6	0.0	-5.1	0.0	0.0	5.1	0.0	-0.0	-41.5	-41.5

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 13", ID: "A_119"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
2	466071.56	5021215.34	79.50	0	63	49.3	49.3	0.0	0.0	67.6	0.1	-5.1	0.0	0.0	5.1	0.0	-0.0	-18.4	-18.4
3	466071.56	5021215.34	79.50	0	125	60.4	60.4	0.0	0.0	67.6	0.3	3.0	0.0	0.0	0.5	0.0	-0.0	-11.0	-11.0
4	466071.56	5021215.34	79.50	0	250	63.9	63.9	0.0	0.0	67.6	0.7	1.9	0.0	0.0	1.7	0.0	-0.0	-8.0	-8.0
5	466071.56	5021215.34	79.50	0	500	71.3	71.3	0.0	0.0	67.6	1.3	-1.3	0.0	0.0	4.5	0.0	-0.0	-0.8	-0.8
6	466071.56	5021215.34	79.50	0	1000	72.5	72.5	0.0	0.0	67.6	2.5	-1.7	0.0	0.0	5.4	0.0	-0.0	-1.3	-1.3
7	466071.56	5021215.34	79.50	0	2000	71.7	71.7	0.0	0.0	67.6	6.5	-1.7	0.0	0.0	5.9	0.0	-0.0	-6.6	-6.6
8	466071.56	5021215.34	79.50	0	4000	66.5	66.5	0.0	0.0	67.6	22.2	-1.7	0.0	0.0	6.1	0.0	-0.0	-27.7	-27.7
9	466071.56	5021215.34	79.50	0	8000	60.4	60.4	0.0	0.0	67.6	79.1	-1.7	0.0	0.0	6.3	0.0	-0.0	-90.9	-90.9
10	465963.84	5021171.40	79.50	0	32	30.4	30.4	0.0	0.0	66.1	0.0	-4.9	0.0	0.0	0.0	0.0	-0.0	-30.8	-30.8
11	465963.84	5021171.40	79.50	0	63	53.6	53.6	0.0	0.0	66.1	0.1	-4.9	0.0	0.0	0.0	0.0	-0.0	-7.6	-7.6
12	465963.84	5021171.40	79.50	0	125	64.7	64.7	0.0	0.0	66.1	0.2	2.9	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
13	465963.84	5021171.40	79.50	0	250	68.2	68.2	0.0	0.0	66.1	0.6	2.0	0.0	0.0	0.0	0.0	-0.0	-0.5	-0.5
14	465963.84	5021171.40	79.50	0	500	75.6	75.6	0.0	0.0	66.1	1.1	-1.1	0.0	0.0	0.0	0.0	-0.0	9.6	9.6
15	465963.84	5021171.40	79.50	0	1000	76.8	76.8	0.0	0.0	66.1	2.1	-1.5	0.0	0.0	0.0	0.0	-0.0	10.2	10.2
16	465963.84	5021171.40	79.50	0	2000	76.0	76.0	0.0	0.0	66.1	5.5	-1.5	0.0	0.0	0.0	0.0	-0.0	6.0	6.0
17	465963.84	5021171.40	79.50	0	4000	70.8	70.8	0.0	0.0	66.1	18.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-12.4	-12.4
18	465963.84	5021171.40	79.50	0	8000	64.7	64.7	0.0	0.0	66.1	66.4	-1.5	0.0	0.0	0.0	0.0	-0.0	-66.2	-66.2
19	465847.18	5021236.34	79.50	0	32	31.3	31.3	0.0	0.0	65.7	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-29.6	-29.6
20	465847.18	5021236.34	79.50	0	63	54.5	54.5	0.0	0.0	65.7	0.1	-4.8	0.0	0.0	0.0	0.0	-0.0	-6.4	-6.4
21	465847.18	5021236.34	79.50	0	125	65.6	65.6	0.0	0.0	65.7	0.2	3.7	0.0	0.0	0.0	0.0	-0.0	-4.0	-4.0
22	465847.18	5021236.34	79.50	0	250	69.1	69.1	0.0	0.0	65.7	0.6	3.1	0.0	0.0	0.0	0.0	-0.0	-0.3	-0.3
23	465847.18	5021236.34	79.50	0	500	76.5	76.5	0.0	0.0	65.7	1.1	-0.7	0.0	0.0	0.0	0.0	-0.0	10.4	10.4
24	465847.18	5021236.34	79.50	0	1000	77.7	77.7	0.0	0.0	65.7	2.0	-1.2	0.0	0.0	0.0	0.0	-0.0	11.2	11.2
25	465847.18	5021236.34	79.50	0	2000	76.9	76.9	0.0	0.0	65.7	5.3	-1.2	0.0	0.0	0.0	0.0	-0.0	7.1	7.1
26	465847.18	5021236.34	79.50	0	4000	71.7	71.7	0.0	0.0	65.7	17.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-10.7	-10.7
27	465847.18	5021236.34	79.50	0	8000	65.6	65.6	0.0	0.0	65.7	63.7	-1.2	0.0	0.0	0.0	0.0	-0.0	-62.6	-62.6
28	465945.82	5021267.44	79.50	0	32	31.0	31.0	0.0	0.0	67.0	0.0	-5.0	0.0	0.0	0.0	0.0	-0.0	-31.0	-31.0
29	465945.82	5021267.44	79.50	0	63	54.2	54.2	0.0	0.0	67.0	0.1	-5.0	0.0	0.0	0.0	0.0	-0.0	-7.9	-7.9
30	465945.82	5021267.44	79.50	0	125	65.3	65.3	0.0	0.0	67.0	0.3	3.0	0.0	0.0	0.0	0.0	-0.0	-5.0	-5.0
31	465945.82	5021267.44	79.50	0	250	68.8	68.8	0.0	0.0	67.0	0.7	2.0	0.0	0.0	0.0	0.0	-0.0	-0.8	-0.8
32	465945.82	5021267.44	79.50	0	500	76.2	76.2	0.0	0.0	67.0	1.2	-1.2	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
33	465945.82	5021267.44	79.50	0	1000	77.4	77.4	0.0	0.0	67.0	2.3	-1.6	0.0	0.0	0.0	0.0	-0.0	9.7	9.7
34	465945.82	5021267.44	79.50	0	2000	76.6	76.6	0.0	0.0	67.0	6.1	-1.6	0.0	0.0	0.0	0.0	-0.0	5.1	5.1
35	465945.82	5021267.44	79.50	0	4000	71.4	71.4	0.0	0.0	67.0	20.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-14.6	-14.6
36	465945.82	5021267.44	79.50	0	8000	65.3	65.3	0.0	0.0	67.0	73.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-73.5	-73.5
37	465852.93	5021350.18	79.50	0	32	27.9	27.9	0.0	0.0	67.2	0.0	-5.0	0.0	0.0	0.0	0.0	-0.0	-34.3	-34.3
38	465852.93	5021350.18	79.50	0	63	51.1	51.1	0.0	0.0	67.2	0.1	-5.0	0.0	0.0	0.0	0.0	-0.0	-11.2	-11.2
39	465852.93	5021350.18	79.50	0	125	62.2	62.2	0.0	0.0	67.2	0.3	3.2	0.0	0.0	0.0	0.0	-0.0	-8.5	-8.5
40	465852.93	5021350.18	79.50	0	250	65.7	65.7	0.0	0.0	67.2	0.7	2.1	0.0	0.0	0.0	0.0	-0.0	-4.3	-4.3
41	465852.93	5021350.18	79.50	0	500	73.1	73.1	0.0	0.0	67.2	1.3	-1.1	0.0	0.0	0.0	0.0	-0.0	5.7	5.7
42	465852.93	5021350.18	79.50	0	1000	74.3	74.3	0.0	0.0	67.2	2.4	-1.5	0.0	0.0	0.0	0.0	-0.0	6.2	6.2
43	465852.93	5021350.18	79.50	0	2000	73.5	73.5	0.0	0.0	67.2	6.3	-1.5	0.0	0.0	0.0	0.0	-0.0	1.5	1.5
44	465852.93	5021350.18	79.50	0	4000	68.3	68.3	0.0	0.0	67.2	21.2	-1.5	0.0	0.0	0.0	0.0	-0.0	-18.7	-18.7
45	465852.93	5021350.18	79.50	0	8000	62.2	62.2	0.0	0.0	67.2	75.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-79.2	-79.2
46	465908.91	5021363.85	79.50	0	32	19.8	19.8	0.0	0.0	67.7	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-42.9	-42.9
47	465908.91	5021363.85	79.50	0	63	43.0	43.0	0.0	0.0	67.7	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	-19.7	-19.7
48	465908.91	5021363.85	79.50	0	125	54.1	54.1	0.0	0.0	67.7	0.3	3.2	0.0	0.0	0.0	0.0	-0.0	-17.1	-17.1
49	465908.91	5021363.85	79.50	0	250	57.6	57.6	0.0	0.0	67.7	0.7	2.0	0.0	0.0	0.0	0.0	-0.0	-12.8	-12.8
50	465908.91	5021363.85	79.50	0	500	65.0	65.0	0.0	0.0	67.7	1.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-2.8	-2.8
51	465908.91	5021363.85	79.50	0	1000	66.2	66.2	0.0	0.0	67.7	2.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-2.4	-2.4
52	465908.91	5021363.85	79.50	0	2000	65.4	65.4	0.0	0.0	67.7	6.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-7.4	-7.4
53	465908.91	5021363.85	79.50	0	4000	60.2	60.2	0.0	0.0	67.7	22.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-28.4	-28.4
54	465908.91	5021363.85	79.50	0	8000	54.1	54.1	0.0	0.0	67.7	80.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-92.2	-92.2
55	466107.87	5021230.15	79.50	0	32	20.0	20.0	0.0	0.0	68.1	0.0	-5.1	0.0	0.0	5.1	0.0	-0.0	-48.1	-48.1
56	466107.87	5021230.15	79.50	0	63	43.2	43.2	0.0	0.0	68.1	0.1	-5.1	0.0	0.0	5.1	0.0	-0.0	-25.0	-25.0
57	466107.87	5021230.15	79.50	0	125	54.3	54.3	0.0	0.0	68.1	0.3	3.1	0.0	0.0	0.6	0.0	-0.0	-17.8	-17.8
58	466107.87	5021230.15	79.50	0	250	57.8	57.8	0.0	0.0	68.1	0.8	1.8	0.0	0.0	2.0	0.0	-0.0	-14.9	-14.9
59	466107.87	5021230.15	79.50	0	500	65.2	65.2	0.0	0.0	68.1	1.4	-1.3	0.0	0.0	5.1	0.0	-0.0	-8.0	-8.0
60	466107.87	5021230.15	79.50	0	1000	66.4	66.4	0.0	0.0	68.1	2.6	-1.7	0.0	0.0	5.9	0.0	-0.0	-8.5	-8.5
61	466107.87	5021230.15	79.50	0	2000	65.6	65.6	0.0	0.0	68.1	6.9	-1.7	0.0	0.0	6.2	0.0	-0.0	-13.9	-13.9
62	466107.87	5021230.15	79.50	0	4000	60.4	60.4	0.0	0.0	68.1	23.4	-1.7	0.0	0.0	6.3	0.0	-0.0	-35.7	-35.7
63	466107.87	5021230.15	79.50	0	8000	54.3	54.3	0.0	0.0	68.1	83.5	-1.7	0.0	0.0	6.4	0.0	-0.0	-102.0	-102.0
64	465901.56	5021368.89	79.50	0	32	18.2	18.2	0.0	0.0	67.7	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-44.5	-44.5

Line Source, ISO 9613, Name: "Truck Movements - Road Segment 13", ID: "A_119"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
65	465901.56	5021368.89	79.50	0	63	41.4	41.4	0.0	0.0	67.7	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	-21.4	-21.4
66	465901.56	5021368.89	79.50	0	125	52.5	52.5	0.0	0.0	67.7	0.3	3.2	0.0	0.0	0.0	0.0	-0.0	-18.7	-18.7
67	465901.56	5021368.89	79.50	0	250	56.0	56.0	0.0	0.0	67.7	0.7	2.0	0.0	0.0	0.0	0.0	-0.0	-14.4	-14.4
68	465901.56	5021368.89	79.50	0	500	63.4	63.4	0.0	0.0	67.7	1.3	-1.2	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
69	465901.56	5021368.89	79.50	0	1000	64.6	64.6	0.0	0.0	67.7	2.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-4.1	-4.1
70	465901.56	5021368.89	79.50	0	2000	63.8	63.8	0.0	0.0	67.7	6.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-9.0	-9.0
71	465901.56	5021368.89	79.50	0	4000	58.6	58.6	0.0	0.0	67.7	22.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-30.1	-30.1
72	465901.56	5021368.89	79.50	0	8000	52.5	52.5	0.0	0.0	67.7	80.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-93.9	-93.9

Line Source, ISO 9613, Name: "Leachate Truck Movements", ID: "A_120"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	465500.88	5020871.70	79.50	0	32	36.7	36.7	0.0	0.0	52.1	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-12.4	-12.4
2	465500.88	5020871.70	79.50	0	63	54.9	54.9	0.0	0.0	52.1	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	5.8	5.8
3	465500.88	5020871.70	79.50	0	125	66.0	66.0	0.0	0.0	52.1	0.1	2.6	0.0	0.0	0.0	0.0	-0.0	11.3	11.3
4	465500.88	5020871.70	79.50	0	250	69.5	69.5	0.0	0.0	52.1	0.1	3.9	0.0	0.0	0.0	0.0	-0.0	13.4	13.4
5	465500.88	5020871.70	79.50	0	500	69.9	69.9	0.0	0.0	52.1	0.2	-0.0	0.0	0.0	0.0	0.0	-0.0	17.6	17.6
6	465500.88	5020871.70	79.50	0	1000	77.1	77.1	0.0	0.0	52.1	0.4	-0.6	0.0	0.0	0.0	0.0	-0.0	25.2	25.2
7	465500.88	5020871.70	79.50	0	2000	77.3	77.3	0.0	0.0	52.1	1.1	-0.6	0.0	0.0	0.0	0.0	-0.0	24.7	24.7
8	465500.88	5020871.70	79.50	0	4000	72.1	72.1	0.0	0.0	52.1	3.7	-0.6	0.0	0.0	0.0	0.0	-0.0	16.9	16.9
9	465500.88	5020871.70	79.50	0	8000	66.0	66.0	0.0	0.0	52.1	13.3	-0.6	0.0	0.0	0.0	0.0	-0.0	1.3	1.3
10	465531.07	5020883.17	79.50	0	32	36.7	36.7	0.0	0.0	52.0	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-12.3	-12.3
11	465531.07	5020883.17	79.50	0	63	54.9	54.9	0.0	0.0	52.0	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	5.9	5.9
12	465531.07	5020883.17	79.50	0	125	66.0	66.0	0.0	0.0	52.0	0.1	2.6	0.0	0.0	0.0	0.0	-0.0	11.3	11.3
13	465531.07	5020883.17	79.50	0	250	69.5	69.5	0.0	0.0	52.0	0.1	3.9	0.0	0.0	0.0	0.0	-0.0	13.5	13.5
14	465531.07	5020883.17	79.50	0	500	69.9	69.9	0.0	0.0	52.0	0.2	-0.0	0.0	0.0	0.0	0.0	-0.0	17.7	17.7
15	465531.07	5020883.17	79.50	0	1000	77.1	77.1	0.0	0.0	52.0	0.4	-0.6	0.0	0.0	0.0	0.0	-0.0	25.3	25.3
16	465531.07	5020883.17	79.50	0	2000	77.3	77.3	0.0	0.0	52.0	1.1	-0.6	0.0	0.0	0.0	0.0	-0.0	24.8	24.8
17	465531.07	5020883.17	79.50	0	4000	72.1	72.1	0.0	0.0	52.0	3.7	-0.6	0.0	0.0	0.0	0.0	-0.0	17.0	17.0
18	465531.07	5020883.17	79.50	0	8000	66.0	66.0	0.0	0.0	52.0	13.2	-0.6	0.0	0.0	0.0	0.0	-0.0	1.4	1.4
19	465561.26	5020894.64	79.50	0	32	36.7	36.7	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-12.9	-12.9
20	465561.26	5020894.64	79.50	0	63	54.9	54.9	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	5.3	5.3
21	465561.26	5020894.64	79.50	0	125	66.0	66.0	0.0	0.0	52.6	0.1	2.7	0.0	0.0	0.0	0.0	-0.0	10.6	10.6
22	465561.26	5020894.64	79.50	0	250	69.5	69.5	0.0	0.0	52.6	0.1	4.0	0.0	0.0	0.0	0.0	-0.0	12.8	12.8
23	465561.26	5020894.64	79.50	0	500	69.9	69.9	0.0	0.0	52.6	0.2	-0.0	0.0	0.0	0.0	0.0	-0.0	17.1	17.1
24	465561.26	5020894.64	79.50	0	1000	77.1	77.1	0.0	0.0	52.6	0.4	-0.6	0.0	0.0	0.0	0.0	-0.0	24.6	24.6
25	465561.26	5020894.64	79.50	0	2000	77.3	77.3	0.0	0.0	52.6	1.2	-0.6	0.0	0.0	0.0	0.0	-0.0	24.1	24.1
26	465561.26	5020894.64	79.50	0	4000	72.1	72.1	0.0	0.0	52.6	4.0	-0.6	0.0	0.0	0.0	0.0	-0.0	16.1	16.1
27	465561.26	5020894.64	79.50	0	8000	66.0	66.0	0.0	0.0	52.6	14.1	-0.6	0.0	0.0	0.0	0.0	-0.0	-0.1	-0.1
28	465591.46	5020906.12	79.50	0	32	36.7	36.7	0.0	0.0	53.7	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-14.0	-14.0
29	465591.46	5020906.12	79.50	0	63	54.9	54.9	0.0	0.0	53.7	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	4.2	4.2
30	465591.46	5020906.12	79.50	0	125	66.0	66.0	0.0	0.0	53.7	0.1	2.8	0.0	0.0	0.0	0.0	-0.0	9.5	9.5
31	465591.46	5020906.12	79.50	0	250	69.5	69.5	0.0	0.0	53.7	0.1	4.1	0.0	0.0	0.0	0.0	-0.0	11.6	11.6
32	465591.46	5020906.12	79.50	0	500	69.9	69.9	0.0	0.0	53.7	0.3	-0.0	0.0	0.0	0.0	0.0	-0.0	16.0	16.0
33	465591.46	5020906.12	79.50	0	1000	77.1	77.1	0.0	0.0	53.7	0.5	-0.6	0.0	0.0	0.0	0.0	-0.0	23.5	23.5
34	465591.46	5020906.12	79.50	0	2000	77.3	77.3	0.0	0.0	53.7	1.3	-0.6	0.0	0.0	0.0	0.0	-0.0	22.9	22.9
35	465591.46	5020906.12	79.50	0	4000	72.1	72.1	0.0	0.0	53.7	4.5	-0.6	0.0	0.0	0.0	0.0	-0.0	14.6	14.6
36	465591.46	5020906.12	79.50	0	8000	66.0	66.0	0.0	0.0	53.7	15.9	-0.6	0.0	0.0	0.0	0.0	-0.0	-3.0	-3.0
37	465636.75	5020923.33	79.50	0	32	39.7	39.7	0.0	0.0	55.5	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	-12.8	-12.8
38	465636.75	5020923.33	79.50	0	63	57.9	57.9	0.0	0.0	55.5	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	5.3	5.3
39	465636.75	5020923.33	79.50	0	125	69.0	69.0	0.0	0.0	55.5	0.1	3.0	0.0	0.0	0.0	0.0	-0.0	10.4	10.4
40	465636.75	5020923.33	79.50	0	250	72.5	72.5	0.0	0.0	55.5	0.2	4.3	0.0	0.0	0.0	0.0	-0.0	12.5	12.5
41	465636.75	5020923.33	79.50	0	500	72.9	72.9	0.0	0.0	55.5	0.3	0.0	0.0	0.0	0.0	0.0	-0.0	17.0	17.0
42	465636.75	5020923.33	79.50	0	1000	80.1	80.1	0.0	0.0	55.5	0.6	-0.6	0.0	0.0	0.0	0.0	-0.0	24.5	24.5
43	465636.75	5020923.33	79.50	0	2000	80.3	80.3	0.0	0.0	55.5	1.6	-0.6	0.0	0.0	0.0	0.0	-0.0	23.7	23.7
44	465636.75	5020923.33	79.50	0	4000	75.1	75.1	0.0	0.0	55.5	5.5	-0.6	0.0	0.0	0.0	0.0	-0.0	14.6	14.6
45	465636.75	5020923.33	79.50	0	8000	69.0	69.0	0.0	0.0	55.5	19.7	-0.6	0.0	0.0	0.0	0.0	-0.0	-5.6	-5.6
46	465697.13	5020946.27	79.50	0	32	39.7	39.7	0.0	0.0	57.9	0.0	-3.1	0.0	0.0	0.0	0.0	-0.0	-15.0	-15.0
47	465697.13	5020946.27	79.50	0	63	57.9	57.9	0.0	0.0	57.9	0.0	-3.1	0.0	0.0	0.0	0.0	-0.0	3.1	3.1
48	465697.13	5020946.27	79.50	0	125	69.0	69.0	0.0	0.0	57.9	0.1	3.2	0.0	0.0	0.0	0.0	-0.0	7.8	7.8
49	465697.13	5020946.27	79.50	0	250	72.5	72.5	0.0	0.0	57.9	0.2	4.3	0.0	0.0	0.0	0.0	-0.0	10.0	10.0
50	465697.13	5020946.27	79.50	0	500	72.9	72.9	0.0	0.0	57.9	0.4	-0.0	0.0	0.0	0.0	0.0	-0.0	14.6	14.6
51	465697.13	5020946.27	79.50	0	1000	80.1	80.1	0.0	0.0	57.9	0.8	-0.6	0.0	0.0	0.0	0.0	-0.0	22.0	22.0

Line Source, ISO 9613, Name: "Leachate Truck Movements", ID: "A_120"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
52	465697.13	5020946.27	79.50	0	2000	80.3	80.3	0.0	0.0	57.9	2.1	-0.6	0.0	0.0	0.0	0.0	-0.0	20.9	20.9
53	465697.13	5020946.27	79.50	0	4000	75.1	75.1	0.0	0.0	57.9	7.3	-0.6	0.0	0.0	0.0	0.0	-0.0	10.6	10.6
54	465697.13	5020946.27	79.50	0	8000	69.0	69.0	0.0	0.0	57.9	25.9	-0.6	0.0	0.0	0.0	0.0	-0.0	-14.1	-14.1
55	465787.72	5020980.69	79.50	0	32	42.7	42.7	0.0	0.0	60.8	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-14.1	-14.1
56	465787.72	5020980.69	79.50	0	63	60.9	60.9	0.0	0.0	60.8	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	4.0	4.0
57	465787.72	5020980.69	79.50	0	125	72.0	72.0	0.0	0.0	60.8	0.1	3.4	0.0	0.0	0.0	0.0	-0.0	7.7	7.7
58	465787.72	5020980.69	79.50	0	250	75.5	75.5	0.0	0.0	60.8	0.3	4.2	0.0	0.0	0.0	0.0	-0.0	10.2	10.2
59	465787.72	5020980.69	79.50	0	500	75.9	75.9	0.0	0.0	60.8	0.6	-0.2	0.0	0.0	0.0	0.0	-0.0	14.7	14.7
60	465787.72	5020980.69	79.50	0	1000	83.1	83.1	0.0	0.0	60.8	1.1	-0.8	0.0	0.0	0.0	0.0	-0.0	22.0	22.0
61	465787.72	5020980.69	79.50	0	2000	83.3	83.3	0.0	0.0	60.8	3.0	-0.8	0.0	0.0	0.0	0.0	-0.0	20.3	20.3
62	465787.72	5020980.69	79.50	0	4000	78.1	78.1	0.0	0.0	60.8	10.1	-0.8	0.0	0.0	0.0	0.0	-0.0	8.0	8.0
63	465787.72	5020980.69	79.50	0	8000	72.0	72.0	0.0	0.0	60.8	36.1	-0.8	0.0	0.0	0.0	0.0	-0.0	-24.1	-24.1
64	465908.49	5021026.58	79.50	0	32	42.7	42.7	0.0	0.0	63.7	0.0	-4.5	0.0	0.0	0.0	0.0	-0.0	-16.5	-16.5
65	465908.49	5021026.58	79.50	0	63	60.9	60.9	0.0	0.0	63.7	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	1.7	1.7
66	465908.49	5021026.58	79.50	0	125	72.0	72.0	0.0	0.0	63.7	0.2	3.7	0.0	0.0	0.0	0.0	-0.0	4.4	4.4
67	465908.49	5021026.58	79.50	0	250	75.5	75.5	0.0	0.0	63.7	0.5	3.8	0.0	0.0	0.0	0.0	-0.0	7.5	7.5
68	465908.49	5021026.58	79.50	0	500	75.9	75.9	0.0	0.0	63.7	0.8	-0.4	0.0	0.0	0.0	0.0	-0.0	11.8	11.8
69	465908.49	5021026.58	79.50	0	1000	83.1	83.1	0.0	0.0	63.7	1.6	-1.0	0.0	0.0	0.0	0.0	-0.0	18.8	18.8
70	465908.49	5021026.58	79.50	0	2000	83.3	83.3	0.0	0.0	63.7	4.2	-1.0	0.0	0.0	0.0	0.0	-0.0	16.4	16.4
71	465908.49	5021026.58	79.50	0	4000	78.1	78.1	0.0	0.0	63.7	14.2	-1.0	0.0	0.0	0.0	0.0	-0.0	1.3	1.3
72	465908.49	5021026.58	79.50	0	8000	72.0	72.0	0.0	0.0	63.7	50.5	-1.0	0.0	0.0	0.0	0.0	-0.0	-41.2	-41.2
73	466086.58	5021109.39	79.50	0	32	45.4	45.4	0.0	0.0	66.9	0.0	-5.0	0.0	0.0	0.0	0.0	-0.0	-16.6	-16.6
74	466086.58	5021109.39	79.50	0	63	63.6	63.6	0.0	0.0	66.9	0.1	-5.0	0.0	0.0	0.0	0.0	-0.0	1.6	1.6
75	466086.58	5021109.39	79.50	0	125	74.7	74.7	0.0	0.0	66.9	0.3	3.1	0.0	0.0	0.0	0.0	-0.0	4.4	4.4
76	466086.58	5021109.39	79.50	0	250	78.2	78.2	0.0	0.0	66.9	0.7	2.1	0.0	0.0	0.0	0.0	-0.0	8.5	8.5
77	466086.58	5021109.39	79.50	0	500	78.6	78.6	0.0	0.0	66.9	1.2	-1.1	0.0	0.0	0.0	0.0	-0.0	11.5	11.5
78	466086.58	5021109.39	79.50	0	1000	85.8	85.8	0.0	0.0	66.9	2.3	-1.5	0.0	0.0	0.0	0.0	-0.0	18.0	18.0
79	466086.58	5021109.39	79.50	0	2000	86.0	86.0	0.0	0.0	66.9	6.0	-1.5	0.0	0.0	0.0	0.0	-0.0	14.5	14.5
80	466086.58	5021109.39	79.50	0	4000	80.8	80.8	0.0	0.0	66.9	20.5	-1.5	0.0	0.0	0.0	0.0	-0.0	-5.2	-5.2
81	466086.58	5021109.39	79.50	0	8000	74.7	74.7	0.0	0.0	66.9	73.1	-1.5	0.0	0.0	0.0	0.0	-0.0	-63.9	-63.9
82	466251.61	5021027.98	79.50	0	32	45.6	45.6	0.0	0.0	68.4	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-17.6	-17.6
83	466251.61	5021027.98	79.50	0	63	63.8	63.8	0.0	0.0	68.4	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	0.5	0.5
84	466251.61	5021027.98	79.50	0	125	74.9	74.9	0.0	0.0	68.4	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	2.8	2.8
85	466251.61	5021027.98	79.50	0	250	78.4	78.4	0.0	0.0	68.4	0.8	2.2	0.0	0.0	0.0	0.0	-0.0	7.1	7.1
86	466251.61	5021027.98	79.50	0	500	78.8	78.8	0.0	0.0	68.4	1.4	-1.0	0.0	0.0	0.0	0.0	-0.0	10.1	10.1
87	466251.61	5021027.98	79.50	0	1000	86.0	86.0	0.0	0.0	68.4	2.7	-1.4	0.0	0.0	0.0	0.0	-0.0	16.4	16.4
88	466251.61	5021027.98	79.50	0	2000	86.2	86.2	0.0	0.0	68.4	7.1	-1.5	0.0	0.0	0.0	0.0	-0.0	12.2	12.2
89	466251.61	5021027.98	79.50	0	4000	81.0	81.0	0.0	0.0	68.4	24.2	-1.5	0.0	0.0	0.0	0.0	-0.0	-10.1	-10.1
90	466251.61	5021027.98	79.50	0	8000	74.9	74.9	0.0	0.0	68.4	86.3	-1.5	0.0	0.0	0.0	0.0	-0.0	-78.3	-78.3
91	466430.64	5020966.73	79.50	0	32	39.0	39.0	0.0	0.0	70.0	0.0	-5.3	0.0	0.0	5.3	0.0	-0.0	-31.0	-31.0
92	466430.64	5020966.73	79.50	0	63	57.2	57.2	0.0	0.0	70.0	0.1	-5.3	0.0	0.0	6.8	0.0	-0.0	-14.4	-14.4
93	466430.64	5020966.73	79.50	0	125	68.3	68.3	0.0	0.0	70.0	0.4	3.5	0.0	0.0	1.5	0.0	-0.0	-7.0	-7.0
94	466430.64	5020966.73	79.50	0	250	71.8	71.8	0.0	0.0	70.0	0.9	1.9	0.0	0.0	3.7	0.0	-0.0	-4.7	-4.7
95	466430.64	5020966.73	79.50	0	500	72.2	72.2	0.0	0.0	70.0	1.7	-1.3	0.0	0.0	7.7	0.0	-0.0	-5.9	-5.9
96	466430.64	5020966.73	79.50	0	1000	79.4	79.4	0.0	0.0	70.0	3.3	-1.6	0.0	0.0	9.6	0.0	-0.0	-1.8	-1.8
97	466430.64	5020966.73	79.50	0	2000	79.6	79.6	0.0	0.0	70.0	8.6	-1.7	0.0	0.0	11.6	0.0	-0.0	-8.9	-8.9
98	466430.64	5020966.73	79.50	0	4000	74.4	74.4	0.0	0.0	70.0	29.3	-1.7	0.0	0.0	13.9	0.0	-0.0	-37.1	-37.1
99	466430.64	5020966.73	79.50	0	8000	68.3	68.3	0.0	0.0	70.0	104.4	-1.7	0.0	0.0	16.6	0.0	-0.0	-121.0	-121.0
100	466339.07	5020908.98	79.50	0	32	37.7	37.7	0.0	0.0	69.0	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-26.1	-26.1
101	466339.07	5020908.98	79.50	0	63	55.9	55.9	0.0	0.0	69.0	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-8.0	-8.0
102	466339.07	5020908.98	79.50	0	125	67.0	67.0	0.0	0.0	69.0	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	-5.8	-5.8
103	466339.07	5020908.98	79.50	0	250	70.5	70.5	0.0	0.0	69.0	0.8	2.0	0.0	0.0	0.0	0.0	-0.0	-1.3	-1.3
104	466339.07	5020908.98	79.50	0	500	70.9	70.9	0.0	0.0	69.0	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	1.5	1.5
105	466339.07	5020908.98	79.50	0	1000	78.1	78.1	0.0	0.0	69.0	2.9	-1.5	0.0	0.0	0.0	0.0	-0.0	7.8	7.8
106	466339.07	5020908.98	79.50	0	2000	78.3	78.3	0.0	0.0	69.0	7.7	-1.5	0.0	0.0	0.0	0.0	-0.0	3.2	3.2
107	466339.07	5020908.98	79.50	0	4000	73.1	73.1	0.0	0.0	69.0	26.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-20.3	-20.3
108	466339.07	5020908.98	79.50	0	8000	67.0	67.0	0.0	0.0	69.0	92.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-93.0	-93.0
109	466376.08	5020923.06	79.50	0	32	37.5	37.5	0.0	0.0	69.4	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-26.7	-26.7
110	466376.08	5020923.06	79.50	0	63	55.7	55.7	0.0	0.0	69.4	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-8.6	-8.6
111	466376.08	5020923.06	79.50	0	125	66.8	66.8	0.0	0.0	69.4	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	-6.5	-6.5
112	466376.08	5020923.06	79.50	0	250	70.3	70.3	0.0	0.0	69.4	0.9	2.0	0.0	0.0	0.0	0.0	-0.0	-2.0	-2.0
113	466376.08	5020923.06	79.50	0	500	70.7	70.7	0.0	0.0	69.4	1.6	-1.2	0.0	0.0	0.0	0.0	-0.0	0.8	0.8
114	466376.08	5020923.06	79.50	0	1000	77.9	77.9	0.0	0.0	69.4	3.0	-1.6	0.0	0.0	0.0	0.0	-0.0	7.0	7.0

Line Source, ISO 9613, Name: "Leachate Truck Movements", ID: "A_120"																				
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
115	466376.08	5020923.06	79.50	0	2000	78.1	78.1	0.0	0.0	69.4	8.0	-1.6	0.0	0.0	0.0	0.0	-0.0	2.2	2.2
116	466376.08	5020923.06	79.50	0	4000	72.9	72.9	0.0	0.0	69.4	27.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-22.2	-22.2
117	466376.08	5020923.06	79.50	0	8000	66.8	66.8	0.0	0.0	69.4	97.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-98.2	-98.2
118	465976.13	5021052.28	79.50	0	32	31.8	31.8	0.0	0.0	65.0	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-28.5	-28.5
119	465976.13	5021052.28	79.50	0	63	50.0	50.0	0.0	0.0	65.0	0.1	-4.8	0.0	0.0	0.0	0.0	-0.0	-10.3	-10.3
120	465976.13	5021052.28	79.50	0	125	61.1	61.1	0.0	0.0	65.0	0.2	3.8	0.0	0.0	0.0	0.0	-0.0	-7.9	-7.9
121	465976.13	5021052.28	79.50	0	250	64.6	64.6	0.0	0.0	65.0	0.5	3.6	0.0	0.0	0.0	0.0	-0.0	-4.5	-4.5
122	465976.13	5021052.28	79.50	0	500	65.0	65.0	0.0	0.0	65.0	1.0	-0.5	0.0	0.0	0.0	0.0	-0.0	-0.5	-0.5
123	465976.13	5021052.28	79.50	0	1000	72.2	72.2	0.0	0.0	65.0	1.8	-1.1	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
124	465976.13	5021052.28	79.50	0	2000	72.4	72.4	0.0	0.0	65.0	4.8	-1.1	0.0	0.0	0.0	0.0	-0.0	3.6	3.6
125	465976.13	5021052.28	79.50	0	4000	67.2	67.2	0.0	0.0	65.0	16.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-13.2	-13.2
126	465976.13	5021052.28	79.50	0	8000	61.1	61.1	0.0	0.0	65.0	58.7	-1.1	0.0	0.0	0.0	0.0	-0.0	-61.5	-61.5
127	466396.14	5020935.17	79.50	0	32	32.2	32.2	0.0	0.0	69.6	0.0	-5.3	0.0	0.0	0.0	0.0	-0.0	-32.2	-32.2
128	466396.14	5020935.17	79.50	0	63	50.4	50.4	0.0	0.0	69.6	0.1	-5.3	0.0	0.0	0.0	0.0	-0.0	-14.1	-14.1
129	466396.14	5020935.17	79.50	0	125	61.5	61.5	0.0	0.0	69.6	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	-12.0	-12.0
130	466396.14	5020935.17	79.50	0	250	65.0	65.0	0.0	0.0	69.6	0.9	2.0	0.0	0.0	0.0	0.0	-0.0	-7.5	-7.5
131	466396.14	5020935.17	79.50	0	500	65.4	65.4	0.0	0.0	69.6	1.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-4.7	-4.7
132	466396.14	5020935.17	79.50	0	1000	72.6	72.6	0.0	0.0	69.6	3.1	-1.6	0.0	0.0	0.0	0.0	-0.0	1.4	1.4
133	466396.14	5020935.17	79.50	0	2000	72.8	72.8	0.0	0.0	69.6	8.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-3.5	-3.5
134	466396.14	5020935.17	79.50	0	4000	67.6	67.6	0.0	0.0	69.6	28.0	-1.6	0.0	0.0	0.0	0.0	-0.0	-28.4	-28.4
135	466396.14	5020935.17	79.50	0	8000	61.5	61.5	0.0	0.0	69.6	99.7	-1.6	0.0	0.0	0.0	0.0	-0.0	-106.3	-106.3
136	466401.53	5020948.63	79.50	0	32	34.1	34.1	0.0	0.0	69.7	0.0	-5.3	0.0	0.0	5.3	0.0	-0.0	-35.7	-35.7
137	466401.53	5020948.63	79.50	0	63	52.3	52.3	0.0	0.0	69.7	0.1	-5.3	0.0	0.0	5.3	0.0	-0.0	-17.6	-17.6
138	466401.53	5020948.63	79.50	0	125	63.4	63.4	0.0	0.0	69.7	0.4	3.5	0.0	0.0	3.5	0.0	-0.0	-13.7	-13.7
139	466401.53	5020948.63	79.50	0	250	66.9	66.9	0.0	0.0	69.7	0.9	1.9	0.0	0.0	6.6	0.0	-0.0	-12.2	-12.2
140	466401.53	5020948.63	79.50	0	500	67.3	67.3	0.0	0.0	69.7	1.7	-1.2	0.0	0.0	10.2	0.0	-0.0	-13.0	-13.0
141	466401.53	5020948.63	79.50	0	1000	74.5	74.5	0.0	0.0	69.7	3.1	-1.6	0.0	0.0	12.9	0.0	-0.0	-9.7	-9.7
142	466401.53	5020948.63	79.50	0	2000	74.7	74.7	0.0	0.0	69.7	8.3	-1.6	0.0	0.0	15.7	0.0	-0.0	-17.4	-17.4
143	466401.53	5020948.63	79.50	0	4000	69.5	69.5	0.0	0.0	69.7	28.2	-1.6	0.0	0.0	18.6	0.0	-0.0	-45.4	-45.4
144	466401.53	5020948.63	79.50	0	8000	63.4	63.4	0.0	0.0	69.7	100.6	-1.6	0.0	0.0	21.3	0.0	-0.0	-126.6	-126.6
145	466304.53	5020901.12	79.50	0	32	33.1	33.1	0.0	0.0	68.6	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-30.4	-30.4
146	466304.53	5020901.12	79.50	0	63	51.3	51.3	0.0	0.0	68.6	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-12.2	-12.2
147	466304.53	5020901.12	79.50	0	125	62.4	62.4	0.0	0.0	68.6	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	-10.0	-10.0
148	466304.53	5020901.12	79.50	0	250	65.9	65.9	0.0	0.0	68.6	0.8	2.1	0.0	0.0	0.0	0.0	-0.0	-5.6	-5.6
149	466304.53	5020901.12	79.50	0	500	66.3	66.3	0.0	0.0	68.6	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-2.7	-2.7
150	466304.53	5020901.12	79.50	0	1000	73.5	73.5	0.0	0.0	68.6	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	3.6	3.6
151	466304.53	5020901.12	79.50	0	2000	73.7	73.7	0.0	0.0	68.6	7.3	-1.5	0.0	0.0	0.0	0.0	-0.0	-0.7	-0.7
152	466304.53	5020901.12	79.50	0	4000	68.5	68.5	0.0	0.0	68.6	24.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-23.4	-23.4
153	466304.53	5020901.12	79.50	0	8000	62.4	62.4	0.0	0.0	68.6	88.5	-1.5	0.0	0.0	0.0	0.0	-0.0	-93.2	-93.2
154	466205.26	5021151.50	79.50	0	32	32.4	32.4	0.0	0.0	68.5	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-31.0	-31.0
155	466205.26	5021151.50	79.50	0	63	50.6	50.6	0.0	0.0	68.5	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-12.9	-12.9
156	466205.26	5021151.50	79.50	0	125	61.7	61.7	0.0	0.0	68.5	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	-10.5	-10.5
157	466205.26	5021151.50	79.50	0	250	65.2	65.2	0.0	0.0	68.5	0.8	2.0	0.0	0.0	0.0	0.0	-0.0	-6.2	-6.2
158	466205.26	5021151.50	79.50	0	500	65.6	65.6	0.0	0.0	68.5	1.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-3.3	-3.3
159	466205.26	5021151.50	79.50	0	1000	72.8	72.8	0.0	0.0	68.5	2.7	-1.5	0.0	0.0	0.0	0.0	-0.0	3.0	3.0
160	466205.26	5021151.50	79.50	0	2000	73.0	73.0	0.0	0.0	68.5	7.2	-1.5	0.0	0.0	0.0	0.0	-0.0	-1.3	-1.3
161	466205.26	5021151.50	79.50	0	4000	67.8	67.8	0.0	0.0	68.5	24.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-23.8	-23.8
162	466205.26	5021151.50	79.50	0	8000	61.7	61.7	0.0	0.0	68.5	87.5	-1.5	0.0	0.0	0.0	0.0	-0.0	-92.9	-92.9
163	466201.08	5021162.64	79.50	0	32	32.4	32.4	0.0	0.0	68.5	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-31.0	-31.0
164	466201.08	5021162.64	79.50	0	63	50.6	50.6	0.0	0.0	68.5	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-12.9	-12.9
165	466201.08	5021162.64	79.50	0	125	61.7	61.7	0.0	0.0	68.5	0.3	3.3	0.0	0.0	0.0	0.0	-0.0	-10.5	-10.5
166	466201.08	5021162.64	79.50	0	250	65.2	65.2	0.0	0.0	68.5	0.8	2.0	0.0	0.0	0.0	0.0	-0.0	-6.1	-6.1
167	466201.08	5021162.64	79.50	0	500	65.6	65.6	0.0	0.0	68.5	1.5	-1.2	0.0	0.0	0.0	0.0	-0.0	-3.2	-3.2
168	466201.08	5021162.64	79.50	0	1000	72.8	72.8	0.0	0.0	68.5	2.8	-1.6	0.0	0.0	0.0	0.0	-0.0	3.1	3.1
169	466201.08	5021162.64	79.50	0	2000	73.0	73.0	0.0	0.0	68.5	7.3	-1.6	0.0	0.0	0.0	0.0	-0.0	-1.2	-1.2
170	466201.08	5021162.64	79.50	0	4000	67.8	67.8	0.0	0.0	68.5	24.6	-1.6	0.0	0.0	0.0	0.0	-0.0	-23.8	-23.8
171	466201.08	5021162.64	79.50	0	8000	61.7	61.7	0.0	0.0	68.5	87.8	-1.6	0.0	0.0	0.0	0.0	-0.0	-93.1	-93.1
172	466315.47	5020899.99	79.50	0	32	31.5	31.5	0.0	0.0	68.7	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-32.0	-32.0
173	466315.47	5020899.99	79.50	0	63	49.7	49.7	0.0	0.0	68.7	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-13.9	-13.9
174	466315.47	5020899.99	79.50	0	125	60.8	60.8	0.0	0.0	68.7	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	-11.7	-11.7
175	466315.47	5020899.99	79.50	0	250	64.3	64.3	0.0	0.0	68.7	0.8	2.1	0.0	0.0	0.0	0.0	-0.0	-7.3	-7.3
176	466315.47	5020899.99	79.50	0	500	64.7	64.7	0.0	0.0	68.7	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-4.4	-4.4
177	466315.47	5020899.99	79.50	0	1000	71.9	71.9	0.0	0.0	68.7	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	1.9	1.9

Line Source, ISO 9613, Name: "Leachate Truck Movements", ID: "A_120"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
178	466315.47	5020899.99	79.50	0	2000	72.1	72.1	0.0	0.0	68.7	7.4	-1.5	0.0	0.0	0.0	0.0	-0.0	-2.5	-2.5
179	466315.47	5020899.99	79.50	0	4000	66.9	66.9	0.0	0.0	68.7	25.2	-1.5	0.0	0.0	0.0	0.0	-0.0	-25.5	-25.5
180	466315.47	5020899.99	79.50	0	8000	60.8	60.8	0.0	0.0	68.7	89.7	-1.5	0.0	0.0	0.0	0.0	-0.0	-96.1	-96.1
181	466195.57	5021166.42	79.50	0	32	30.5	30.5	0.0	0.0	68.5	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-32.9	-32.9
182	466195.57	5021166.42	79.50	0	63	48.7	48.7	0.0	0.0	68.5	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-14.7	-14.7
183	466195.57	5021166.42	79.50	0	125	59.8	59.8	0.0	0.0	68.5	0.3	3.3	0.0	0.0	0.0	0.0	-0.0	-12.3	-12.3
184	466195.57	5021166.42	79.50	0	250	63.3	63.3	0.0	0.0	68.5	0.8	2.0	0.0	0.0	0.0	0.0	-0.0	-7.9	-7.9
185	466195.57	5021166.42	79.50	0	500	63.7	63.7	0.0	0.0	68.5	1.4	-1.2	0.0	0.0	0.0	0.0	-0.0	-5.0	-5.0
186	466195.57	5021166.42	79.50	0	1000	70.9	70.9	0.0	0.0	68.5	2.7	-1.6	0.0	0.0	0.0	0.0	-0.0	1.3	1.3
187	466195.57	5021166.42	79.50	0	2000	71.1	71.1	0.0	0.0	68.5	7.2	-1.6	0.0	0.0	0.0	0.0	-0.0	-3.0	-3.0
188	466195.57	5021166.42	79.50	0	4000	65.9	65.9	0.0	0.0	68.5	24.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-25.5	-25.5
189	466195.57	5021166.42	79.50	0	8000	59.8	59.8	0.0	0.0	68.5	87.5	-1.6	0.0	0.0	0.0	0.0	-0.0	-94.6	-94.6
190	466297.00	5020907.01	79.50	0	32	29.7	29.7	0.0	0.0	68.5	0.0	-5.2	0.0	0.0	0.0	0.0	-0.0	-33.6	-33.6
191	466297.00	5020907.01	79.50	0	63	47.9	47.9	0.0	0.0	68.5	0.1	-5.2	0.0	0.0	0.0	0.0	-0.0	-15.5	-15.5
192	466297.00	5020907.01	79.50	0	125	59.0	59.0	0.0	0.0	68.5	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	-13.3	-13.3
193	466297.00	5020907.01	79.50	0	250	62.5	62.5	0.0	0.0	68.5	0.8	2.2	0.0	0.0	0.0	0.0	-0.0	-8.9	-8.9
194	466297.00	5020907.01	79.50	0	500	62.9	62.9	0.0	0.0	68.5	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-6.0	-6.0
195	466297.00	5020907.01	79.50	0	1000	70.1	70.1	0.0	0.0	68.5	2.8	-1.5	0.0	0.0	0.0	0.0	-0.0	0.3	0.3
196	466297.00	5020907.01	79.50	0	2000	70.3	70.3	0.0	0.0	68.5	7.3	-1.5	0.0	0.0	0.0	0.0	-0.0	-4.0	-4.0
197	466297.00	5020907.01	79.50	0	4000	65.1	65.1	0.0	0.0	68.5	24.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-26.5	-26.5
198	466297.00	5020907.01	79.50	0	8000	59.0	59.0	0.0	0.0	68.5	87.7	-1.5	0.0	0.0	0.0	0.0	-0.0	-95.8	-95.8
199	465970.06	5021049.98	79.50	0	32	25.6	25.6	0.0	0.0	64.9	0.0	-4.7	0.0	0.0	0.0	0.0	-0.0	-34.6	-34.6
200	465970.06	5021049.98	79.50	0	63	43.8	43.8	0.0	0.0	64.9	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	-16.4	-16.4
201	465970.06	5021049.98	79.50	0	125	54.9	54.9	0.0	0.0	64.9	0.2	3.8	0.0	0.0	0.0	0.0	-0.0	-14.0	-14.0
202	465970.06	5021049.98	79.50	0	250	58.4	58.4	0.0	0.0	64.9	0.5	3.6	0.0	0.0	0.0	0.0	-0.0	-10.6	-10.6
203	465970.06	5021049.98	79.50	0	500	58.8	58.8	0.0	0.0	64.9	1.0	-0.5	0.0	0.0	0.0	0.0	-0.0	-6.5	-6.5
204	465970.06	5021049.98	79.50	0	1000	66.0	66.0	0.0	0.0	64.9	1.8	-1.1	0.0	0.0	0.0	0.0	-0.0	0.4	0.4
205	465970.06	5021049.98	79.50	0	2000	66.2	66.2	0.0	0.0	64.9	4.8	-1.1	0.0	0.0	0.0	0.0	-0.0	-2.4	-2.4
206	465970.06	5021049.98	79.50	0	4000	61.0	61.0	0.0	0.0	64.9	16.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-19.1	-19.1
207	465970.06	5021049.98	79.50	0	8000	54.9	54.9	0.0	0.0	64.9	57.9	-1.1	0.0	0.0	0.0	0.0	-0.0	-66.8	-66.8

ATTACHMENT H

Noise Monitoring Data

Date	Time	POR1		POR2		POR3	
		Leq	L90	Leq	L90	Leq	L90
23-Aug-13	12:00 AM	57	49	58	45	51	35
23-Aug-13	1:00 AM	55	46	56	43	48	34
23-Aug-13	2:00 AM	54	43	57	42	49	36
23-Aug-13	3:00 AM	53	42	57	42	49	38
23-Aug-13	4:00 AM	55	47	56	44	49	36
23-Aug-13	5:00 AM	59	54	64	49	58	44
23-Aug-13	6:00 AM	63	59	69	57	64	54
23-Aug-13	7:00 AM	62	58	69	55	64	54
23-Aug-13	8:00 AM	61	56	68	52	63	49
23-Aug-13	9:00 AM	61	56	67	52	61	47
23-Aug-13	10:00 AM	61	55	66	52	60	45
23-Aug-13	11:00 AM	60	54	67	51	60	46
23-Aug-13	12:00 PM	60	54	67	50	61	45
23-Aug-13	1:00 PM	61	54	67	54	64	59
23-Aug-13	2:00 PM	61	56	68	54	61	48
23-Aug-13	3:00 PM	63	57	69	56	62	50
23-Aug-13	4:00 PM	63	58	68	59	62	51
23-Aug-13	5:00 PM	63	58	68	58	62	51
23-Aug-13	6:00 PM	62	57	69	53	60	48
23-Aug-13	7:00 PM	62	58	65	51	58	45
23-Aug-13	8:00 PM	63	60	65	52	58	45
23-Aug-13	9:00 PM	63	59	63	52	56	43
23-Aug-13	10:00 PM	62	58	62	50	54	39
23-Aug-13	11:00 PM	61	56	61	48	54	37
24-Aug-13	12:00 AM	60	55	58	47	51	33
24-Aug-13	1:00 AM	58	50	55	44	47	30
24-Aug-13	2:00 AM	57	47	56	43	47	32
24-Aug-13	3:00 AM	55	45	52	41	47	29
24-Aug-13	4:00 AM	55	46	56	42	49	29
24-Aug-13	5:00 AM	58	52	58	45	52	35
24-Aug-13	6:00 AM	61	57	63	50	56	41
24-Aug-13	7:00 AM	61	56	65	50	59	44
24-Aug-13	8:00 AM	59	52	65	47	59	44
24-Aug-13	9:00 AM	59	52	66	48	59	45
24-Aug-13	10:00 AM	59	53	66	50	59	45
24-Aug-13	11:00 AM	59	54	66	53	59	47
24-Aug-13	12:00 PM	58	51	66	54	59	50
24-Aug-13	1:00 PM	58	52	67	56	60	51
24-Aug-13	2:00 PM	58	50	66	56	59	50
24-Aug-13	3:00 PM	59	49	66	56	60	50
24-Aug-13	4:00 PM	59	51	66	55	59	51
24-Aug-13	5:00 PM	58	52	66	48	59	47
24-Aug-13	6:00 PM	59	50	65	46	58	43
24-Aug-13	7:00 PM	61	57	64	48	57	43
24-Aug-13	8:00 PM	62	58	64	49	56	44
24-Aug-13	9:00 PM	61	58	64	48	56	43
24-Aug-13	10:00 PM	61	57	62	47	55	41
24-Aug-13	11:00 PM	60	56	61	46	54	39
25-Aug-13	12:00 AM	57	53	58	44	50	33
25-Aug-13	1:00 AM	55	48	56	40	49	32
25-Aug-13	2:00 AM	52	44	54	37	47	29
25-Aug-13	3:00 AM	52	41	56	36	51	28
25-Aug-13	4:00 AM	49	40	53	34	49	29

Date	Time	POR1		POR2		POR3	
		Leq	L90	Leq	L90	Leq	L90
25-Aug-13	5:00 AM	50	43	58	35	50	32
25-Aug-13	6:00 AM	53	45	59	41	53	35
25-Aug-13	7:00 AM	57	46	62	42	55	38
25-Aug-13	8:00 AM	57	46	63	41	56	36
25-Aug-13	9:00 AM	57	47	65	46	58	43
25-Aug-13	10:00 AM	58	49	66	53	59	48
25-Aug-13	11:00 AM	58	51	66	56	60	52
25-Aug-13	12:00 PM	59	51	67	56	60	53
25-Aug-13	1:00 PM	58	51	65	54	59	53
25-Aug-13	2:00 PM	58	50	66	56	61	54
25-Aug-13	3:00 PM	59	51	66	55	60	52
25-Aug-13	4:00 PM	59	51	66	54	59	50
25-Aug-13	5:00 PM	59	52	66	54	58	47
25-Aug-13	6:00 PM	60	50	65	46	57	44
25-Aug-13	7:00 PM	58	50	64	45	57	44
25-Aug-13	8:00 PM	57	49	63	50	56	48
25-Aug-13	9:00 PM	57	50	62	48	56	47
25-Aug-13	10:00 PM	55	48	61	47	53	43
25-Aug-13	11:00 PM	53	46	59	48	51	43
26-Aug-13	12:00 AM	49	44	56	49	50	45
26-Aug-13	1:00 AM	47	43	53	49	47	45
26-Aug-13	2:00 AM	48	43	54	50	47	44
26-Aug-13	3:00 AM	48	43	54	50	47	43
26-Aug-13	4:00 AM	50	44	56	47	51	43
26-Aug-13	5:00 AM	55	48	63	47	58	45
26-Aug-13	6:00 AM	58	52	68	54	63	53
26-Aug-13	7:00 AM	59	52	68	53	63	51
26-Aug-13	8:00 AM	59	51	68	51	62	49
26-Aug-13	9:00 AM	59	50	67	50	60	48
26-Aug-13	10:00 AM	59	52	67	51	61	48
26-Aug-13	11:00 AM	60	52	68	50	60	49
26-Aug-13	12:00 PM	58	51	67	49	60	49
26-Aug-13	1:00 PM	59	53	67	49	60	46
26-Aug-13	2:00 PM	61	53	67	49	61	48
26-Aug-13	3:00 PM	62	56	68	53	62	51
26-Aug-13	4:00 PM	64	57	69	57	63	54
26-Aug-13	5:00 PM	63	56	69	57	62	53
26-Aug-13	6:00 PM	60	51	67	50	60	47
26-Aug-13	7:00 PM	60	54	65	48	58	47
26-Aug-13	8:00 PM	60	55	63	51	56	49
26-Aug-13	9:00 PM	57	52	61	51	55	49
26-Aug-13	10:00 PM	56	51	61	50	54	49
26-Aug-13	11:00 PM	54	49	59	50	52	47
27-Aug-13	12:00 AM	53	50	56	50	51	48
27-Aug-13	1:00 AM	51	48	55	49	49	46
27-Aug-13	2:00 AM	50	48	53	48	49	46
27-Aug-13	3:00 AM	50	48	55	49	49	47
27-Aug-13	4:00 AM	50	45	56	47	52	46
27-Aug-13	5:00 AM	55	48	63	46	58	41
27-Aug-13	6:00 AM	59	54	69	54	63	54
27-Aug-13	7:00 AM	61	53	67	55	62	54
27-Aug-13	8:00 AM	61	51	67	51	61	46
27-Aug-13	9:00 AM	59	49	67	46	60	46

Date	Time	POR1		POR2		POR3	
		Leq	L90	Leq	L90	Leq	L90
27-Aug-13	10:00 AM	59	49	67	45	60	46
27-Aug-13	11:00 AM	58	49	67	47	60	44
27-Aug-13	12:00 PM	58	50	66	48	60	48
27-Aug-13	1:00 PM	59	49	67	53	60	48
27-Aug-13	2:00 PM	60	51	67	50	61	49
27-Aug-13	3:00 PM	62	53	69	54	61	51
27-Aug-13	4:00 PM	62	53	69	54	62	52
27-Aug-13	5:00 PM	62	51	68	55	61	51
27-Aug-13	6:00 PM	60	50	67	51	64	50
27-Aug-13	7:00 PM	58	49	65	46	58	43
27-Aug-13	8:00 PM	58	52	64	48	59	47
27-Aug-13	9:00 PM	58	52	62	49	56	47
27-Aug-13	10:00 PM	57	50	61	49	54	45
27-Aug-13	11:00 PM	55	49	58	48	51	46
28-Aug-13	12:00 AM	54	45	57	47	53	48
28-Aug-13	1:00 AM	51	41	56	46	51	48
28-Aug-13	2:00 AM	49	40	53	44	53	50
28-Aug-13	3:00 AM	50	40	50	43	48	43
28-Aug-13	4:00 AM	49	41	55	43	50	41
28-Aug-13	5:00 AM	54	46	65	44	59	41
28-Aug-13	6:00 AM	60	53	68	53	63	50
28-Aug-13	7:00 AM	61	53	67	52	62	51
28-Aug-13	8:00 AM	60	49	69	48	61	46
28-Aug-13	9:00 AM	62	51	68	47	60	41
28-Aug-13	10:00 AM	60	51	69	54	59	42
28-Aug-13	11:00 AM	61	50	68	48	60	44
28-Aug-13	12:00 PM	61	51	67	48	59	45
28-Aug-13	1:00 PM	61	49	68	48	60	47
28-Aug-13	2:00 PM	60	51	68	49	60	50
28-Aug-13	3:00 PM	61	52	68	50	61	51
28-Aug-13	4:00 PM	63	55	69	54	62	55
28-Aug-13	5:00 PM	62	56	69	55	62	54
28-Aug-13	6:00 PM	62	54	67	51	61	50
28-Aug-13	7:00 PM	61	56	64	49	59	45
28-Aug-13	8:00 PM	61	57	64	52	58	52
28-Aug-13	9:00 PM	60	56	64	53	58	53
28-Aug-13	10:00 PM	58	54	61	52	56	51
28-Aug-13	11:00 PM	56	49	59	51	55	51
29-Aug-13	12:00 AM	54	46	58	50	53	49
29-Aug-13	1:00 AM	51	45	56	49	52	47
29-Aug-13	2:00 AM	52	43	55	48	49	43
29-Aug-13	3:00 AM	51	44	55	48	49	46
29-Aug-13	4:00 AM	55	46	60	46	50	40
29-Aug-13	5:00 AM	58	52	64	49	58	43
29-Aug-13	6:00 AM	62	57	69	55	62	54
29-Aug-13	7:00 AM	61	56	69	54	63	54
29-Aug-13	8:00 AM	60	54	68	52	62	50
29-Aug-13	9:00 AM	61	55	67	52	60	44
29-Aug-13	10:00 AM	61	53	67	54	60	46
29-Aug-13	11:00 AM	61	54	67	56	60	48
29-Aug-13	12:00 PM	61	53	67	59	60	49

ATTACHMENT I

STAMSON Calculations

STAMSON 5.0 NORMAL REPORT Date: 16-10-2014 10:12:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: vl_day.te Time Period: 1 hours
Description: Vacant Lot - VL01 - Daytime

Road data, segment # 1: EB

Car traffic volume : 756 veh/TimePeriod
Medium truck volume : 59 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: EB

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 205.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: WB

Car traffic volume : 756 veh/TimePeriod
Medium truck volume : 59 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: WB

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 250.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: EB

Source height = 1.31 m

ROAD (0.00 + 54.40 + 0.00) = 54.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	73.61	0.00	-17.89	-1.31	0.00	0.00	0.00	54.40

Segment Leq : 54.40 dBA

Results segment # 2: WB

Source height = 1.31 m

ROAD (0.00 + 53.04 + 0.00) = 53.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	73.61	0.00	-19.25	-1.31	0.00	0.00	0.00	53.04

Segment Leq : 53.04 dBA

Total Leq All Segments: 56.78 dBA

TOTAL Leq FROM ALL SOURCES: 56.78

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APPENDIX C

Emission Summary and Dispersion Modelling Report

REPORT

December 2014

APPENDIX C

Emission Summary and Dispersion Modelling Report
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

Report Number: 12-1125-0045/4500/vol IV

Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared in support of the Design and Operation (D&O) Report for the proposed Capital Region Resource Recovery Centre (CRRRC) facility located in Ottawa, Ontario (the Facility) as proposed by Taggart Miller Environmental Services (Taggart Miller). In preparing this ESDM, Guidance in the Ontario Ministry of the Environment and Climate Change (MOECC) publication "*Guideline A-10: Procedure for Preparing an Emission Summary and Dispersion Modelling (ESDM) Report, Version 3.0"*, dated March 2009 (ESDM Procedure Document) PIBS 3614e03 was followed, as appropriate.

The CRRRC is proposed to provide facilities and capacity for the recovery of resources and diversion of materials from disposal for wastes that are generated by the Industrial, Commercial and Institutional (IC&I) and Construction and Demolition (C&D) sectors in Ottawa and eastern Ontario. It would also provide landfill disposal capacity for post-diversion residuals and materials that are not diverted. The Facility is expected to emit products of combustion, suspended particulate matter, as well as other emission by-products from waste processing and management. The North American Industry Classification System (NAICS) codes that apply to the Facility are 562920 (Material Recovery Facilities) and 562210 (Waste Treatment and Disposal), the second of which is listed in Schedule 5 of *Ontario Regulation* (O. Reg.) 419.05. The modelled emission inventory includes process sources as well as fugitive sources.

The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s.11 of O. Reg. 419/05 and the data quality assessment follows the classification system outlined in the ESDM Procedure Document.

The Facility is subject to s.20 of O. Reg. 419/05, therefore the modelled impact of contaminant emissions were assessed against the Schedule 3 standards using the AERMOD model, which is an approved dispersion model under O. Reg. 419/05. The modelling scenario, for the relevant averaging period, assumed operating conditions for the Facility that result in the highest concentration of each significant contaminant at a point of impingement (POI). The results are presented in the following Emission Summary Table.

The POI concentrations listed in the Emission Summary Table were compared against published MOECC POI Limits as described in the ESDM Procedure Document.

This ESDM Report demonstrates that the Facility can operate in compliance with s.20 of O. Reg. 419/05.

Table I: Emission Summary Table

Contaminant	CAS No.	Total Facility Emission Rate [g/s]	Air Dispersion Model Used	Maximum POI Concentration [µg/m³]	Averaging Period [hours]	MOECC POI Limit [µg/m³]	Regulation Schedule No.	Percentage of MOECC Limit [%]
Sulphur Dioxide	7446-09-5	0.102	AERMOD	8.54	24	275	Schedule 3	3.1%
Sulphur Dioxide	7446-09-5	0.102	AERMOD	15.91	1	690	Schedule 3	2.3%
Hydrogen Sulfide	7783-06-4	0.0077	AERMOD	0.26	24	7	Schedule 3	3.7%
Hydrogen Sulfide	7783-06-4	0.0077	AERMOD	0.79	10-min	13	Schedule 3	6.1%
Nitrogen Oxides	10102-44-0	3.24	AERMOD	37.15	24	200	Schedule 3	18.6%
Nitrogen Oxides	10102-44-0	3.24	AERMOD	68.90	1	400	Schedule 3	17.2%
Carbon Monoxide	630-08-0	6.17	AERMOD	872.4	½	6000	Schedule 3	14.5%
Vinyl chloride	75-01-4	0.0006	AERMOD	0.021	24	1	Schedule 3	2.1%
Suspended particulate matter (< 44 µm Diameter)	N/A	1.38	AERMOD	98.23	24	120	Schedule 3	81.9%
PM_{10}	N/A	0.64	AERMOD	23.30	24	50	AAQC	46.6%
$PM_{2.5}$	N/A	0.46	AERMOD	20.16	24	25	AAQC	80.6%
Odour	N/A	21732	AERMOD	0.58	10-min	1	Guideline	57.8%

Table of Contents

TABLES

FIGURES

ATTACHMENTS

Ministry of the Environment

Ministère de l'Environnement

EMISSION SUMMARY AND DISPERSION MODELLING REPORT CHECKLIST

Company Name:	Taggart Miller Environmental Services
Company Address:	c/o 225 Metcalfe Street, Suite 708, Ottawa, Ontario, K2P 1P9
Location Facility	Boundary Road and Devine Road, Ottawa, Ontario

The attached Emission Summary and Dispersion Modelling Report was prepared in accordance with s.26 of O. Reg. 419/05 and the guidance in the MOECC document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 and "Air Dispersion Modelling Guideline for Ontario" dated March 2009 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:	Taggart Miller Environmental Services
Name:	Derek Cathcart
Title:	General Manager of Engineering
Phone Number:	905-415-7317
Signature:	
Date:	

Technical Contact:	
Name:	Camille Taylor, P. Eng., Eng.
Representing:	Golder Associates Ltd.
Phone Number:	(613) 592 9600 ext. 4236
Signature:	
Date:	

EMISSION SUMMARY AND DISPERSION MODELLING REPORT CHECKLIST

	Required Information			
			Submitted	**Explanation/Reference**
	Executive Summary and Emission Summary Table			
	1.1	Overview of ESDM Report	☒ Yes	Executive Summary
	1.2	Emission Summary Table	☒ Yes	Table I
1.0	**Introduction and Facility Description**			
	1.1	Purpose and Scope of ESDM Report (when report only represents a portion of facility)	☒ Yes	Section 1.1
	1.2	Description of Processes and NAICS code(s)	☒ Yes	Section 1.2
	1.3	Description of Products and Raw Materials	☒ Yes	Section 1.2.1
	1.4	Process Flow Diagram	☒ Yes	Figures 2A and 2B
	1.5	Operating Schedule	☒ Yes	Section 1.3
2.0	**Initial Identification of Sources and Contaminants**			
	2.1	Sources and Contaminants Identification Table	☒ Yes	Table 1
3.0	**Assessment of the Significance of Contaminants and Sources**		☒ Yes	
	3.1	Identification of Negligible Contaminants and Sources	☒ Yes	Section 3.0
	3.2	Rationale for Assessment	☒ Yes	Section 3.0
4.0	**Operating Conditions, Emission Estimating and Data Quality**			
	4.1	Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	☒ Yes	Section 4.1
	4.2	Explanation of Method used to calculate the emission rate for each contaminant	☒ Yes	Section 4.2
	4.3	Sample calculation for each method	☒ Yes	Section 4.3
	4.4	Assessment of Data Quality for each emission rate	☒ Yes	Section 4.4
5.0	**Source Summary Table and Property Plan**			
	5.1	Source Summary Table	☒ Yes	Table 2
	5.2	Site Plan (scalable)	☒ Yes	Figure 1
6.0	**Dispersion Modelling**			
	6.1	Dispersion Modelling Input Summary Table	☒ Yes	Table 3
	6.2	Land Use Zoning Designation Plan	☒ Yes	Figure 4
	6.3	Dispersion Modelling Input and Output Files	☒ Yes	Section 6.9
7.0	**Emission Summary Table and Conclusions**			
	7.1	Emission Summary Table	☒ Yes	Table 5
	7.2	Assessment of Contaminants with no MOECC POI Limits	☒ Yes	Section 7.2
	7.3	Conclusions	☒ Yes	Section 8.0
	Attachments (Provide supporting information or details such as...)			
	Attachment A – Emission Rate Calculations		☒ Yes	Attachment A

1.0 INTRODUCTION AND FACILITY DESCRIPTION

1.1 Purpose and Scope of ESDM Report

Taggart Miller Environmental Services (Taggart Miller) is proposing the construction and operation of the Capital Region Resource Recovery Centre (CRRRC) facility to be located in Ottawa, Ontario (the Facility). The location of the Facility is presented in Figure 1 – Site Location Plan.

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared to support the Design and Operation (D&O) Report for the facility in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the Ontario Ministry of the Environment and Climate Change (MOECC) publication "*Guideline A-10: Procedure for Preparing an Emission Summary and Dispersion Modelling (ESDM) Report, Version 3.0*", dated March 2009 (ESDM Procedure Document) PIBS 3614e03 was followed, as appropriate.

1.2 Description of Processes and NAICS Code(s)

1.2.1 Description of Processes (including Raw Materials and Products)

The CRRRC is proposed to provide facilities and capacity for the recovery of resources and the diversion of materials from disposal for wastes that are generated by the Industrial, Commercial and Institutional (IC&I) and Construction and Demolition (C&D) sectors in Ottawa and eastern Ontario. It would also provide landfill disposal capacity for post-diversion residuals and materials that are not diverted. The following diversion facilities/operations are proposed for the CRRRC:

- LFG & Biogas Flare;
- Electrical Generation Plant;
- Material Recovery Facility (MRF);
- C&D Recycling;
- Organics Processing;
- Leaf and yard waste composting;
- Petroleum hydrocarbon impacted soil treatment;
- Landfill for residual wastes; and,
- Leachate pre-treatment.

The Facility also includes ancillary operations such as an emergency generator, maintenance welding equipment, a compressor, a diesel fire pump, and emergency lights. The C&D, MRF, and organics processing facilities are proposed to be heated using heat recovered from the flare or electrical generation plant, and therefore emissions associated with heating of these facilities are accounted for in the flare and electrical generator plant emission estimates.

Proposed throughputs and process information are provided in detail in Attachment A – Emission Rate Calculations. Table 1 – Sources and Contaminants Identification Table provides a summary of the individual sources of emissions at the Facility.

A process flow diagram is provided in Figures 2A and 2B – Simplified Process Flow Diagram.

1.2.2 Description of NAICS Code(s)

The North American Industry Classification System (NAICS) codes that apply to the Facility are 562920 (Material Recovery Facilities) and 562210 (Waste Treatment and Disposal).

1.3 Operating Schedule

The Facility is proposed to operate as follows:

Facility	Activity	Daily Operating Hours (hours/day)	Annual Operating Period (days/year)
MRF and C&D Processing Facilities	Dust collectors	12	312
Organics Processing Facility	Organics processing operations biofilter	24	365
	Material handling at organics processing facility	12	312
PHC impacted soil treatment facility	PHC impacted soil treatment facility biofilter	24	365
	Material handling at PHC impacted soil treatment facility	12	312
Leaf and yard waste composting	Composting/Curing pad operations	12	312
	Material handling at composting/curing pad	12	312
Flare and Energy Processing Facility	LFG and biogas combustion	24	365
Leachate Pre-treatment	Ventilation from leachate pre-treatment operations	24	365
	Leachate ponds	24	365
Landfill	Landfill gas fugitive losses through the cover soils	24	365
	Material handling at the landfill	12	312

The proposed operating hours for waste receiving and processing (ancillary facilities) and landfill operations are from 0600 to 1900 hours Monday to Saturday. Essential equipment associated with bio-gas, leachate and power generation is required to operate 24 hours per day 365 days of the year.

1.4 Facility Throughput

The Facility throughput will vary; however, the maximum operating capacities of the Facility is to receive approximately 450,000 tonnes of waste and soils per year, with a maximum daily rate of 3,000 tonnes/day.

2.0 INITIAL IDENTIFICATION OF SOURCES AND CONTAMINANTS

2.1 Sources and Contaminants Identification Table

Table 1 – Sources and Contaminants Identification Table includes all the emission sources at the Facility, O. Reg. 419/05. Each of the identified sources has been assigned a source reference number.

There may be general ventilation in some portions of the CRRRC (i.e., the administration building and maintenance garage) that only discharges uncontaminated air from the workspaces or air from the workspace that may include contaminants that come from commercial office supplies, building maintenance products or supplies and activities; these types of ventilation sources are considered to be negligible and were not identified as sources at the Facility.

Although as per O. Reg. 524/98-S.13 the emissions from on-Site vehicles and fugitive emissions from on-Site roadways and storage piles are exempt from O. Reg. 419 compliance assessment, they have conservatively been included in the O. Reg. 419/05 compliance assessment for the CRRRC.

The types of contaminants potentially emitted from each source are also identified in Table 1; however this assessment focuses on concentrations of the following indicator contaminants, which could be emitted from the proposed CRRRC, and for which air quality criteria exist:

- Particulate matter, including suspended particulate matter (SPM), particles nominally smaller than 10 µm in diameter (PM_{10}), and particles nominally smaller than 2.5 µm in diameter ($PM_{2.5}$);
- Oxides of nitrogen (NO_X);
- Sulphur dioxide (SO_2);
- Carbon monoxide (CO);
- Hydrogen sulphide (H_2S);
- Vinyl chloride (C_2H_3Cl); and,
- Odour.

3.0 ASSESSMENT OF THE SIGNIFICANCE OF CONTAMINANTS AND SOURCES

Contaminants and sources at the Facility were assessed for significance following the guidance outlined in the ESDM Procedure Document. Contaminants that are discharged from the Facility in negligible amounts and/or sources that discharge a contaminant in a negligible amount were excluded from further analysis. The rationale for these exclusions is provided below.

Of the sources listed in Table 1 – Sources and Contaminants Identification Table, two (2) sources have been identified as negligible; operational Support activities (such as maintenance activities, including welding, compressor, diesel fire pump, lights), and tailpipe exhaust from maintenance vehicles.

4.0 OPERATING CONDITIONS, EMISSION ESTIMATING AND DATA QUALITY

4.1 Description of Operating Conditions

Section 10 of O. Reg. 419/05 states that an acceptable operating condition is a scenario in which operating conditions for the Facility would result, for the relevant contaminant, in the highest concentration of the contaminant possible at the point of impingement (POI). The operating condition described in this ESDM Report meets this requirement.

The operating scenario presented includes the emissions of all the CRRRC components, with all equipment operating at the maximum rated capacity for the entire period.

The averaging time for the operating condition is dependent on the averaging time for the MOECC POI Limit. The individual maximum rates of production for each significant source of emissions correspond to the maximum emission rate for the averaging time. Details of the maximum operating rates are provided in Attachment A – Emission Rate Calculations.

4.2 Explanation of the Methods Used to Calculate Emission Rates

The maximum emission rates for each significant contaminant emitted from the significant sources were estimated in accordance with requirements of the ESDM Procedure Document. These rates and methods are summarized in Table 2 – Source Summary Table.

4.3 Sample Calculations

Sample calculations are presented in Attachment A – Emission Rate Calculations. All of the emission estimation methods are acceptable methods as outlined in the ESDM Procedure Document.

4.4 Assessment of Data Quality

The data quality for each contaminant emission rate is documented in Table 2 – Source Summary Table and Attachment A – Emission Rate Calculations.

4.5 Conservatism of Emission Estimates and Operating Condition

The following assumptions were included in the development of the emission estimates and operating condition for the Facility:

- The operating scenario presented includes the emissions of all the CRRRC components, with all equipment operating at the maximum rated capacity for the entire period.
- Road dust and vehicle exhaust were conservatively included in the emission estimates and modelling.

Based on the conservative assumptions summarized above and detailed in Attachment A – Emission Rate Calculations, the emission rates listed in Table 2 are not likely to be an underestimate of the actual emission rates.

5.0 SOURCE SUMMARY TABLE AND SITE PLAN

5.1 Source Summary Table

The emission rates for each source of significant contaminants are documented in Table 2 – Source Summary Table in accordance with requirements of sub paragraph 8 of s.26(1) of O. Reg. 419/05.

5.2 Site Plan

A scaled Site plan is provided in Figure 3 – Dispersion Modelling Plan. This includes:

- The property boundary;
- The co-ordinates for sufficient points on the property boundary to accurately describe the boundary;
- Each significant source of significant contaminants; and,
- The currently proposed location, dimensions and height of every proposed structure on the property.

Where reasonable, the location and heights of only those on-Site structures that may affect the dispersion of emissions from significant sources are included.

For ease of reference, each of the sources is labelled with the source reference number in Table 2 – Source Summary Table.

6.0 DISPERSION MODELLING

The dispersion modelling was conducted in accordance with the MOECC publication *"Guideline A-11: Air Dispersion Modelling Guideline for Ontario, Version, 2.0"*, dated March 2009 (ADMGO) PIBS 5165e02.

The Facility was has not yet been constructed and therefore, s.20 of O. Reg. 419/05 currently applies to the Facility.

The use of a more refined model, such as AERMOD, is necessary when assessing air quality against Schedule 3 Standards. It is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources).

The AERMOD modelling system is made up of the AERMOD dispersion model, the AERMET meteorological pre-processor and the AERMAP terrain pre-processor. The following approved dispersion model and pre-processors were used in the assessment:

- AERMOD dispersion model (v. 13350);
- AERMAP surface pre-processor (v. 11103); and,
- BPIP building downwash pre-processor (v.42104).

AERMET was not used in this assessment, as a pre-processed MOECC meteorological dataset was used. The dataset for Eastern Ontario, which is comprised of hourly surface meteorological data from Ottawa Airport (Station ID 610600) and upper air data from Maniwaki (Station ID 7034480) for the period 1996-2000 were used. The land use surrounding the facility is characterized as rural, and therefore MOECC's "CROPS" meteorological dataset is used.

There are no sensitive receptors (e.g., child care facility, health care facility, senior's residence, long-term care facility or an educational facility) located at the Facility. Therefore, same structure contamination was not considered.

6.1 Dispersion Modelling Input Summary Table

A description of the way in which the approved dispersion modelling was performed is included as Table 3 – Dispersion Modelling Input Summary Table. This table meets both the requirements of s.26(1)11 and sections 8-17 of O. Reg. 419/05 and follows the format provided in the ESDM Procedure Document.

The source data required for each source was determined according to the procedures provided in ADMGO and presented in Figure 3 – Dispersion Modelling Plan. Furthermore, the dispersion modelling input parameters are summarized in Table 4 – Dispersion Modelling Source Summary Table.

6.2 Coordinate System

The Universal Transverse Mercator (UTM) coordinate system, as per Section 5.2.2 of the ADMGO, was used to specify model object sources, buildings and receptors. All coordinates were defined in the North American Datum of 1983 (NAD83).

6.3 Meteorology and Land Use Data

Sub paragraph 10 of s.26(1) of O. Reg.419/05 requires a description of the local land use conditions if meteorological data, as described in paragraph 2 of s.13(l) of O. Reg. 419/05, was used. In this assessment, the AERMOD model was run using a MOECC pre-processed five year dispersion meteorological dataset (i.e., surface and profile files), last updated in 2007, in accordance with paragraph 1 of s.13(1) of O. Reg. 419/05. The dataset for Eastern Ontario, which is comprised of hourly surface meteorological data from Ottawa Airport (Station ID 610600) and upper air data from Maniwaki (Station ID 7034480) for the period 1996-2000 were used in the assessment. The land use surrounding the facility is characterized as rural, as illustrated in Figure 4 – Land Use Zoning Designation Plan and Figure 5 – 3 km Satellite Image. As a result, MOECC's "CROPS" meteorological dataset was used.

6.4 Terrain

Terrain data used in this assessment was obtained from MOECC (7.5 minute format) and is illustrated in Figure 6. DEM files used in this assessment are:

- 1424_1.DEM
- 1424_2.DEM
- 1425_1.DEM
- 1425_2.DEM
- 1426_1.DEM
- 1426_2.DEM

6.5 Receptors

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05. Specifically, a nested receptor grid, centered around the outer edges of all the sources, was placed as follows:

a) 20 m spacing, within an area of 200 m by 200 m;

b) 50 m spacing, within an area surrounding the area described in (a) with a boundary at 300 m by 300 m outside the boundary of the area described in (a);

c) 100 m spacing, within an area surrounding the area described in (b) with a boundary at 800 m by 800 m outside the boundary of the area described in (a);

d) 200 m spacing, within an area surrounding the area described in (c) with a boundary at 1,800 m by 1,800 m outside the boundary of the area described in (a); and,

e) 500 m spacing, within an area surrounding the area described in (d) with a boundary at 4,800 m by 4,800 m outside the boundary of the area described in (a).

In addition to using the nested receptor grid, receptors were also placed every 10 m along the property line. The area of modeling coverage is illustrated on Figure 7 – Dispersion Modelling Receptors. In addition to the modelling receptor grid, discrete receptors representing the location of the closest nearby residences were included for the odour modelling assessment, as shown in Figure 7.

There is no child care facility, health care facility, senior's residence, long-term care facility or an educational facility located at the Facility. As such, same structure contamination was not considered. The nearest residence is located within approximately 500 m from the Facility's property line.

6.6 Building Downwash

Building wake effects were considered in this assessment using the U.S. EPAs Building Profile Input Program (BPIP-PRIME), another pre-processor to AERMOD. The inputs into this pre-processor include the coordinates and heights of the buildings and stacks. The output data from BPIP is used in the AERMOD building wake effect calculations.

The PRIME plume rise algorithms include vertical wind shear calculations [important for buoyant releases from short stacks (i.e. stacks at release heights within the recirculation zones of buildings)]. The PRIME algorithm also allows for the wind speed deficit induced by the building to change with respect to the distance from the building. These factors improve the accuracy of predicted concentrations within building wake zones that form in the lee of buildings.

6.7 Averaging Time and Conversions

Schedule 3 standards of O. Reg. 419/05 apply to this Facility. Many of these standards are based on 1-hour and 24-hour averaging times, which are averaging times easily provided by AERMOD. In cases where a standard has an averaging period that AERMOD is not designed to predict (e.g., 10-min), a conversion to the appropriate averaging period was completed using the MOECC recommended conversion factors, as documented in the ADMGO.

An example is given below for converting from a 1-hour averaging period to a 10-minute averaging period:

$$F = \left(\frac{t_1}{t_0}\right)^n$$

$$= \left(\frac{60}{10}\right)^{0.28}$$

$$= 1.65$$

Where:

F = the factor to convert from the averaging period t_1 output from the model (MOECC assumes AERMOD predicts true 60 minute averages) to the desired averaging period t_0 (assumed to be 10-minutes in the example above), and,

n = the exponent variable; in this case the MOECC value of n = 0.28 is used for conversion.

For averaging periods greater than 1-hour, the AERMOD output was used directly.

Modelling of odour based compounds (whole odour and H_2S) was completed in accordance with the MOE Technical Bulletin titled *Methodology for Modelling Assessments of Contaminants with 10-minute Average Standards and Guidelines* (MOE, 2008).

6.8 Dispersion Modelling Options

The options used in the AERMOD dispersion model are summarized in the table below.

Options used in AERMOD

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Specifies that regulatory default options will be used	No
CONC	Specifies that concentration values will be calculated	Yes
DDPLETE	Specifies that dry deposition will be calculated	No
WDPLETE	Specifies that wet deposition will be calculated	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used	No, the model used elevated terrain data files as detailed in the AERMAP output.
NOSTD	Specifies that the non-default option of no stack-tip downwash will be used	No
AVERTIME	Time averaging periods calculated	1-hr, 24-hr
URBANOPT	Allows the model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions	No
URBANROUGHNESS	Specifies the urban roughness length (m)	No, Site specific urban roughness values were incorporated into the AERMET processing.
FLAGPOLE	Specifies that receptor heights above local ground level are allowed on the receptors	No

6.9 Modelling Files

6.9.1 Contaminant Specific Modelling

Individual model runs were conducted for the following contaminants:

- Particulate matter, including suspended particulate matter (SPM), particles nominally smaller than 10 µm in diameter (PM_{10}), and particles nominally smaller than 2.5 µm in diameter ($PM_{2.5}$);
- Oxides of nitrogen (NO_X);
- Sulphur dioxide (SO_2);
- Carbon monoxide (CO);
- Hydrogen sulphide (H_2S);
- Vinyl chloride (C_2H_3Cl); and,
- Odour.

Each contaminant was modelled individually using the calculated emission rate.

7.0 EMISSION SUMMARY TABLE

7.1 Emission Summary Table

A POI concentration for each significant contaminant emitted from the Facility was determined based on the emission rates listed in Table 2 – Source Summary Table. The results are presented in Table 5 – Emission Summary Table.

As per the guidance document, the eight (8) highest concentrations in the model outputs for 1-hour averaging periods were removed, while the single highest concentration was removed for 24-hour averaging periods. This is to account for meteorological anomalies. The POI concentrations listed in Table 5 were compared against the MOECC POI Limits. At 81.9%, SPM has the highest concentration relative to the corresponding MOECC POI Limit of 120 µg/m^3 over 24-hrs. The maximum is predicted to occur at 465963.00, 5021033.2 (UTM Zone 18), as shown in Figure 7.

7.2 Assessment of Contaminants with no MOECC POI Limits

All nine (9) indicator contaminants assessed have MOECC POI limits.

7.3 Summary of Assessment

In order to simplify the presentation of the results and to focus the report on the assessment of compliance, the contaminants have been categorized, as follows:

Contaminant Category	Number of Contaminants in this ESDM
Significant Contaminants	
Number of Compounds Assessed	9
Compounds without MOECC POI Limits greater than the Jurisdictional Screening Level (JSL)	0
Compounds without MOECC POI Limits greater than the *de minimus* limit	0
Number of Compounds with Upper Risk Thresholds	0

8.0 CONCLUSIONS

This ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the ESDM Procedure Document was followed, as appropriate.

The Facility is subject to s.20 of O. Reg. 419/05; contaminant emissions are assessed for their appropriate averaging periods using the AERMOD dispersion model.

All the emission rates listed in Table 2 – Source Summary Table correspond to the operating scenario that results in the maximum POI concentration from the Site. Therefore, the emission rates listed in Table 2 – Source Summary Table are not likely to be an underestimate of the actual emission rates.

A POI concentration for each significant contaminant emitted from the Facility was determined based on the calculated emission rates and the output from AERMOD; the results are presented in Table 5 – Emission Summary Table and were compared against the respective MOECC POI Limits.

For the nine (9) contaminants assessed with MOECC POI Limits, all the predicted POI concentrations are below the corresponding limits. At 81.9%, SPM has the highest predicted concentration relative to the corresponding MOECC POI Limit of 120 µg/m^3 over 24-hrs.

It is assumed that the conservative emission rates, when combined with the conservative assumed operating conditions and conservative dispersion modelling assumptions, are not likely to under predict the concentrations at a POI. Therefore, this assessment demonstrates that the Facility can operate in compliance with s.20 of O. Reg. 419/05.

9.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

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TABLES

Table 1
Sources and Contaminants Identification Table

Source Information				Significant (Yes or No)?	Modelled (Yes or No)?	Rationale
Source ID	General Location	Sources	Expected Compounds			
1	Flare	Enclosed LFG and Biogas Flare	Landfill gas & biogas combustion by-products	Yes	Yes	—
2	Electrical Generation Plant	LFG and Biogas to Energy Engine	Landfill gas & biogas combustion by-products	Yes	Yes	—
3	Construction and Demolition Facility	Dust Collector	Particulate matter	Yes	Yes	—
4	Material Recovery Facility	Dust Collector	Particulate matter	Yes	Yes	—
5	Organics Processing Facility	Biofilter	Odour	Yes	Yes	—
6		Composting Operations (Material Handling)	Particulate matter	Yes	Yes	—
		Organics Processing Operations (Tailpipe Emissions)	Combustion by-products	Yes	Yes	Although as per O. Reg. 524/98-S.13 the emissions from on-Site vehicles are exempt from Ontario Reg. 419 compliance assessment, they have conservatively been included in the O.Reg. 419/05 compliance assessment for the CRRRC.
7	Composting	Composting, Curing, and Post Processing (Material Handling)	Particulate matter	Yes	Yes	—
		Composting, Curing, and Post Processing (Tailpipe Emissions)	Combustion by-products	Yes	Yes	Although as per O. Reg. 524/98-S.13 the emissions from on-Site vehicles are exempt from Ontario Reg. 419 compliance assessment, they have conservatively been included in the O.Reg. 419/05 compliance assessment for the CRRRC.
8	PHC Impacted Soil Treatment Area	Biofilter	Odour	Yes	Yes	—
9		PHC Impacted Soil Treatment Operations (Material Handling)	Particulate matter	Yes	Yes	—
		PHC Impacted Soil Treatment Operations (Tailpipe Emissions)	Combustion by-products	Yes	Yes	Although as per O. Reg. 524/98-S.13 the emissions from on-Site vehicles are exempt from Ontario Reg. 419 compliance assessment, they have conservatively been included in the O.Reg. 419/05 compliance assessment for the CRRRC.
10	Landfill	Landfill Cap	Products of decomposition of landfill gas	Yes	Yes	—
		Landfill Operations (Material Handling)	Particulate matter	Yes	Yes	—
		Landfill Operations (Tailpipe Emissions)	Combustion by-products	Yes	Yes	Although as per O. Reg. 524/98-S.13 the emissions from on-Site vehicles are exempt from Ontario Reg. 419 compliance assessment, they have conservatively been included in the O.Reg. 419/05 compliance assessment for the CRRRC.
11	Leachate Pre-treatment	Leachate Pre-treatment	Odour	Yes	Yes	—
24		Leachate Holding Pond	Odour	Yes	Yes	Potential odour emissions from the leachate holding pond and the treated effluent pond will be mitigated through aeration and use of a misting system. The leachate holding pond is intended to be used for overflow prior to pre-treatment.
25		Leachate Equalization Pond	Odour	Yes	Yes	
12	Paved Roads	Vehicle Exhaust and Fugitive Road Dust	Particulate matter and Combustion by-products	Yes	Yes	Although as per O. Reg. 524/98-S.13 the emissions from on-Site vehicles and fugitive emissions from on-Site roadways and storage piles are exempt from Ontario Reg. 419 compliance assessment, they have conservatively been included in the O.Reg. 419/05 compliance assessment for the CRRRC.
13	Unpaved Roads	Vehicle Exhaust and Fugitive Road Dust				
14	Support Activities	Stationary Fuel Combustion (MRF)	Combustion by-products	Yes	Yes	—
15		Stationary Fuel Combustion (C&D)				
16		Stationary Fuel Combustion (PHC Impacted Soil Treatment Area)				
17		Stationary Fuel Combustion (Organics Processing Facility)				
18		Stationary Fuel Combustion (Administrative Building)				
19		Stationary Fuel Combustion (Maintenance Garage)				
20		Stationary Fuel Combustion (Leachate Treatment Facility)				
21		Diesel Emergency Power Generator (used to provide electricity during power outages)	Combustion by-products	N/A	N/A	The emergency power generator will be registered under the Environmental Activity and Sector Registry (EASR).
22		Operational Support Activities (such as maintenance activities, including welding, compressor, diesel fire pump, lights)	N/A	No	No	These activities are considered to be negligible in comparison to the other activities occurring on site.
23		Tailpipe Exhaust from Maintenance Vehicles	Combustion by-products	No	No	These activities are considered to be negligible in comparison to the other activities occurring on site.

Table 2
Source Summary Table

Source Identifier	Source Description	Source: Stack Height Above Roof [m]	X Coordinate [m]	Y Coordinate [m]	Emission Data: Contaminant	CAS No.	Maximum Emission Rate [g/s]	Max. Emission Rate per source (or m^2)	Averaging Period [hours]	Emission Estimating Technique	Emissions Data Quality	Percentage of Overall Emissions [%]
1	Flare	N/A	466687.1	5021298.5	Hydrogen Sulfide	7783-06-4	0.00013	0.0001309	1	EF	Above-Average	2%
					Vinyl chloride	75-01-4	0.00007	0.0000710	1	EF	Above-Average	10%
					Carbon Monoxide	630-08-0	0.40571	0.406	1	EF	Above-Average	6%
					Nitrogen Oxides	10102-44-0	0.34709	0.347	1	EF	Above-Average	10%
					Suspended particulate matter (< 44 µm Diameter)	N/A	0.13091	0.131	1	EF	Above-Average	9%
					PM10	N/A	0.13091	0.131	1	EF	Above-Average	17%
					PM2.5	N/A	0.13091	0.131	1	EF	Above-Average	22%
					Sulphur Dioxide	7446-09-5	0.10182	0.102	1	EF	Average	50%
2	Electrical Generation Plant	6.5	466688.8	5021351	Hydrogen Sulfide	7783-06-4	0.00305	0.00044	1	EF	Above-Average	39%
		6.5	466690.8	5021347	Vinyl chloride	75-01-4	0.00025	0.00004	1	EF	Above-Average	36%
		6.5	466692.3	5021342	Carbon Monoxide	630-08-0	4.65650	0.665	1	EF	Above-Average	71%
		6.5	466694.1	5021337	Nitrogen Oxides	10102-44-0	0.44044	0.063	1	EF	Above-Average	12%
		6.5	466696.1	5021333	Suspended particulate matter (< 44 µm Diameter)	N/A	0.12761	0.0182	1	EF	Marginal	8%
		6.5	466697.6	5021328	PM10	N/A	0.12761	0.018	1	EF	Marginal	17%
		6.5	466699.5	5021323	PM2.5	N/A	0.12761	0.018	1	EF	Marginal	22%
					Sulphur Dioxide	7446-09-5	0.10183	0.015	1	EF	Average	50%
3	Construction and Demolition Facility	2	466349.70	5021470.00	Suspended particulate matter (< 44 µm Diameter)	N/A	0.07079	0.071	1	EC	Average	5%
					PM10	N/A	0.07079	0.071	1	EC	Average	9%
					PM2.5	N/A	0.07079	0.071	1	EC	Average	12%
4	Material Recovery Facility	2	466688.80	5021351.40	Suspended particulate matter (< 44 µm Diameter)	N/A	0.07079	0.071	1	EC	Average	5%
					PM10	N/A	0.07079	0.071	1	EC	Average	9%
					PM2.5	N/A	0.07079	0.071	1	EC	Average	12%
5	Organics Processing Facility	2.5	466485.8	5021210.5	Odour	N/A	10000.00000	10000.000	10-min	EC	Above Average	46%
8	PHC Impacted Soil Treatment Area	N/A	466355.3	5020948.9	Odour	N/A	2083.33333	2083.333	10-min	EC	Above Average	10%
11	Leachate Pre-Treatment	2.5	466483.6	5021034.7	Odour	N/A	6944.44444	6944.444	10-min	EC	Above Average	32%
AREA SOURCES		**Area [m^2]**	**X Coordinate [m]**	**Y Coordinate [m]**	**Contaminant**	**CAS No.**	**Maximum Emission Rate [g/s]**	**Max. Emission Rate per source (or m^2)**	**Averaging Period [hours]**	**Emission Estimating Technique**	**Emissions Data Quality**	**Percentage of Overall Emissions [%]**
6, 7, 9	Organics processing facility, composting, PHC soil treatment facility	99596	Various	Various	Suspended particulate matter (< 44 µm Diameter)	N/A	1.05E-01	1.06E-06	1	EF	Above Average	7%
					PM10	N/A	9.78E-02	9.82E-07	1	EF	Above Average	13%
					PM2.5	N/A	9.00E-02	9.04E-07	1	EF	Above Average	15%
					Nitrogen Oxides	10102-44-0	1.65E+00	1.65E-05	1	EF	Marginal	46%
					Sulphur Dioxide	7446-09-5	2.78E-05	2.79E-10	1	EF	Marginal	<1%
					Carbon Monoxide	630-08-0	1.51E+00	1.51E-05	1	EF	Marginal	23%
7	Composting	22739	Various	Various	Odour	N/A	3.09E+02	1.36E-02	1	EF	Marginal	1%
10	Landfill	839408	Various	Various	Carbon monoxide	630-08-0	2.92E-03	3.48E-09	1	EF	Average	<1%
					Hydrogen Sulfide	7783-06-4	4.66E-03	5.56E-09	1	EF	Above-Average	59%
					Vinyl chloride	75-01-4	3.80E-04	4.52E-10	1	EF	Above-Average	54%
					Odour	N/A	2.39E+03	2.85E-03	1	EC	Marginal	11%
					Suspended particulate matter (< 44 µm Diameter)	N/A	7.79E-02	9.28E-08	1	EF	Average	5%
					PM10	N/A	6.94E-02	8.27E-08	1	EF	Average	9%
					PM2.5	N/A	6.30E-02	7.50E-08	1	EF	Average	11%
					Nitrogen Oxides	10102-44-0	1.08E+00	1.29E-06				30%
24	Leachate Holding Pond	6629	Various	Various	Odour	N/A	9.25E-01	1.40E-04	10-min	EF	Marginal	<1%
25	Leachate Equalization Pond	19688	Various	Various	Odour	N/A	9.25E-01	4.70E-05	10-min	EF	Marginal	<1%
VOLUME SOURCES		**Initial Vertical Dimension of Volume [m]**	**X Coordinate [m]**	**Y Coordinate [m]**	**Contaminant**	**CAS No.**	**Maximum Emission Rate [g/s]**	**Max. Emission Rate per source (or m^2)**	**Averaging Period [hours]**	**Emission Estimating Technique**	**Emissions Data Quality**	**Percentage of Overall Emissions [%]**
12	Paved Roads	1.63	Various	Various	Suspended particulate matter (< 44 µm Diameter)	N/A	6.35E-01	N/A	1	EF	Marginal	42%
					PM10	N/A	1.23E-01	N/A	1	EF	Marginal	16%
					PM2.5	N/A	3.05E-02	N/A	1	EF	Marginal	5%
					Nitrogen Oxides	10102-44-0	3.15E-02	N/A	1	EF	Marginal	<1%
					Sulphur Dioxide	7446-09-5	8.79E-05	N/A	1	EF	Marginal	<1%
					Carbon Monoxide	630-08-0	7.26E-03	N/A	1	EF	Marginal	<1%
13	Unpaved Roads	1.63	Various	Various	Suspended particulate matter (< 44 µm Diameter)	N/A	2.88E-01	N/A	1	EF	Marginal	19%
					PM10	N/A	7.79E-02	N/A	1	EF	Marginal	10%
					PM2.5	N/A	7.86E-03	N/A	1	EF	Marginal	1%
					Nitrogen Oxides	10102-44-0	2.51E-03	N/A	1	EF	Marginal	<1%
					Sulphur Dioxide	7446-09-5	7.00E-06	N/A	1	EF	Marginal	<1%
					Carbon Monoxide	630-08-0	5.78E-04	N/A	1	EF	Marginal	<1%
14	Stationary Fuel Combustion (MRF)	6.3	466340.4	5021465.9	Nitrogen Oxides	10102-44-0	6.05E-03	N/A	1	EF	Marginal	<1%
15	Stationary Fuel Combustion (C&D)	6.4	466140.2	5021380	Nitrogen Oxides	10102-44-0	6.05E-03	N/A	1	EF	Marginal	<1%
16	Stationary Fuel Combustion (PHC Impacted Soil Treatment Area)	4.2	466360.8	5020952	Nitrogen Oxides	10102-44-0	3.46E-03	N/A	1	EF	Marginal	<1%
17	Stationary Fuel Combustion (Organics Processing Facility)	7.2	466486.4	5021208.2	Nitrogen Oxides	10102-44-0	5.18E-03	N/A	1	EF	Marginal	<1%
18	Stationary Fuel Combustion (Administrative Building)	3.5	465945.7	5021095.2	Nitrogen Oxides	10102-44-0	3.74E-04	N/A	1	EF	Marginal	<1%
19	Stationary Fuel Combustion (Maintenance Garage)	3.7	466535.2	5021494.6	Nitrogen Oxides	10102-44-0	2.30E-03	N/A	1	EF	Marginal	<1%
20	Stationary Fuel Combustion (Leachate Treatment Facility)	7.2	466480.1	5021031.8	Nitrogen Oxides	10102-44-0	1.53E-02	N/A	1	EF	Marginal	<1%
21	Diesel Emergency Power Generator (used to provide electricity during power outages)	N/A	N/A	N/A	Nitrogen Oxides (EPG)	10102-44-0	1.45E-01	N/A	1	EF	Marginal	100%

Notes:
1- The emergency generator was not included in the model as it will be registered under the MOE Environmental Activity and Sector Registry (EASR), as described in Table 1.
"V-ST" - Validated Source Test, "ST" - Source Test, "EF" - Emission Factor, "MB" Mass Balance, "EC" - Engineering Calculation
Data Quality Categories: "Highest"; "Above-Average"; "Average"; and "Marginal"

Table 3

Dispersion Modelling Input Summary Table

Relevant Section of the Regulation	Section Title	Summary of How the Approved Dispersion Model Was Used	Location of Supporting Documentation in ESDM Report
Section 8	Negligible Sources of Contaminants	Sources and contaminants that were considered negligible were explicitly identified, and therefore were not modelled in accordance with s.8 of O.Reg.419/05.	Section 3.0, Table 1
Section 9	Same Structure Contamination	Not applicable as the Facility is the only tenant occupying the property, and does not have a child care facility, health care facility, senior's residence, long-term care facility or an education facility located at the on-site.	N/A
Section 10	Operating Conditions	The operating scenario presented includes the emissions of all the CRRRC components, all equipment operating at the maximum rated capacity for the entire period.	Section 4.0, Table 4
Section 11	Source of Contaminant Emission Rates	The emission rate for each significant contaminant emitted from a significant source was estimated, the methodology for the calculation is documented in Table 2 - Source Summary Table.	Section 4.0, Table 2
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The Operating Conditions were estimated in accordance with s.10(1) 1 and s.11(1) 1 of O.Reg.419/05 and are therefore considered to result in the highest POI concentration that the Facility is capable of for each contaminant emitted.	Section 4.0
Section 13	Meteorological Conditions	AERMOD model was run using a MOE pre-processed five year dispersion meteorological dataset (i.e., surface and profile files), last updated in 2007, in accordance with paragraph 1 of s.13(1) of O. Reg. 419/05. The rural land-use meteorological dataset for the Ottawa area was used.	Section 6.3
Section 14	Area of Modelling Coverage (receptor locations)	A nested grid of receptors, centered around the outer edges of all of the sources was chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05.	Section 6.5, Figure 7
Section 15	Stack Height for Certain New Sources of Contaminant	Not applicable as s.15 of O.Reg.419/05 does not apply to the Facility.	N/A
Section 16	Terrain Data	Terrain data used in this assessment was obtained from MOE (7.5 minute format).	Section 6.4, Figure 6
Section 17	Averaging Periods	The Schedule 3 standards for many of the contaminants emitted from the site are based on a 1-hour or 24-hour averaging time, which is easily provided by AERMOD. Some of the contaminants have 10-min and 1/2-hour MOE POI Limits. These MOE POI concentrations were estimated using the conversion factors provided in Section 4.4 of the ADMGO.	Section 6.7

Table 4
Dispersion Modelling Source Summary Table

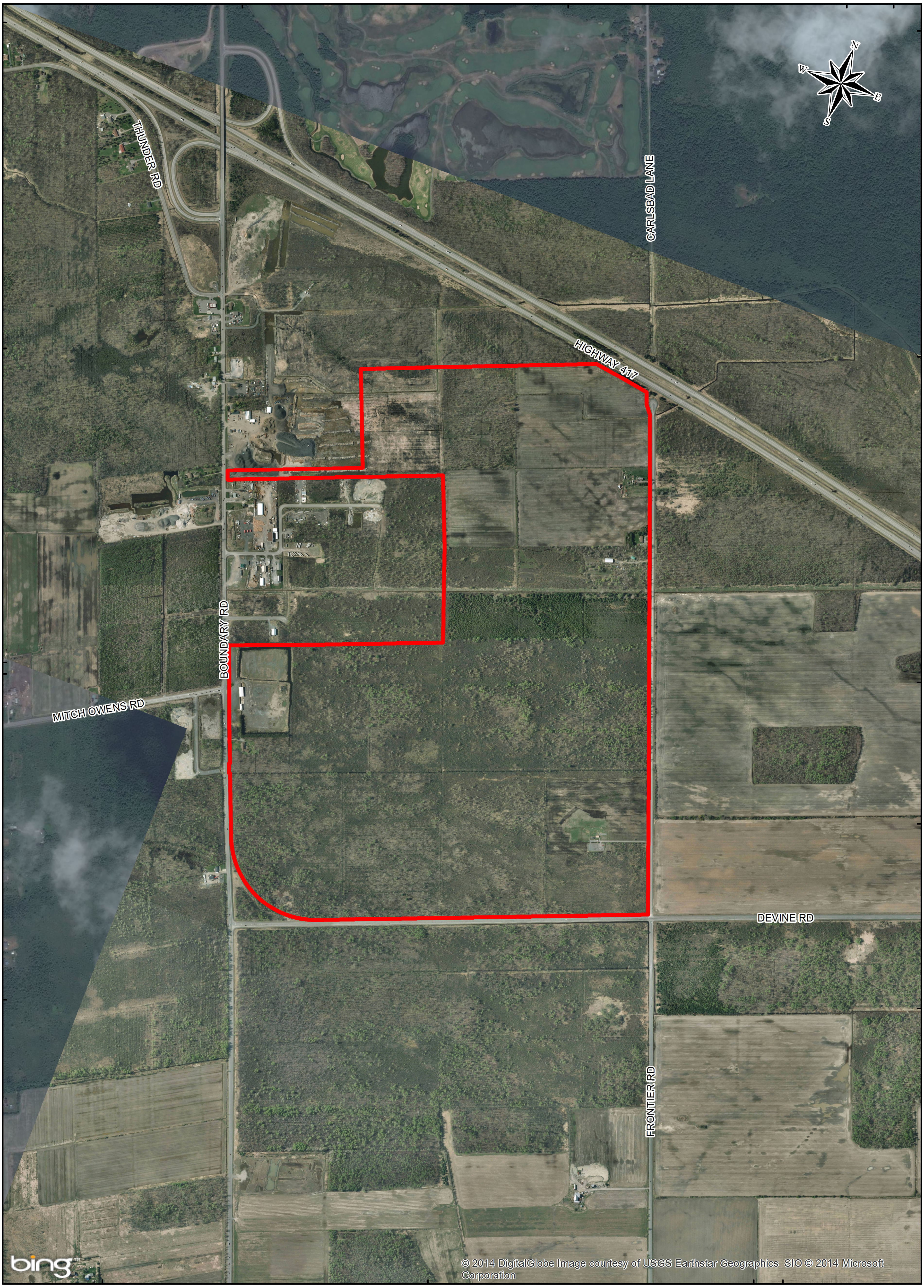
Modelling ID	Source ID(s)	Source Type	Modelling Source Data						Emissions Data		
			Stack Height Above	Stack Gas Exit Velocity [m/s]	Stack Gas Exit Temperature [°C]	Stack Inner Diameter	X Coordinate [m]	Y Coordinate [m]	Contaminant	CAS No.	Maximum Emission Rate [g/s]
1	FLARE	Point	12.2	16.6	1,528	3.0	466687.1	5021298.5	Hydrogen Sulfide	7783-06-4	1.31E-04
									Vinyl chloride	75-01-4	7.10E-05
									Carbon Monoxide	630-08-0	4.06E-01
									Nitrogen Oxides	10102-44-0	3.47E-01
									Suspended particulate matter (< 44 µm Diameter)	N/A	1.31E-01
									PM10	N/A	1.31E-01
									PM2.5	N/A	1.31E-01
									Sulphur Dioxide	7446-09-5	1.02E-01
2	ENG1	Point	12.5	17.8	509	0.3	466688.8	5021351.0	Hydrogen Sulfide	7783-06-4	3.05E-03
	ENG2		12.5	17.8	509	0.3	466690.8	5021347.0	Vinyl chloride	75-01-4	2.49E-04
	ENG3		12.5	17.8	509	0.3	466692.3	5021342.0	Carbon Monoxide	630-08-0	4.66E+00
	ENG4		12.5	17.8	509	0.3	466694.1	5021337.0	Nitrogen Oxides	10102-44-0	4.40E-01
	ENG5		12.5	17.8	509	0.3	466696.1	5021333.0	Suspended particulate matter (< 44 µm Diameter)	N/A	1.28E-01
	ENG6		12.5	17.8	509	0.3	466697.6	5021328.0	PM10	N/A	1.28E-01
	ENG7		12.5	17.8	509	0.3	466699.5	5021323.0	PM2.5	N/A	1.28E-01
									Sulphur Dioxide	7446-09-5	1.02E-01
3	CnD_DC	Point	15.75	9.0	20	1.0	466349.7	5021470.0	Suspended particulate matter (< 44 µm Diameter)	N/A	7.08E-02
									PM10	N/A	7.08E-02
									PM2.5	N/A	7.08E-02
4	MRF_DC	Point	15.5	9.0	20	1.0	466688.80	5021351.40	Suspended particulate matter (< 44 µm Diameter)	N/A	7.08E-02
									PM10	N/A	7.08E-02
									PM2.5	N/A	7.08E-02
5	Org_BioF	Point	5.0	17.7	25	1.2	466485.8	5021210.5	Odour	N/A	1.00E+04
8	HC_BioF	Point	4.0	8.3	25	0.8	466355.3	5020948.9	Odour	N/A	2.08E+03
11	LEACHATE	Point	18.0	8.8	25	1	466483.6	5021034.7	Odour	N/A	6.94E+03
AREA SOURCES				Release Height [m]	Initial Vertical Dimension (Optional) [m]	Area [m2]	X Coordinate [m]	Y Coordinate [m]	Contaminant	CAS No.	Maximum Emission Rate [g/s]
6, 7, 9	AREA	Area		4	1.9	99,595.9	Various	Various	Suspended particulate matter (< 44 µm Diameter)	N/A	1.05E-01
									PM10	N/A	9.78E-02
									PM2.5	N/A	9.00E-02
									Nitrogen Oxides	10102-44-0	1.65E+00
									Sulphur Dioxide	7446-09-5	2.78E-05
									Carbon Monoxide	630-08-0	1.51E+00
7	COMP_OPS	Area		4	0.0	22739.17	Various	Various	Odour	N/A	3.09E+02
10	Landfill	Area		45.8	0	839407.5	Various	Various	Hydrogen Sulfide	7783-06-4	4.66E-03
									Vinyl chloride	75-01-4	3.80E-04
									Odour	N/A	2.39E+03
									Suspended particulate matter (< 44 µm Diameter)	N/A	7.79E-02
									PM10	N/A	6.94E-02
									PM2.5	N/A	6.30E-02
									Nitrogen Oxides	10102-44-0	1.08E+00
24	POND	Area		0.6	0	6629	Various	Various	Odour	N/A	9.25E-01
25	EQ_POND	Area		0.6	0	19688	Various	Various	Odour	N/A	9.25E-01
VOLUME SOURCES				Release Height [m]	Initial Lateral Dimension of Volume [m]	Initial Vertical Dimension of Volume [m]	X Coordinate [m]	Y Coordinate [m]	Contaminant	CAS No.	Maximum Emission Rate [g/s]
12	PAVED	Volume		3.50	3.14	1.63	Various	Various	Suspended particulate matter (< 44 µm Diameter)	N/A	6.35E-01
									PM10	N/A	1.23E-01
									PM2.5	N/A	3.05E-02
									Nitrogen Oxides	10102-44-0	3.15E-02
									Sulphur Dioxide	7446-09-5	8.79E-05
									Carbon Monoxide	630-08-0	7.26E-03
13	UNPAVED	Volume		3.50	4.01	1.63	Various	Various	Suspended particulate matter (< 44 µm Diameter)	N/A	2.88E-01
									PM10	N/A	7.79E-02
									PM2.5	N/A	7.86E-03
									Nitrogen Oxides	10102-44-0	2.51E-03
									Sulphur Dioxide	7446-09-5	7.00E-06
									Carbon Monoxide	630-08-0	5.78E-04
14	MRF_NOx	Volume		13.5	50.2	6.28	466340.4	5021465.9	Nitrogen Oxides	10102-44-0	6.05E-03
15	CnD_NOx	Volume		13.75	60.5	6.4	466140.2	5021380	Nitrogen Oxides	10102-44-0	6.05E-03
16	HCS_NOx	Volume		9	23.5	4.19	466360.8	5020952	Nitrogen Oxides	10102-44-0	3.46E-03
17	Org_NOx	Volume		15.5	40.8	7.2	466486.4	5021208.2	Nitrogen Oxides	10102-44-0	5.18E-03
18	Admin_NOx	Volume		7.5	20.7	3.48	465945.7	5021095.2	Nitrogen Oxides	10102-44-0	3.74E-04
19	Maint_NOx	Volume		8	23.8	3.72	466535.2	5021494.6	Nitrogen Oxides	10102-44-0	2.30E-03
20	Leachate_NOx	Volume		15.5	38.3	7.2	466480.1	5021031.8	Nitrogen Oxides	10102-44-0	1.53E-02
21	EPG	Volume		N/A	N/A	N/A	N/A	N/A	Nitrogen Oxides (EPG)	10102-44-0	1.45E-01

Note:
1- The emergency generator was not included in the model as it will be registered under the MOE Environmental Activity and Sector Registry (EASR), as described in Table 1.

Table 5
Emission Summary Table

Contaminant	CAS No.	Total Facility Emission Rate [g/s]	Air Dispersion Model Used	Maximum POI Concentration [µg/m³]	Averaging Period [hours]	MOE POI Limit [µg/m³]	Limiting Effect	Regulation Schedule No.	Percentage of MOE Limit [%]
Sulphur Dioxide	7446-09-5	0.102	AERMOD	8.54	24	275	Health & Vegetation	Schedule 3	3.1%
Sulphur Dioxide	7446-09-5	0.102	AERMOD	15.91	1	690	Health & Vegetation	Schedule 3	2.3%
Hydrogen Sulfide	7783-06-4	0.0077	AERMOD	0.26	24	7	Health	Schedule 3	3.7%
Hydrogen Sulfide	7783-06-4	0.0077	AERMOD	0.79	10-min	13	Odour	Schedule 3	6.1%
Nitrogen Oxides	10102-44-0	3.241	AERMOD	37.15	24	200	Health	Schedule 3	18.6%
Nitrogen Oxides	10102-44-0	3.241	AERMOD	68.90	1	400	Health	Schedule 3	17.2%
Carbon Monoxide	630-08-0	6.173	AERMOD	872.44	½	6000	Health	Schedule 3	14.5%
Vinyl chloride	75-01-4	0.0006	AERMOD	0.021	24	1	Health	Schedule 3	2.1%
Suspended particulate matter (< 44 µm Diameter)	N/A	0.00	AERMOD	98.23	24	120	Visibility	Schedule 3	81.9%
PM10	N/A	0.637	AERMOD	23.30	24	50	—	AAQC	46.6%
PM2.5	N/A	0.461	AERMOD	20.16	24	25	—	AAQC	80.6%
Odour	N/A	21732.183	AERMOD	0.58	10-min	1	Odour	Guideline	57.8%

FIGURES



LEGEND

PROPERTY BOUNDARY

400 200 0 400

SCALE 1:12,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT
EMISSION SUMMARY AND DISPERSION MODELLING REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
SITE LOCATION PLAN

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045		
DESIGN	AVW	MAR. 2014
GIS	BR/PM	MAR. 2014
CHECK	PLE	AUG. 2014
REVIEW	PAS	AUG. 2014

SCALE AS SHOWN REV. 0.0

FIGURE 1

Path: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\GIS\MXDs\12-1125-0045\Reporting\Phase2000\Task_110_Air\1211250045-2000-0110-01_SiteLocationPlan.mxd

Date: November 2013

Project: 12-1125-0045

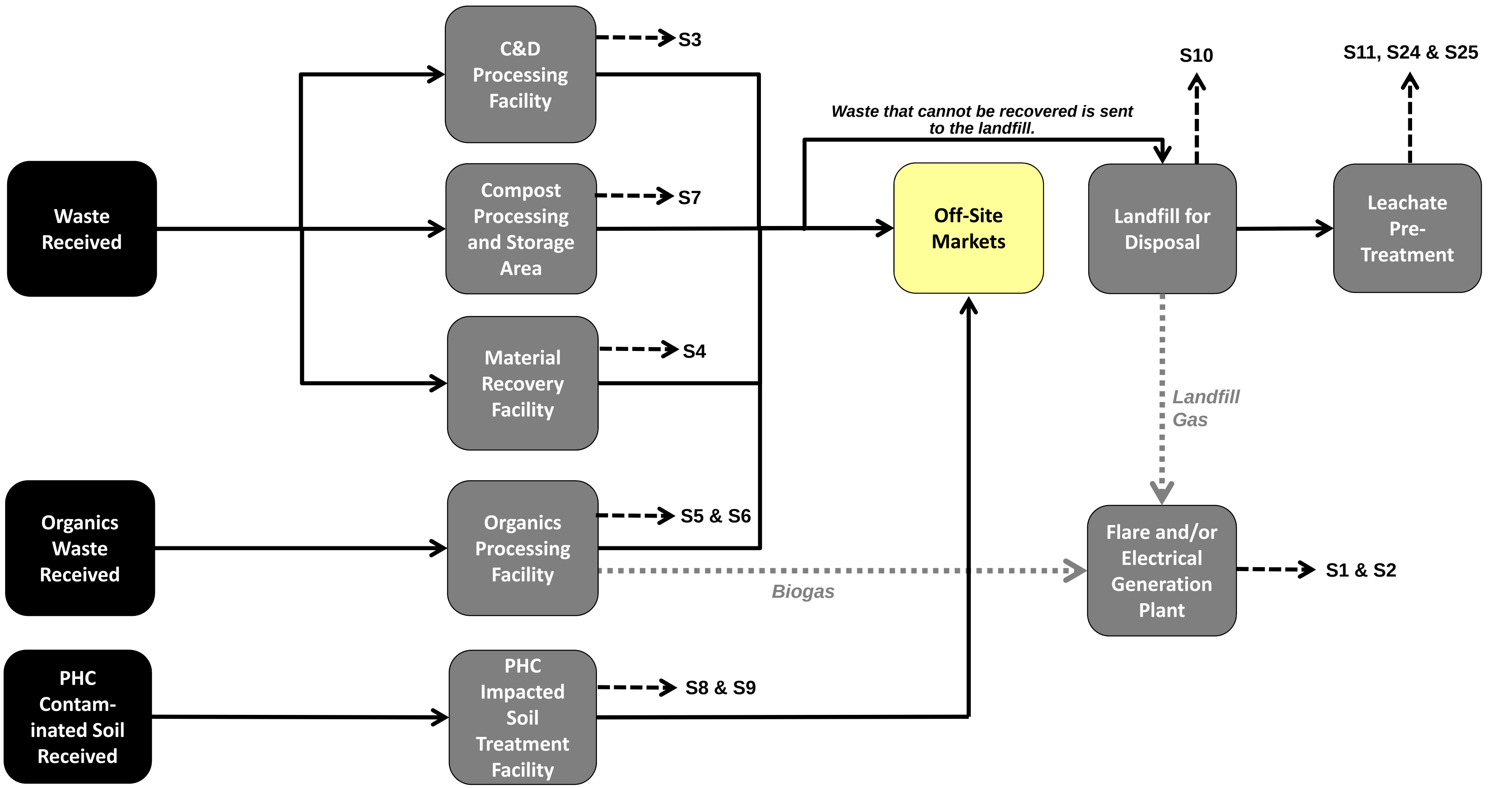
Golder Associates

SIMPLIFIED PROCESS FLOW DIAGRAM

Capital Region Resource Recovery Centre

Ottawa, Ontario

FIGURE 2A



LEGEND

- PROCESS FLOW
- EMISSIONS TO ATMOSPHERE
- SOURCE IDENTIFIER

Made By: AVW

Checked By: CST

NOTES:

1. **This schematic represents the major processes taking place at the Facility. Simple processes such as maintenance, QA/QC procedures, backup operational procedures, and parts-washing have not been represented.**
2. **Vehicle exhaust and fugitive road dust (S12 & S13) are not shown.**

N:\Active\2012\1125 - Environmental and Civil Engineering\12-1125-0045 CRRRC EA Eastern ON\Phase 4000_EA_Documentation\Vol 4 - D&O\ESDM Report\Figures

Date: November 2013

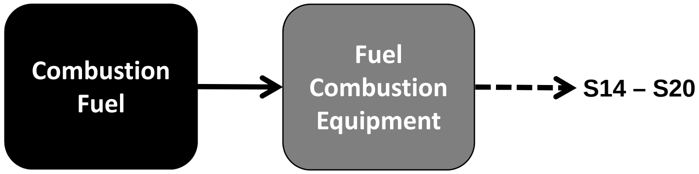
Project: 12-1125-0045

Golder Associates

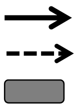
SIMPLIFIED PROCESS FLOW DIAGRAM
Capital Region Resource Recovery Centre
Ottawa, Ontario

FIGURE 2B

N:\Active\2012\1125 - Environmental and Civil Engineering\12-1125-0045 CRRRC EA Eastern ON\Phase 4000_EA_Documentation\Vol 4 - D&O\ESDM Report\Figures



LEGEND



PROCESS FLOW

EMISSIONS TO ATMOSPHERE

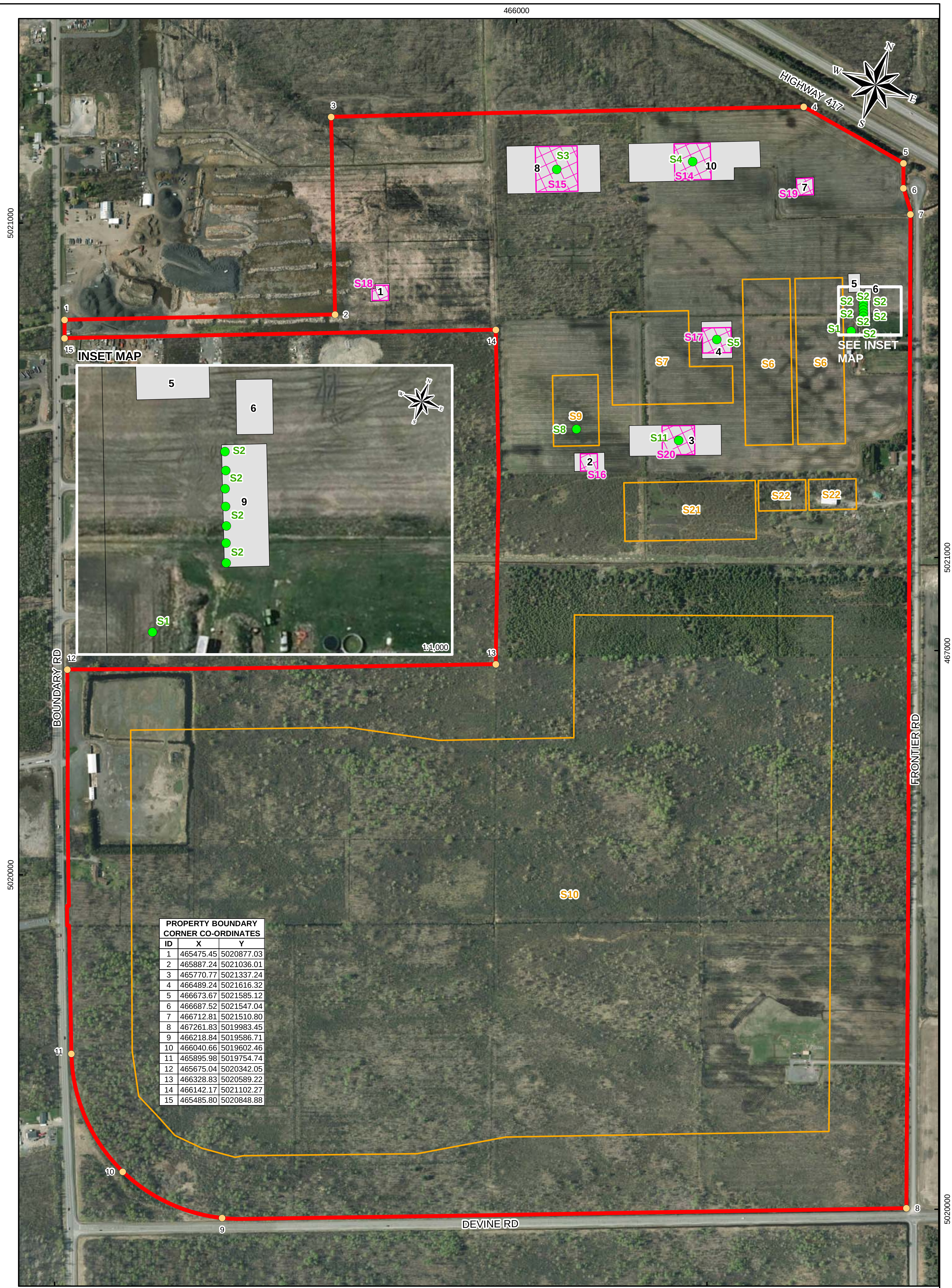
SOURCE IDENTIFIER

Made By: AVW

Checked By: CST

NOTES:

1. **This schematic represents the major processes taking place at the Facility. Simple processes such as maintenance, QA/QC procedures, backup operational procedures, and parts-washing have not been represented.**



PROPERTY BOUNDARY CORNER CO-ORDINATES		
ID	X	Y
1	465475.45	5020877.03
2	465887.24	5021036.01
3	465770.77	5021337.24
4	466489.24	5021616.32
5	466673.67	5021585.12
6	466687.52	5021547.04
7	466712.81	5021510.80
8	467261.83	5019983.45
9	466218.84	5019586.71
10	466040.66	5019602.46
11	465895.98	5019754.74
12	465675.04	5020342.05
13	466328.83	5020589.22
14	466142.17	5021102.27
15	465485.80	5020848.88

LEGEND

- POINT SOURCES
- PROPERTY BOUNDARY CORNER CO-ORDINATES
- VOLUME SOURCE
- PROPERTY BOUNDARY
- AREA SOURCES
- BUILDINGS

BUILDING HEIGHTS
BUILDING 1 - 7.50 m
BUILDING 2 - 9.00 m
BUILDING 3 - 15.50 m
BUILDING 4 - 15.50 m
BUILDING 5 - 10.75 m
BUILDING 6 - 6.50 m
BUILDING 7 - 8.00 m
BUILDING 8 - 13.75 m
BUILDING 9 - 6.00 m
BUILDING 10 - 13.50 m

Point Sources		
Source ID	X Coordinate	Y Coordinate
S1	466687.1	5021298.5
S2	Various	Various
S3	466145.7	5021382.2
S4	466349.7	5021470
S5	466485.8	5021210.5
S8	466355.3	5020948.9
S11	466483.6	5021034.7

Area Sources
Source ID
S6
S7
S9
S10
S21
S22

Volume Sources
Source ID
S14
S15
S16
S17
S18
S19
S20

200 100 0 200

SCALE 1:6,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT
EMISSION SUMMARY AND DISPERSION MODELLING REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
DISPERSION MODELLING PLAN

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	AVW	MAR. 2014	FIGURE 3	
GIS	BR/PM	MAR. 2014		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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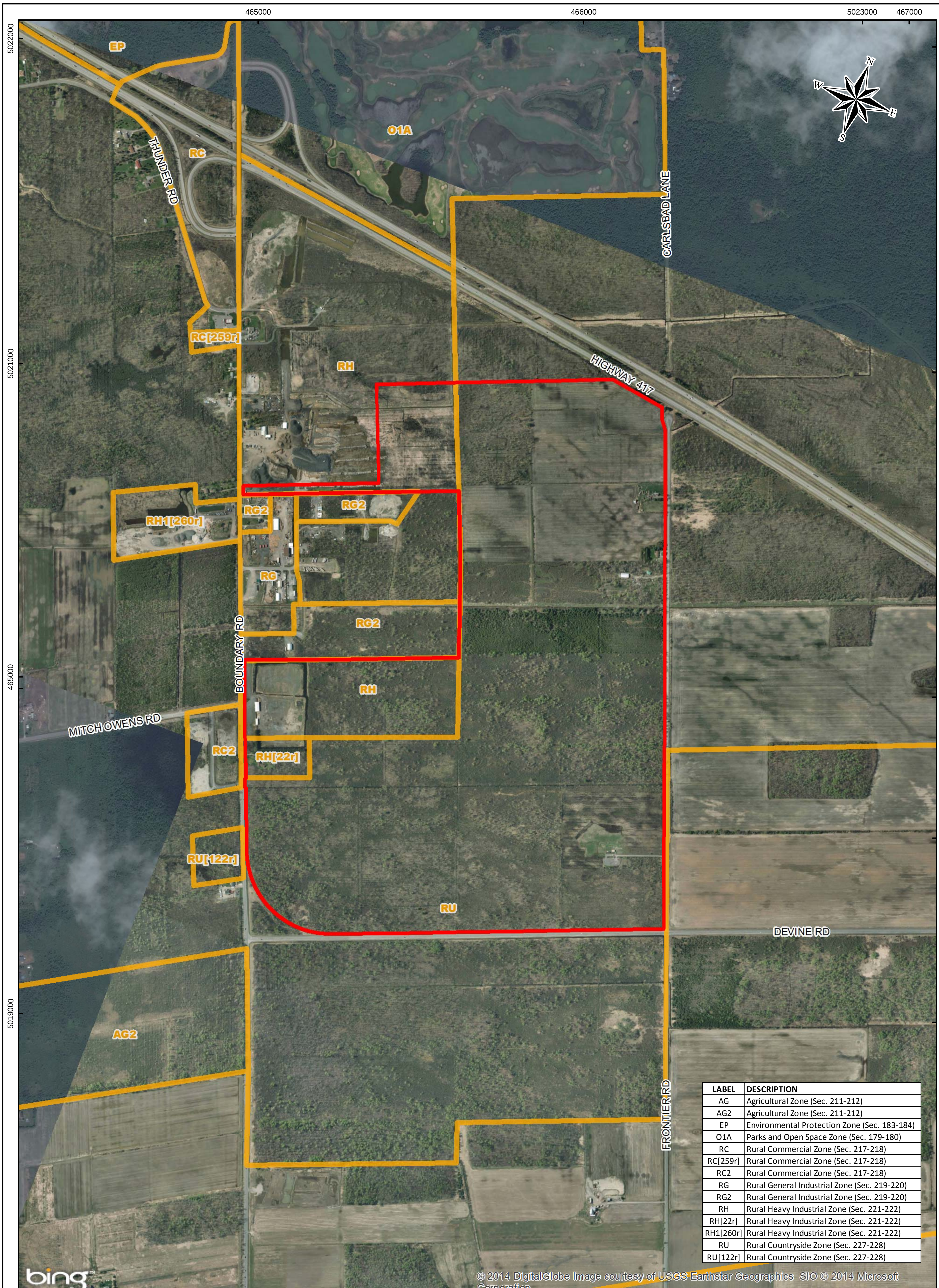


LABEL	DESCRIPTION
AG	Agricultural Zone (Sec. 211-212)
AG2	Agricultural Zone (Sec. 211-212)
EP	Environmental Protection Zone (Sec. 183-184)
O1A	Parks and Open Space Zone (Sec. 179-180)
RC	Rural Commercial Zone (Sec. 217-218)
RC[259r]	Rural Commercial Zone (Sec. 217-218)
RC2	Rural Commercial Zone (Sec. 217-218)
RG	Rural General Industrial Zone (Sec. 219-220)
RG2	Rural General Industrial Zone (Sec. 219-220)
RH	Rural Heavy Industrial Zone (Sec. 221-222)
RH[22r]	Rural Heavy Industrial Zone (Sec. 221-222)
RH1[260r]	Rural Heavy Industrial Zone (Sec. 221-222)
RU	Rural Countryside Zone (Sec. 227-228)
RU[122r]	Rural Countryside Zone (Sec. 227-228)

LEGEND

PROPERTY BOUNDARY

CITY OF OTTAWA ZONING BOUNDARY

400 200 0 400

SCALE 1:12,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

ZONING BOUNDARIES DIGITIZED FROM GEOOTTAWA, CITY OF OTTAWA MAPPING WEBSITE, HTTP://MAPS.OTTAWA.CA/GEOOTTAWA.
BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

EMISSION SUMMARY AND DISPERSION MODELLING REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

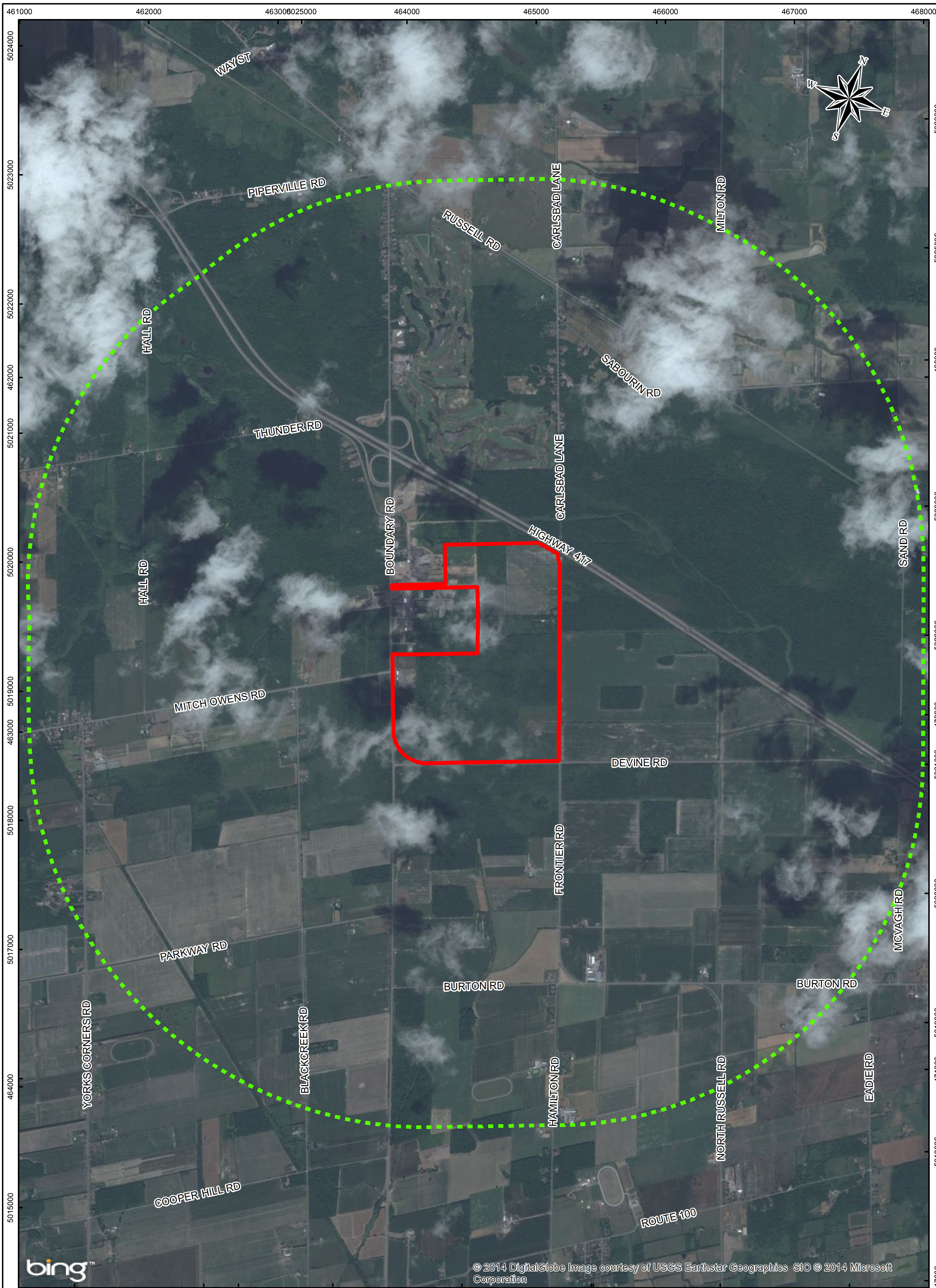
TITLE

LAND USE ZONING DESIGNATION PLAN

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	AVW	MAR. 2014	FIGURE 4	
GIS	BR/PM	MAR. 2014		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

Path: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\GIS\MXDs\12-1125-0045\Reporting\Phase2000\Task_110_Air\1211250045-2000-0110-04_LandUseZoning.mxd



LEGEND

PROPERTY BOUNDARY

3 km BUFFER FROM PROPERTY BOUNDARY

1,000 500 0 1,000

SCALE 1:30,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

EMISSION SUMMARY AND DISPERSION MODELLING REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

3 km SATELLITE IMAGE

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	AVW	MAR. 2014	**FIGURE 5**	
GIS	BR/PM	MAR. 2014		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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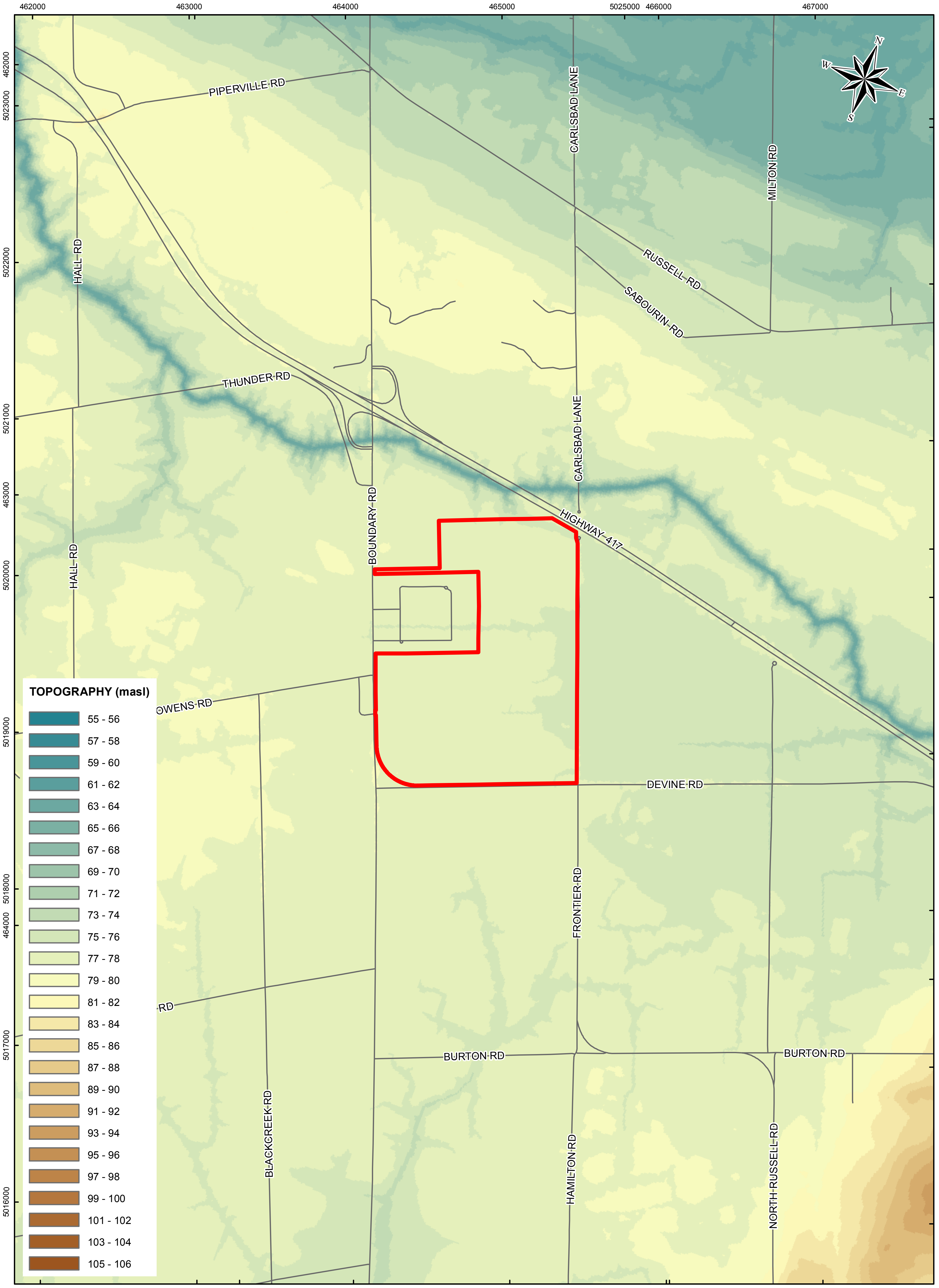

LEGEND

PROPERTY BOUNDARY

500 250 0 500 1,000

SCALE 1:25,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.

PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

EMISSION SUMMARY AND DISPERSION MODELLING REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

DIGITAL TERRAIN DATA

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	AVW	MAR. 2014	FIGURE 6	
GIS	BR	MAR. 2014		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

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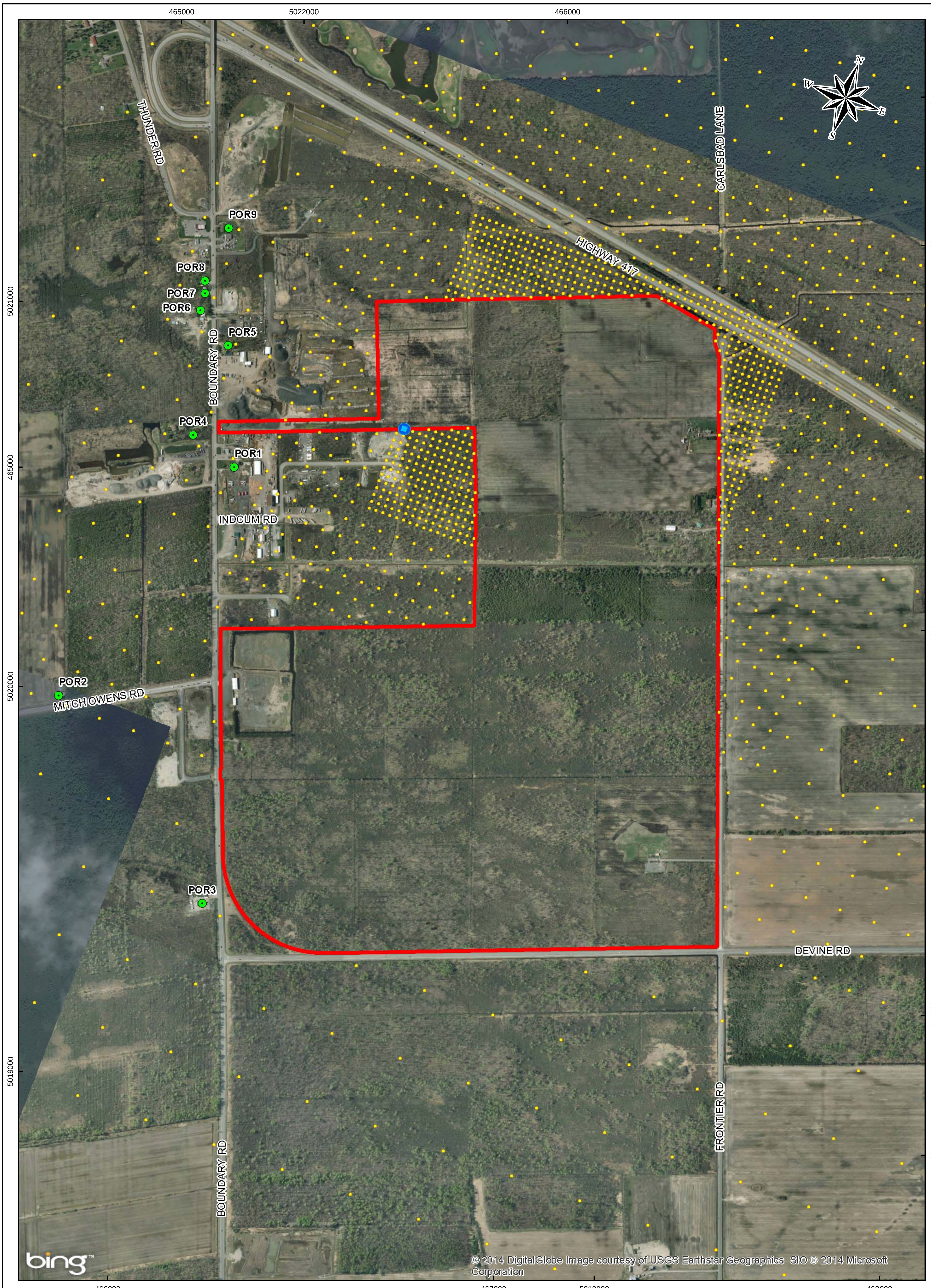


LEGEND

- POINT OF IMPINGEMENT
- DISPERSION MODELLING RECEPTORS
- DISCRETE RECEPTORS
- PROPERTY BOUNDARY (INCLUDING RECEPTORS LOCATED ALONG THE PROPERTY BOUNDARY AT A SPACING OF 10 m)

200 100 0 200

SCALE 1:10,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

EMISSION SUMMARY AND DISPERSION MODELLING REPORT FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

DISPERSION MODELLING RECEPTORS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	AVW	MAR. 2014	FIGURE 7	
GIS	BR/PM	MAR. 2014		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

Path: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\GIS\MXDs\12-1125-0045\Reporting\Phase2000\Task_110_Air\1211250045-2000-0110-07_DispersionModellingReceptors.mxd

ATTACHMENT A

Emission Rate Calculations

December 2014

ATTACHMENT A

Emission Rate Calculations

ESDM REPORT

Report Number: 12-1125-0045/4500/vol IV

ACRONYMS AND GLOSSARY OF TERMS

Acronym	Definition
C&D	Construction and Demolition
CO	Carbon monoxide
CRRRC	Capital Region Resource Recovery Centre
EA	Environmental Assessment
EPA	Environmental Protection Agency
ER	Emission rate
ESDM	Emissions Summary and Dispersion Modelling
FR	Flow Rate
GHG	Greenhouse Gas
HC	Hydrocarbon
IPCC	International Panel on Climate Change
LFG	Landfill gas
MOE	Ontario Ministry of the Environment
MRF	Material Recycling Facility
MSW	Municipal Solid Waste
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_X	Oxides of nitrogen
O. Reg.	Ontario Regulation
O_3	Ozone
PM_{10}	Particles nominally smaller than 10 µm in aerodynamic diameter
$PM_{2.5}$	Particles nominally smaller than 2.5 µm in aerodynamic diameter
POI	Point-of-Impingement
S	Sulphur
SO_2	Sulphur dioxide
SPM	Suspended particulate matter (also Total Suspended Particulate or TSP)
TSD	Technical Supporting Document
US EPA	United States Environmental Protection Agency
VKT	Vehicle kilometres travelled
VMT	Vehicle mile travelled

UNITS

Unit	Definition
acfm	Actual cubic feet per minute
g/s	Grams per second
g/m^3	Grams per cubic metres
kg/mg	Kilograms per milligrams
km	Kilometres
kPa	Kilopascals
m	Metres
m/s	Metres per second
m^3/s	Cubic metres per second
m^3/yr	Cubic metres per year
mg/m^3	Milligrams per cubic metre
mt/hr	Metric tonne per hour
$\mu g/m^3$	Micrograms per cubic metre
µm	Micrometres (also microns), one-millionth of a metre
OU	Odour Units
OU/m^3	Odour Units per cubic metre
ppb	Parts per billion
ppm	Parts per million
VKT/hr	Vehicle kilometres travelled per hour

Table of Contents

1.0 INTRODUCTION

This Attachment provides sample calculations to demonstrate how the emission estimates were developed for the proposed CRRRC. The emission rates were determined as per guidance in the Ontario Ministry of the Environment (MOE) document *"Procedure for Preparing an Emission Summary and Dispersion Modelling Report"* Version 3.0 (March 2009) (ESDM Procedure Document). The results are all in units of grams per seconds (g/s), which are required for the dispersion models.

2.0 SAMPLE CALCULATIONS

2.1 Flare

The landfill gas (LFG) collection system will collect approximately 75% of the LFG produced by the landfill, (U.S. EPA, 2008). This collected gas is either combusted using an enclosed flare or sent to electrical generation plant, which converts the LFG (along with biogas from the organics processing area) to electricity. Based on design specifications, the flare has capacity for LFG and biogas with 56.2% methane and the flow rate of LFG and biogas to the flare will be 0.98 m^3/s, made up of 36% LFG and 64% biogas. LFG constituents and their estimated respective concentrations in the LFG were obtained from the U.S. EPA AP 42 Chapter 2.4 (Table 2.4-1). As worst-case estimates, the biogas was assumed to have the same constituents and concentration as the LFG.

The following is a sample calculation for the emission rate of the LFG constituents (in this case, vinyl chloride) from the flare:

$$\mathrm{ER} = \text{Landfill Gas flow rate } \frac{\mathrm{m}^3}{\mathrm{s}} \times \text{conc.} \frac{\mu\mathrm{g}}{\mathrm{m}^3} \times \frac{1\ \mathrm{g}}{1{,}000{,}000\ \mu\mathrm{g}} \times (1 - \text{ destruction efficiency } (\%))$$

Where:

ER	=	emission rate (g/s),
Landfill Gas Flow rate	=	flow rate of landfill and organics gas to the flare (m^3/s),
conc.	=	concentration of the contaminant in the landfill gas (µg/m^3) obtained from US EPA AP 42 Chapter 2.4, and
destruction efficiency	=	amount of the contaminant that is destroyed during combustion (%) obtained from US EPA AP 42 Chapter 2.4.

$$\mathrm{ER} = 0.983\ \frac{\mathrm{m}^3}{\mathrm{s}} \times 3627.21\ \frac{\mu g}{\mathrm{m}^3} \times \frac{1\ \mathrm{g}}{1{,}000{,}000\ \mu\mathrm{g}} \times (1 - 98\ \%)$$

$$\mathrm{ER} = 0.0000713\ \frac{\mathrm{g}}{\mathrm{s}}$$

The emission rate for reduced sulphur compounds was calculated based on expected LFG composition. The concentration of sulphur in the LFG was estimated by summing the concentration of compounds containing sulphur (based on US EPA AP 42 Chapter 2.4) multiplied by the number of moles of sulphur in each compound. The concentration of reduced compounds was determined to be 39.64 m^3 of sulphur per 1,000,000 m^3 of LFG.

$$\mathrm{ER} = \mathrm{conc.\,of\,sulphur\,in\,the\,LFG}\ \frac{\mathrm{m3\ S}}{\mathrm{m3\ LFG}} \times \mathrm{flow\ rate}\ \frac{\mathrm{m3LFG}}{\mathrm{sec}} \times \frac{\mathrm{1\ mol.K}}{\mathrm{8.3145\ m3\ S.PA}} \times \frac{\mathrm{101325\ Pa}}{\mathrm{298.15\ K}} \times \frac{\mathrm{32.1\ gS}}{\mathrm{mol}}$$

$$\mathrm{ER} = 39.64\ \frac{\mathrm{m^3S}}{\mathrm{1{,}000{,}000\ m^3\ LFG}} \times 0.983\ \frac{\mathrm{m3\ LFG}}{\mathrm{sec}} \times \frac{\mathrm{1\ mol.K}}{\mathrm{8.3145\ m3\ S.PA}} \times \frac{\mathrm{101325\ Pa}}{\mathrm{298.15\ K}} \times \frac{32.1\ g_s}{\mathrm{mol}}$$

$$\mathrm{ER} = 0.0511\,\frac{g_s}{\mathrm{s}}$$

The sulphur dioxide emission rate from the flare was calculated as follows[1]:

$$\mathrm{ER} = \mathrm{reduced\ sulphur\ compounds\ emission\ rate}\ \times {}^{MW_{SO2}}/_{MW_S}$$

$$\mathrm{ER} = 0.0511\ \frac{g_s}{s} \times \frac{64.0}{32.1}$$

$$\mathrm{ER} = 0.102\,\frac{\mathrm{g}}{\mathrm{s}}$$

The following is a sample calculation for the emission rate of combustion by-products (in this case nitrogen oxides) from the flare:

$$\mathrm{ER} = \mathrm{flow\ rate\ dscm} \times \mathrm{percent\ of\ methane\ in\ LFG(\%)} \times \mathrm{NOx\ emission\ factor} \times \mathrm{conversion\ factors}$$

$$\mathrm{ER} = 0.983\ \frac{\mathrm{m^3}}{\mathrm{s}} \times 56.2\ \%\ \mathrm{CH4} \times 631\,\frac{\mathrm{kg}}{\mathrm{1{,}000{,}000dscm\ of\ CH4}} \times 1000\,\frac{\mathrm{g}}{\mathrm{kg}}$$

$$\mathrm{ER} = 0.348\,\frac{\mathrm{g}}{\mathrm{s}}$$

The emission rates for all LFG and biogas constituents were calculated as presented above.

[1] S= sulphur

2.2 Electrical Generation Plant

If built, the electrical generation plant would receive collected LFG and biogas from the organics processing facility. The combined gas would be used to fuel internal combustion engines that will be coupled to electrical generators. Electricity produced by the plant would be exported to the local electrical distribution system and/or used to power on-Site electrical demand. It is anticipated that 7 Jenbacher 1.06 MW engines (each with an electrical generator) would be required to combust this gas. LFG constituents and their estimated respective concentrations in the LFG were obtained from the U.S. EPA AP 42 Chapter 2.4 (Table 2.4-1).

The emission rates for the proposed electrical generation plant were calculated in the same manner as for the flare (refer to Section 2.1).

2.3 Dust Collectors

The Construction and Demolition (C&D) Recycling Facility and the Material Recovery Facility (MRF) will both have dust collectors to control particulate emissions from these facilities. An outlet loading emission factor of 10 mg/m^3 for SPM was used to calculate particulate emissions from these dust collectors. This emission factor is based on guidance provided in the MOE *Procedure for Preparing an Emission Summary and Dispersion Modelling Report* (MOE, March 2009) for small dust collectors. An expected dust collector flow rate of 15,000 acfm was also assumed.

The following is a sample calculation for the emission rate of SPM from the dust collectors proposed at the MRF:

$$\mathrm{ER} = \text{outlet loading}\ \frac{\mathrm{mg}}{\mathrm{m}^3} \times \text{flow rate} \times \frac{\mathrm{ft}^3}{\mathrm{min}} \times \frac{1\ \mathrm{m}^3}{35.32\ \mathrm{ft}^3} \times \frac{1\ \mathrm{min}}{60\ \mathrm{s}} \times \frac{1\ \mathrm{g}}{1000\ \mathrm{mg}}$$

$$\mathrm{ER} = \frac{10\ \mathrm{mg}}{\mathrm{m}^3} \times \frac{15{,}000\ \mathrm{ft3}}{\mathrm{min}} \times \frac{1\ \mathrm{m}^3}{35.32\ \mathrm{ft}^3} \times \frac{1\ \mathrm{min}}{60\ \mathrm{s}} \times \frac{1\ \mathrm{g}}{1{,}000\ \mathrm{mg}}$$

$$\mathrm{ER} = 0.0708\ \mathrm{g/s}$$

Emission rates of PM_{10} and $PM_{2.5}$ were assumed to be 100% of the SPM emission rate.

2.4 Biofilters

Air from the PHC impacted soil treatment and the organics processing areas will be collected and treated through biofilters. There is proposed to be one biofilter for the PHC impacted soil treatment area and one biofilter for the organics processing area.

For the PHC impacted soil treatment area, the flow rate of the biofilter was estimated to be 15,000 m^3/hr based on Information provided by Taggart Miller.

For the organics processing facility, the maximum airflow for the biofilter was assumed to be 72,000m^3/hr based on the maximum design airflow provided by Taggart Miller.

Based on testing completed at similar facilities by BIOREM, maximum odour levels leaving the biofilters were estimated to be 500 OU/m^3.

The following is a sample calculation for the emission rate of odour from the PHC impacted soil treatment area:

$$\mathrm{ER} = \text{biofilter exit odour concentration}\ \frac{\mathrm{OU}}{\mathrm{m^3}} \times \text{flow rate}\,\frac{\mathrm{m^3}}{\mathrm{hr}} \times \frac{1\ \mathrm{hr}}{3600\ \mathrm{s}}$$

$$\mathrm{ER} = 500\ \frac{\mathrm{OU}}{\mathrm{m^3}} \times 15{,}000\,\frac{\mathrm{m^3}}{\mathrm{hr}} \times \frac{1\ \mathrm{hr}}{3600\ \mathrm{s}}$$

$$\mathrm{ER} = 2{,}083\ \mathrm{OU/s}$$

2.5 Material Transfer Fugitive Dust

The U.S. EPA AP-42 emission factors from Chapter 13.2.4 – Aggregate Handling and Storage Piles (November 2006) were used to calculate the fugitive dust emissions associated with material transfer activities that will occur at the landfill, the composting area, the organics processing facility, and the hydrocarbon (HC) impacted soil treatment area. The following predictive emissions equation was used in determining the emission factors for material handling:

$$\mathrm{EF} = \mathrm{k} \times 0.0016\ \times \frac{\left(\frac{\mathrm{U}}{2.2}\right)^{1.3}}{\left(\frac{\mathrm{M}}{2}\right)^{1.4}}$$

Where:
EF = particulate emission factor (kg/Mg),
k = particle size multiplier for particle size range (see Table A 2-1),
U = mean wind speed (m/s), and
M = moisture content of material (percent) (%).

Table A 2-1: Particle Size Assumptions Material Transfer

Size Range	k
$PM_{2.5}$	0.053
PM_{10}	0.35
SPM	0.74

The following is a sample calculation for the SPM emission factor for material handling that will occur at the PHC impacted soil treatment area. A mean wind speed of 3.5 m/s obtained from the MOE pre-processed meteorological data (1996-2000) used for the dispersion modelling assessment. A moisture content of 12% for municipal solid waste landfill cover soil was used, which was obtained from Table 13.2.4.1 of the U.S. EPA AP-42.

$$\mathrm{EF} = 0.74 \times 0.0016 \times \frac{\left(\frac{3.5\ \mathrm{m/s}}{2.2}\right)^{1.3}}{\left(\frac{12\%}{2}\right)^{1.4}}$$

$$\mathrm{EF} = 0.000176\ \mathrm{kg/Mg}$$

The following is a sample calculation for the SPM emission rate per drop for a handling rate of 106 tonnes/hr.

$$\mathrm{ER} = \frac{0.000176\ \mathrm{kg}}{\mathrm{tonnes}} \times \frac{106\ \mathrm{tonnes}}{\mathrm{hr}} \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}} \times \frac{1{,}000\ \mathrm{g}}{1\ \mathrm{kg}}$$

$$\mathrm{ER} = 0.00518\ \frac{\mathrm{g}}{\mathrm{s}}\ \text{per drop}$$

It was assumed that there will be two loaders in the PHC impacted soil treatment area that can be moving material simultaneously, at the same time that each biopile can be turned, thus a maximum of 2 drop points occurring at the same time during operations at the PHC impacted soil treatment area was assumed. The emission rate is as follows:

$$\mathrm{ER} = \mathrm{ER}\ \text{per drop}\ \times \#\ \text{of drops}$$

$$\mathrm{ER} = 0.00518 \frac{\mathrm{g}}{\mathrm{s}} \text{per drop}\ \times 2$$

$$\mathrm{ER} = 0.0104\ \mathrm{g/s}$$

The emission rates of PM_{10} and $PM_{2.5}$ were calculated as presented above.

2.6 Composting/Curing Pad

Leaf and yard, wood waste, and digested product will be composted or cured on-Site. Emission factors used to calculate the odour emissions associated with the proposed composting/curing pad activities were obtained from a study completed for GORE (Barth & Bitter GmbH, 2006). The annual throughput of compost/curing pad activities is anticipated to be 50,000 tonnes/yr, 60% of which will be digested product, and 40% of which will be yard waste. Approximately 32,300 tonnes of the final product may be produced annually.

The following is a sample calculation for the emission rate of the composting/curing pad pile:

$$\mathrm{ER} = \text{emission factor } \frac{\mathrm{OU}}{\mathrm{m}^2 - s} \times \text{area } (\mathrm{m}^2)$$

$$\mathrm{ER} = 0.56 \frac{\mathrm{OU}}{\mathrm{m}^2 - s} \times 447(\mathrm{m}^2)$$

$$\mathrm{ER} = 250 \mathrm{~OU/s}$$

The average emission rate for all composting/curing pad activities was calculated.

2.7 Landfill Cap

LFG not collected and distributed to the flare or the electrical generation plant may result in fugitive LFG emissions from the landfill cap. These fugitive emissions were estimated, including odour emissions. LFG constituents and their estimated respective concentrations in the LFG were obtained from the U.S. EPA AP 42 Chapter 2.4 (Table 2.4-1). Average LFG emissions per year were estimated using results from the LandGEM model based on a 75% capture efficiency.

The following is a sample calculation for the emission rate of vinyl chloride from the landfill cap:

$$\mathrm{ER} = \text{conc.} \frac{\mu\mathrm{g}}{\mathrm{m}^3} \times \mathrm{LGF} \frac{\mathrm{m}^3}{\mathrm{yr}} \times \frac{1 \mathrm{~yr}}{365 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \mathrm{~hr}}{3{,}600 \mathrm{~s}} \times \frac{1 \mathrm{~g}}{1{,}000{,}000\ \mu\mathrm{g}} \times (1 - \text{collection efficiency } (\%))$$

Where:
ER = emission rate (m^3/s),
conc. = concentration of the contaminant in the landfill gas (g/m^3) obtained from US EPA AP 42 Chapter 2.4
LFG = average landfill gas emissions per yr (m^3/yr) (obtained from LandGEM), and
collection efficiency = collection efficiency of landfill gas.

$$\mathrm{ER} = 3627.21 \frac{\mu\mathrm{g}}{\mathrm{m}^3} \times 13{,}199{,}538.3 \frac{\mathrm{m}^3}{\mathrm{yr}} \times \frac{1 \mathrm{~yr}}{365 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \mathrm{~hr}}{3{,}600 \mathrm{~s}} \times \frac{1 \mathrm{~g}}{1{,}000{,}000\ \mu\mathrm{g}} \times (1 - 75\%)$$

$$\mathrm{ER} = 0.0003795 \frac{\mathrm{g}}{\mathrm{s}}$$

Emissions of the remaining LFG constituents were calculated in the same manner presented above.

To calculate the odour emissions, the flow rate of the landfill cap is needed. The following is a sample calculation to determine the flow rate from the landfill cap:

$$\mathrm{FR} = \mathrm{LFG}\ \frac{\mathrm{m}^3}{\mathrm{yr}} \times \frac{1\ \mathrm{yr}}{365\ \mathrm{days}} \times \frac{1\ \mathrm{day}}{24\ \mathrm{hrs}} \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}} \times (1 - 75\%)$$

Where:
FR = flow Rate (m^3/s),
LFG = average landfill gas emissions per year (m^3/yr) (obtained from LandGEM), and
75% = collection efficiency of landfill gas.

$$\mathrm{FR} = 13{,}199{,}538.3\ \frac{\mathrm{m}^3}{\mathrm{yr}} \times \frac{1\ \mathrm{yr}}{365\ \mathrm{days}} \times \frac{1\ \mathrm{day}}{24\ \mathrm{hrs}} \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}} \times (1 - 75\%)$$

$$\mathrm{FR} = 0.105\ \frac{\mathrm{m}^3}{\mathrm{s}}$$

The following is a sample calculation for the emission rate of odour from the landfill cap. The odour concentration of the LFG was estimated to be 10,000 OU/m^3 based on the upper range from the MOE's *Interim Guide to Estimate and Assessing Landfill Air Impacts* (MOE, 1992).

$$\mathrm{ER} = \mathrm{odour\ concentration}\ \frac{\mathrm{OU}}{\mathrm{m}^3} \times \mathrm{flow\ rate}\,\frac{\mathrm{m}^3}{\mathrm{s}}$$

$$\mathrm{ER} = 10{,}000\ \frac{\mathrm{OU}}{\mathrm{m}^3} \times 0.105\,\frac{\mathrm{m}^3}{\mathrm{s}}$$

$$\mathrm{ER} = 1{,}050\ \mathrm{OU}/s$$

2.8 Leachate Pre-treatment

Leachate odour emissions were estimated based on information obtained from BIOREM as well as the proposed flow rate of the scrubber system and odour emissions at other similar leachate pre-treatment operations. These were used as worst-case emissions from the proposed leachate treatment building. The design includes the use of a scrubber.

The following is a sample calculation for the emission rate of odour from the leachate facilities:

$$\mathrm{ER} = \mathrm{odour\ concentration}\ \frac{\mathrm{OU}}{\mathrm{m}^3} \times\ \mathrm{flow\ rate}\,\frac{\mathrm{m}^3}{s}$$

$$\mathrm{ER} = 1{,}000\ \frac{\mathrm{OU}}{\mathrm{m}^3} \times 6.94\,\frac{\mathrm{m}^3}{\mathrm{s}}$$

$$\mathrm{ER} = 6940\ \mathrm{OU/s}$$

2.9 Leachate Ponds

Emissions from the leachate ponds were estimated based on information obtained from the design team. Additionally a detection threshold (i.e. emission factor) of 100 OU for a final clarifier was obtained from a paper titled 'Odor Threshold Emission Factors for Common WWTP Processes' (St. Croix Sensory Inc., 2008). The volume throughput used is based on the maximum design capacity of the pond.

The following is a sample calculation for the emission rate of odour from the leachate holding pond:

$$\mathrm{ER} = \text{odour detection limit } \frac{\mathrm{OU}}{\mathrm{m}^3} \times \text{ volumetric throughput} \frac{\mathrm{m}^3}{s}$$

$$\mathrm{ER} = 100\ \frac{\mathrm{OU}}{\mathrm{m}^3} \times 0.0093 \frac{\mathrm{m}^3}{\mathrm{s}}$$

$$\mathrm{ER} = 0.93\ \mathrm{OU}/s$$

2.10 Stationary Fuel Combustion

The proposed CRRRC buildings may be heated using fuel oil. Anticipated fuel oil usage rates for stationary fuel combustion were provided by Taggart Miller. U.S. EPA AP-42 emission factors from Chapter 1.3 – Fuel Oil Combustion (US EPA1999) were used to calculate emissions from combustion.

The following is a sample calculation for the MRF building for the emission rate of NOx:

$$\mathrm{ER} = \text{diesel usage} \frac{10^3\ \mathrm{gal}}{\mathrm{yr}} \times \text{ emission factor NOx} \frac{\mathrm{lb}}{10^3\ \mathrm{gal}} \times \frac{1\ \mathrm{yr}}{365\ \mathrm{days}} \times \frac{1\ \mathrm{day}}{24\ \mathrm{hrs}} \times \frac{1\ \mathrm{hr}}{3600\ \mathrm{s}}$$

$$\mathrm{ER} = 21 \frac{10^3\ \mathrm{gal}}{\mathrm{yr}} \times 20 \frac{\mathrm{lb}}{10^3\ \mathrm{gal}} \times \frac{1\ \mathrm{yr}}{365\ \mathrm{days}} \times \frac{1\ \mathrm{day}}{24\ \mathrm{hrs}} \times \frac{1\ \mathrm{hr}}{3600\ \mathrm{s}} \times \frac{453.6\ \mathrm{g}}{1\ \mathrm{lb}}$$

$$\mathrm{ER} = 0.006 \frac{\mathrm{tonnes}}{\mathrm{yr}}$$

2.11 Non-Road Vehicles – Exhaust Emissions

Crank case emission factors and load factors for non-road Engine Modelling (Compression Ignition) – U.S. EPA 009d (July, 2010) were used to calculate the exhaust emissions from on-Site vehicles. It was assumed that all on-Site vehicles comply with Tier 3 emission standards.

The following predictive emissions equation was used to determine the combustion emission rates for on-Site vehicles:

$$\mathrm{ER} = \mathrm{EF} \times \text{engine horsepower rating } \times \text{load factor } \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}}$$

Where:
ER = emission rate (g/s), and
EF = emission factor (g/hp-hr).

The following is a sample calculation for the NO_x emissions for the Caterpillar 430 backhoe to be located at the landfill:

$$\mathrm{ER} = \frac{2.62\ \mathrm{g}}{\mathrm{hp} - \mathrm{hr}} \times 500\ \mathrm{hp}\ \times 0.21\ \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}}$$

$$\mathrm{ER} = 0.0764\ \mathrm{g/s}$$

The emission rates for non-road vehicles were calculated for each of the areas of the Site where non-road vehicles are anticipated to be present (the landfill, composting pad area, petroleum hydrocarbon impacted soil treatment area, and the organics treatment area) by summing the emission rates from each of the vehicles at the respective areas. The emissions rates for suspended particulate matter (SPM), PM_{10} and $PM_{2.5}$, SO_2, and CO were calculated using the same equation.

2.12 On-Road Vehicles – Exhaust Emissions

Emission factors for the on-Site vehicle exhaust for on-road vehicles were obtained using the U.S. EPA MOBILE6 emission model.

The emission factors developed for the fleet trucks are provided in Table A 2-2.

Table A 2-2: Emission Factors for Fleet Trucks Calculated Using MOBILE6

Compound	Emission Factor (g/VKT)[1]
SPM	1.02E-01
PM_{10}	1.02E-01
$PM_{2.5}$	8.49E-02
NO_X	2.43E+00
SO_2	6.80E-03
CO	5.60E-01

Notes: (1) VKT =vehicle kilometres travelled

The following equation was used to determine the vehicle kilometres travelled per hour (VKT/hr):

$$\frac{VKT}{hr} = \frac{\#\ of\ Trucks}{Hour}\ X\ Road\ Length\ Travelled\ (km)$$

The following is a sample calculation for VKT/hr on one segment (P1) of the paved roads:

$$\frac{VKT}{hr} = \frac{45\ Trucks}{Hour}\ X\ \ 0.7\ km$$

VKT/hr = 31.6

Each of the road segments P1 to P11 was calculated using the equation above. The road segments are presented in Figure A.1. The value of 46.7 VKT/hr represents total vehicle kilometres travelled per hour on all paved road segments. This value is used in the sample calculation for NO_x below.

The following predictive emissions equation was used to determine the tailpipe emission rates for on-Site vehicles travelling on paved roads:

$$\mathrm{ER} = \mathrm{EF} \times \text{vehicle kilometres travelled per hour} \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}}$$

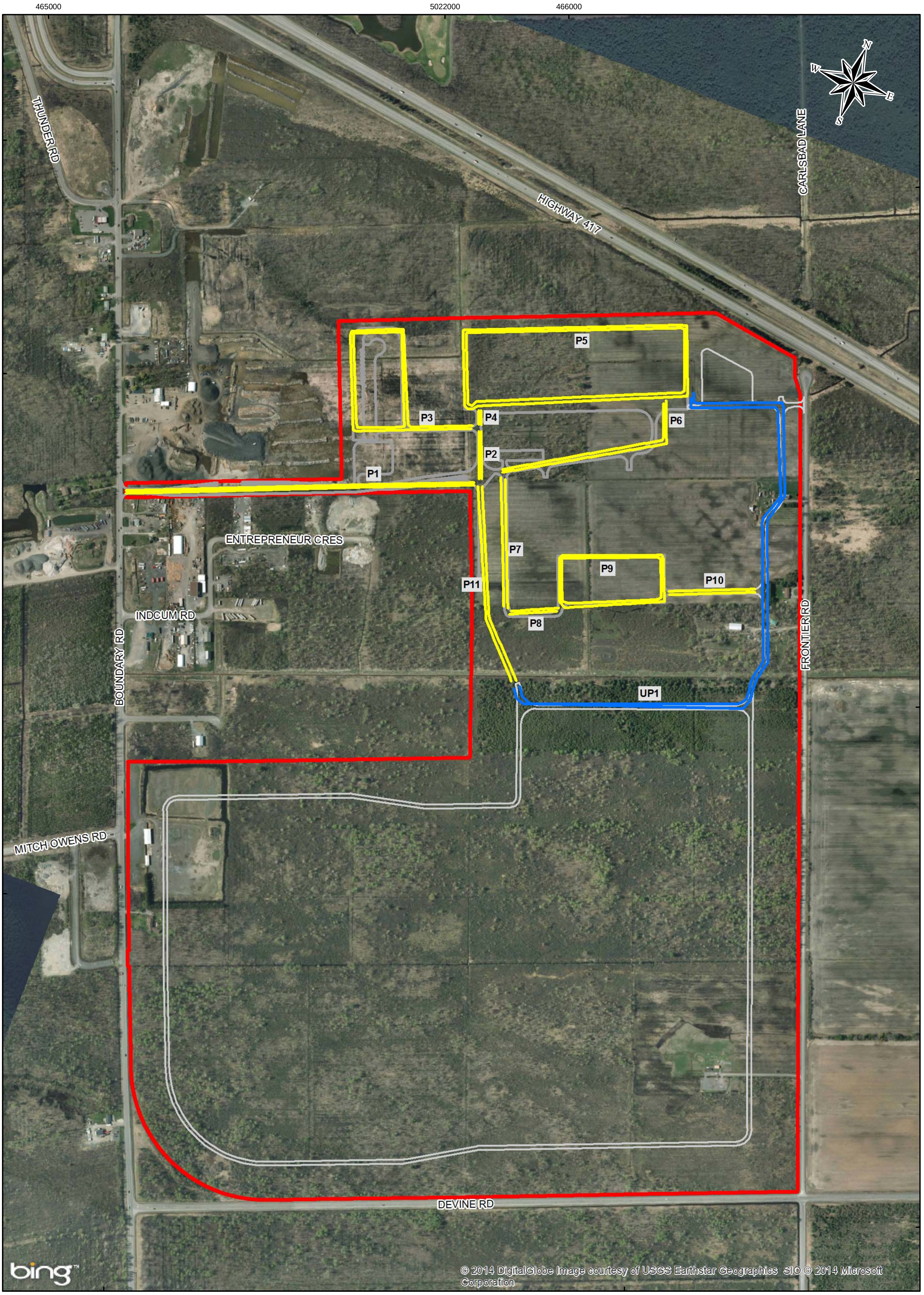
Where:
ER = emission rate (g/s),
EF = emission factor (g/VKT), and
VKT = 46.7 VKT (calculated VKT for all paved road segments.)

The following is a sample calculation for NO_x emissions for on-Site vehicles tailpipe emissions on paved road segments.

$$E\mathrm{R} = \frac{2.43\ \mathrm{g}}{\mathrm{VKT}} \times \frac{46.7\ \mathrm{VKT}}{\mathrm{hr}} \times \frac{1\ \mathrm{hr}}{3{,}600\ \mathrm{s}}$$

$$\mathrm{ER} = 0.0315\ \mathrm{g/s}$$

Additionally, SPM, PM_{10} and $PM_{2.5}$, SO_2, and CO were calculated using the same equation. The emission rates for unpaved road segments were calculated using the same emissions factor and the same approach to determine the vehicle kilometres travelled as shown in Section 4.1.3 and 4.1.4.



LEGEND

- PROPERTY BOUNDARY
- UNPAVED ROADS
- PAVED ROADS
- MODELLED PAVED ROADS
- MODELLED UNPAVED ROADS

150 75 0 150

SCALE 1:7,500 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUCTION WITH THE ACCOMPANYING REPORT.

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

ENVIRONMENTAL ASSESSMENT OF THE
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

EMISSION SUMMARY AND DISPERSION MODELLING REPORT
FOR CAPITAL REGION RESOURCE RECOVERY CENTRE

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV. 0.0
DESIGN	AVW	DEC. 2013	FIGURE A.1	
GIS	PJM	DEC. 2013		
CHECK	PLE	AUG. 2014		
REVIEW	PAS	AUG. 2014		

Path: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\GIS\MXDs\12-1125-0045\Working\Phase2000\Task110-Atmosphere\Air Quality & Odour Assessment\1211250045-2000-0110-B06_EmissionDispersion.mxd

2.13 Vehicles – Unpaved Road Dust

The predictive equation in U.S. EPA AP-42 Chapter 13.2.2 – Unpaved Roads (November 2006) was used to calculate the fugitive dust emissions from paved roadways. The equation accounts for the application of dust suppressant control efficiency. The equation is as follows:

$$\mathrm{EF} = \left(\mathrm{k}\left(\frac{\mathrm{s}}{12}\right)^{\mathrm{a}} \times \left(\frac{\mathrm{W}}{3}\right)^{\mathrm{b}} \times 281.9\right)(1 - \text{control efficiency})$$

Where:
EF = particulate emission factor (g/VKT),
k = empirical constant for particle size range (pounds (lbs) per vehicle mile travelled (VMT)) (see Table A 2-3),
s = road surface silt content (%) assumed to be 6.4% (as per US EPA AP-42 Section 13.2.2 for MSW landfills),
W = average weight (tons) of the vehicles traveling the road,
a = empirical constant for particle size range (dimensionless) (see Table A 2-3),
b = empirical constant for particle size range (dimensionless) (see Table A 2-3),
281.9 = conversion from pounds per vehicle miles travelled to grams per vehicle kilometres travelled, and
control efficiency = reduction of fugitive dust emissions due to dust suppressant use.

Table A 2-3: Particle Size Assumptions for Unpaved Road Dust

Size Range	k (lb/VMT)	a	b
$PM_{2.5}$	0.15	0.9	0.45
PM_{10}	1.5	0.9	0.45
SPM	4.9	0.7	0.45

The following is a sample calculation for SPM for the emission factor for vehicles that will travel along the north side of the landfill. It was estimated that the fleet vehicles will have an average weight of 15.43 tons. A control efficiency of 85% was selected to represent the use of dust suppressants.

$$\mathrm{EF} = \left(4.9\left(\frac{6.4}{12}\right)^{0.7} \times \left(\frac{15.43}{3}\right)^{0.45} \times 281.9\right)(1 - 85\%)$$

$$\mathrm{EF} = 278.8\ \mathrm{g/VKT}$$

The following is a sample calculation for the SPM emission rate for vehicles travelling along the same unpaved road segment:

$$\mathrm{ER} = \frac{278.8\ \mathrm{g}}{\mathrm{VKT}} \times \frac{3.72\ \mathrm{VKT}}{\mathrm{hr}} \times \frac{1\ \mathrm{hr}}{3600\ \mathrm{s}}$$

$$\mathrm{ER} = 0.288\ \mathrm{g/s}$$

The emission rates of PM_{10} and $PM_{2.5}$ were calculated as presented above.

2.14 Vehicles – Paved Road Dust

The U.S. EPA AP-42 emission factors from Chapter 13.2.1 – Paved Roads (January 2011) were used to calculate the fugitive dust emissions from paved roadways. The following predictive emissions equation was used to determine the fugitive dust emission factor for paved roads:

$$\mathrm{EF} = (\mathrm{k}(\mathrm{sL})^{0.91} \times (\mathrm{W})^{1.02})\ (1 - \text{control efficiency})$$

Where:
EF = particulate emission factor (having units matching the units of k),
k = particle size multiplier for particle size range and units of interest (see Table A 2-4),
sL = road surface silt loading (g/m^2) assumed to be 7.4 (as per US EPA AP-42 Section 13.2.1-3, silt loading for MSW landfills),
W = average weight (tons) of the vehicles traveling the road, and
control efficiency = reduction of fugitive dust emissions due to dust suppression activities.

Table A 2-4: Particle Size Assumptions for Paved Road Dust

Size Range	k (g/VKT)
$PM_{2.5}$	0.15
PM_{10}	0.62
SPM	3.23

The following is a sample calculation for SPM for the predictive emission factor for vehicles that will travel along the entrance road segment to/from Boundary Road. It was estimated that the fleet vehicles will have an average weight of 15.43 tons. The number of precipitation days was estimated to be 163 as per Environment Canada Climate Normals records. A control efficiency of 85% was selected to represent the dust suppression activities that will occur based on best management practices expected control efficiency.

$$\mathrm{EF} = (3.23 \ \times (7.4)^{0.91} \times (15.43)^{1.02})(1 - 85\%)$$

$$\mathrm{EF} = 48.80\ \ \mathrm{g/VKT}$$

The following is a sample calculation for the SPM emission rate for vehicles travelling along the same paved road segment:

$$\mathrm{ER} = \frac{48.80\ \mathrm{g}}{\mathrm{VKT}} \times \frac{31.62\ \mathrm{VKT}}{\mathrm{hr}} \times \frac{1\ \mathrm{hr}}{3600\ \mathrm{s}}$$

$$\mathrm{ER} = 0.429\ \mathrm{g/s}$$

The emission rates of PM_{10} and $PM_{2.5}$ were calculated as presented above.

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ATTACHMENT 1

Activity	Assumption			
	Parameter	**Value**	**Unit**	**Notes**
Flare (S1)	Flow rate to flare	0.98	am^3/s	Based on 1000 cfm of biogas (received from Taggart Miller) and 1,770 cfm of landfill gas (obtained from LandGEM model). Converted to m3/s and assumed actual.
Engines (S2)	Flow rate to engines	0.98	am^3/s	Flow rate for each of the 7 engines. Based on the engine specs. Assumed actual.
C&D and MRF (S3 and S4)	Flow rate of dust collectors	15,000	acfm	Provided by Taggart Miller. Stack assumed to be in the centre of the building. Assumed actual.
	Outlet loading	10	mg/m^3	Manufacturer guarantee and MOE recommendation for small dust collectors.
Organics and HC Soil Biofilters (S5 and S8)	Odour concentration	500	OU/m^3	Estimated by BIOREM as a maximum concentration output for a similar facility.
	Stack volumetric flow rate for organics processing facility	72,000	Am^3/hr	Estimated. Assumed to be actual.
	Stack volumetric flow rate for HC soil facility	15,000	Am^3/hr	Estimated. Assumed to be actual.
Leachate building stack (S11)	Odour concentration	1,000	OU/m3	Estimated and assumes the exhaust is equipped with a scrubber.
	Stack volumetric flow rate	25,000	Am3/hr	Estimated. Assumed to be actual.
Organics Processing (S6)	Number of drop points for organics process	4	drop pts	Based on information provided by Taggart Miller (equipment list and maximum number of drop points).
	Number of drop points for transfer of organic waste for off-site treatment	2	drop pts	Based on information provided by Taggart Miller (equipment list and maximum number of drop points).
	Food waste handling rate	50,000	tonnes/yr	Provided by Taggart Miller.
	Non-food organic waste handling rate	16,000	tonnes/yr	Provided by Taggart Miller.
	Bulking agent handling rate	7,000	tonnes/yr	Provided by Taggart Miller.
PHC Impacted Soil Material Handling (S9)	Number of drop points	2	drop pts	Assumed that there are 2 loaders in the HC soil area that can be moving material simultaneously, at the same time that each biopile can be turned.

Activity	Assumption			
	Parameter	Value	Unit	Notes
	Handling rate	106	tonnes/hr	Based on information provided by Taggart Miller.
Compost Material Handling (S7)	Number of drop points	7	drop pts	Based on information provided by Taggart Miller. Based on 7 pieces of equipment.
	Leaf and yard waste material handling	20000	tonnes/yr	Provided by Taggart Miller.
	Digestate compost material handling	30000	tonnes/yr	Provided by Taggart Miller.
Landfill Operations (S10)	Landfill area	839,408	m^2	From the site plans designed by Golder.
	LFG Emissions	13,199,538	m^3/yr	Annual average of LFG emissions calculated using the LandGEM model.
	Collection efficiency	75%	%	Typical range of operation. Based on recommendation from MOE.
	Odour concentration	10,000	OU/m^3	Based on the 'upper range' estimate of odour concentration from the MOE's Interim Guide to Estimate and Assess Landfill Air Impacts.
Composting (S7)	Annual throughput	50,000	tonnes/yr	Provided by Taggart Miller.
	Proportion that is organic waste	60%	%	Provided by Taggart Miller.
	Proportion that is yard waste	40%	%	Provided by Taggart Miller.
	Amount of finished product	32,300	tonnes/yr	Calculated based on information provided by Taggart Miller (annual throughput of compost produced, and breakdown percentages).
	Pile height	4	m	Estimated pile size.
	Pile base size	8	m	Estimated pile size.
Stationary Fuel Combustion (S14-S20)	Fuel oil usage	134,412	gal/yr	Provided by Taggart Miller.

Note: — denotes not applicable

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APPENDIX D

Construction and Demolition Processing Facility Design and Operations

December 2014

APPENDIX D

Construction and Demolition Processing Facility Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Table of Contents

FIGURES

1.0 INTRODUCTION

This appendix to the Design and Operations (D&O) Report has been prepared to describe the proposed construction and demolition (C&D) processing facility, a waste processing facility that will operate as a component of the Capital Region Resource Recovery Centre (CRRRC). This appendix should be read in conjunction with the D&O Report for the complete CRRRC Site that is Volume IV of the document package. The D&O Report has been prepared to support an application for approval under the *Environmental Assessment Act* (EAA) (MOE 2010a), and also for subsequent approvals under the *Environmental Protection Act* (EPA) (MOE 2010b) and *Ontario Water Resources Act* (OWRA) (MOE, 2011) in support of the application for an Environmental Compliance Approval (ECA) for the CRRRC.

The proposed C&D processing facility will have a total footprint in the range of 13,000 square metres. It is anticipated that C&D materials will be received in a variety of ways ranging from trucks delivering roll-off bins to tractor trailers. C&D material recovery will be carried out at the CRRRC to recover waste materials received from construction and demolition projects. The main recovered products from the C&D processing are expected to consist of shredded wood, ferrous and non-ferrous metals, mixed aggregate, shingles, cardboard and drywall. Metal is recovered directly, wood is often chipped or shredded for composting or made into mulch or biofuel, asphalt is ground for re-use, and concrete is crushed. Recovered materials will be sent to off-Site markets or re-used on-Site, and rejected and residual materials will be hauled to the on-Site landfill.

This D&O Report has been prepared to describe the design of the C&D processing facility and the on-Site operations, which include the following activities:

- The receipt and processing of a maximum of 800 tonnes per day of C&D material;
- The receipt and processing of a maximum of 199,680 tonnes of C&D material annually;
- A maximum unprocessed material storage quantity of 2,200 tonnes at any one time;
- Receiving hours of 6:00 a.m. to 6:00 p.m., Monday to Saturday; and,
- Operating hours of 7:00 a.m. to 11:00 p.m., Monday to Saturday.

The D&O Report has been prepared in accordance with the Ministry of the Environment and Climate Change (MOECC) Guide to Applying for an Environmental Compliance Approval (MOE, 2012).

1.1 Regulatory Requirements

Waste processing sites are subject to Part V of the EPA (MOE, 2010b). Section 27 of the EPA requires that an ECA be obtained from the Director of the MOECC for the establishment, operation, alterations, or enlargement of a waste processing site.

2.0 FACILITY DESIGN

2.1 Function of the Construction and Demolition Processing Facility

The function of the facility is to receive and process solid, non-hazardous waste from C&D projects. Recovered materials will be sent to off-Site markets, utilized as a bulking agent in the organics processing facility operations, sent to the compost processing and storage area (wood) or re-used on-Site, and rejected and residual materials will be hauled to the on-Site landfill.

Waste will be deposited on the floor within the C&D processing facility building, sorted, processed and then loaded into trucks or tractor trailers to be hauled off-Site, to the organics processing facility, to the compost processing and storage area, or to the on-Site landfill.

2.2 Facility Layout

Figure 1 shows the proposed plan of the C&D processing facility area and Figure 2 shows the proposed layout of the C&D processing facility. The C&D processing facility will be developed as part of the initial Site development, and is located in the north portion of the Site, immediately adjacent to the materials recovery facility (MRF).

The C&D processing facility will consist of a slab-on-grade industrial building with a footprint in the range of 13,000 square metres, and a height of approximately 13 to 14 metres, which will be occupied by the following:

- Approximately 4,100 square metres designated for the receipt and storage of incoming waste;
- Approximately 4,900 square metres designated for processing of waste;
- Approximately 700 square metres of office/employee space; and,
- Approximately 2,600 square metres designated for the storage and loading of products from the process.

Doors on the south side of the building will be used for entry for trucks delivering C&D waste. Other doors on the south side will be load-out doors to allow entry of trucks to receive recovered materials or residuals for the on-Site landfill. On the west wall, there are equipment access doors and load-out doors. There will also be doors located on the north wall that will be used rarely to service equipment. The offices and employee facilities, including employee parking, will be on the north side of the main buildings.

The building will house the diversion equipment and processing activities. The C&D processing facility building will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system. The building will be equipped with a dust collection system that will discharge through a bag house and cyclone with the air vented through the roof. The air ventilation rate is estimated to be 390,000 cubic feet per minute. The air change rate in the receiving area is estimated to be 6 changes per hour, 3 changes per hour in the processing area, and 0.5 changes per hour in the office/employee space.

Water collected by floor drains in the C&D processing facility will accumulate in underground holding tanks. The water will be removed with a vacuum truck for off-Site treatment or be delivered to the on-Site leachate pre-treatment facility.

2.3 Truck Traffic

There is sufficient queuing capacity on the access roads at the Site to allow for vehicles entering and exiting the CRRRC Site.

The facility's design is to be capable of processing a maximum of 199,680 tonnes of C&D waste per year. Based on shipping and receiving 6 days per week, the corresponding number of trucks will depend on the size of the trucks dropping off C&D materials at the facility, and the size of the trucks hauling recovered materials off-Site or for use on-Site, or rejected and residual materials to the on-Site landfill.

2.4 Wastes Accepted at the Site

2.4.1 Waste Characterization

The C&D processing facility will be primarily used to recover materials received from C&D projects.

2.4.2 Waste Quantities

The C&D processing facility will have the capacity to process approximately 50 tonnes per hour of C&D waste, or approximately a maximum of 800 tonnes per day. The maximum amount of C&D waste that can be processed at the C&D processing facility is 199,680 tonnes per year.

It is estimated that 60 to 80% of C&D materials received at the C&D processing facility will be recovered.

2.5 Waste Storage

Waste will be stored in accordance with Section 3.3.2 of the Ontario Fire Code (MCSCS, 2007), which stipulates the requirements for indoor general storage of combustible or non-combustible solids. Since the building has a sprinkler system, the storage of C&D material will comply with the following:

- The area of individual storage piles will not exceed 1,000 square metres;
- The clearance between sprinkler head deflectors and the tops of piles shall not be less than 457 millimetres; and,
- Aisles separating storage piles will be a minimum width of 2.4 metres extending the length of each storage pile.

The maximum amount of unprocessed waste to be stored at one time is 2,200 tonnes, which will be confined to the waste receiving and storage area as indicated on Figure 2. The maximum amount of processed materials to be stored at one time is 2,890 tonnes.

2.6 Closure Plan

The C&D processing facility will be decommissioned and closed prior to a change in use or sale of the property. A closure plan will be completed at least six months prior to Site closure.

The decommissioning and closure of the C&D processing facility will include the following procedures:

- All C&D material storage areas will be emptied and the material sold if possible or sent for disposal;
- All equipment will be either sold or reused at another facility;
- All floors will be swept and, if necessary, power washed and any wastewater would be collected and disposed in accordance with *Ontario Regulation* (O. Reg.) 347 (MOE, 1990); and,
- The exterior portions of the C&D processing facility will be cleaned of any litter.

3.0 FACILITY OPERATIONS

3.1 Description of On-Site Operations

Inbound vehicles with C&D waste material will enter the Site from Boundary Road and will proceed to the weigh scale. While vehicles are being weighed, the weigh scale operator will obtain and record information such as the source and description of the waste and the ECA number of the hauler. If, after inspection, the mixture of waste contained in the incoming load is suitable for processing, the vehicle driver will be directed by the weigh scale operator to the receiving area of the C&D processing facility, where the vehicle will unload into the receiving area as directed by a C&D processing facility employee. If, after inspection, the mixture of waste contained in the incoming load is unsuitable for processing, the vehicle will be sent directly to the landfill for disposal. After unloading as directed, the empty vehicle will exit the Site.

The C&D processing facility building will house mechanical processing equipment and manual sorting in the west and northwest areas of the building. Incoming trucks from the scale and vehicles transferring bins from the small load drop-off will enter the building from the south side and unload onto the building floor. The eastern and southern parts of the building will be mostly open space for receiving and other processing operations, such as chipping of recovered wood. Incoming waste will undergo a manual pre-sort which will remove cardboard, drywall and large rejected material. Material will then be recovered via screens, trommels, air separation and magnets. Metal will typically be recovered directly, wood often chipped or shredded for composting or made into mulch or biofuel, asphalt ground for re-use, and concrete crushed. The operational flow chart for the C&D processing facility is shown on Figure 3. The main recovered products will consist of shredded wood, ferrous and non-ferrous metals, mixed aggregate, shingles, cardboard and drywall, and process fines.

It should be noted that the processed material will be stored indoors. Recovered drywall will not be used solely as daily cover (crushed drywall mixed with other fines may be used as daily cover though) and will not be disposed of in the landfill in large quantities at one time.

The building will be set up for loading of trucks within the building; in the loading area, trucks will receive recovered materials to be sent to off-Site markets, recovered materials to be re-used on-Site, and/or rejected and residual materials to be hauled to the on-Site landfill.

3.2 Hours and Days of Operation

The C&D processing facility will operate between the hours of 7:00 a.m. and 11:00 p.m., Monday through Saturday. Waste will be received at the CRRRC between the hours of 6:00 a.m. and 6:00 p.m. The Site is expected to operate between 300 and 312 days per year.

3.3 Material Balance

A material balance for the C&D processing facility is provided on Figure 4. The maximum processing capacity of C&D waste accepted at the C&D processing facility is 800 tonnes per day, to a maximum of 199,680 tonnes per year.

Of the C&D material accepted at the C&D processing facility, it is estimated that 60 to 80% will be recovered during operations.

3.4 Waste Receiving Sites

Waste residuals from the C&D processing facility will be sent to the on-Site landfill.

3.5 Facility Equipment and Maintenance

The C&D processing facility operation will utilize the following equipment:

- Ford F-150 4x4 pickup truck;
- Two Caterpillar 966 loaders;
- Two open top 120 cubic yard trailers;
- Shunt tractor (shared with MRF);
- Caterpillar 330 excavator (with grapple);
- Two Caterpillar 246 skidsteer;
- Crushers;
- Screens;
- Magnets;
- Air separators;
- Shredder; and,
- Conveyor belts.

Note that all models above are presented on an “or equivalent” basis.

A preventative maintenance program will be followed for each piece of equipment based on manufacturer specifications.

3.6 Staff Training

A training plan will be developed and maintained for all employees that operate the C&D processing facility. Trained personnel will supervise all receiving of waste at the C&D processing facility. All employees directly involved with activities relating to the facility will be trained in the following:

- Relevant waste management legislation, regulations and guidelines;
- Major environmental concerns pertaining to the waste being handled;
- Occupational health and safety concerns pertaining to the processes and waste to be handled;
- Management procedures including the use and operation of equipment for the processes and waste to be handled;
- Environmental emergency and contingency procedures for the processes and waste to be handled;
- The use and operation of the equipment to be used by the operator;
- Procedures for the refusal of unacceptable loads;

- Site specific written procedures for the control of nuisance conditions;
- Record keeping procedures; and,
- The requirements of the ECA.

A record of the employee training, including the date of training, the name and signature of the employee and a description of the training provided will be maintained.

3.7 Waste Screening Procedure

Waste will be accepted only from approved haulers that have a valid Waste Systems ECA, as per Section 16(1) of O. Reg. 347 (MOE, 1990). Additionally, small C&D waste loads may be accepted at the small loads area. It is expected that this will make up a very small percentage of the total incoming waste stream.

All incoming vehicles must enter over the weigh scale to determine the weight of waste coming into the C&D processing facility. The scale attendant will do an initial screening of the load. After the initial weigh-in, the incoming vehicle will be directed to the C&D processing facility. An employee located at the C&D processing facility receiving area will inspect the incoming material to ensure that the load does not contain any unacceptable or prohibited wastes or materials. Loads that do contain prohibited materials will be rejected and will be reloaded onto the vehicle delivering the load.

In the unlikely event that unacceptable or prohibited material is not detected until the hauler has left the Site, the material will be segregated, characterized, and managed in accordance with O. Reg. 347 (MOE, 1990). An incident report will be completed. Effort will be made to identify and contact the customer and/or generator of the materials to ensure that prohibited materials will not be delivered to the facility in the future.

3.8 Monitoring, Environmental Emergency and Contingency Plan

An Environmental Emergency and Contingency (E2C) Plan will be developed for the entire CRRRC Site as described in the D&O Report for the complete CRRRC Site.

Environmental monitoring related to the C&D processing facility will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to dust, noise, and odour.

3.9 Disruption of Shipment

Should there be a disruption of shipment of recovered materials, the C&D processing facility would be able to continue to accept waste until the C&D processing facility reaches the maximum approved storage capacity. At that time, the C&D processing facility would not accept additional waste for processing. If the shipment disruption continues such that the maximum approved storage would be exceeded, the material would be sent for disposal at the landfill. Additional material would not be accepted at the C&D processing facility until shipment of recovered materials was possible.

4.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD. P

M.K. Farnel, P.Eng. Environmental Engineer	P.A. Smolkin, P.Eng. Principal

ALC/MKF/PAS/sg

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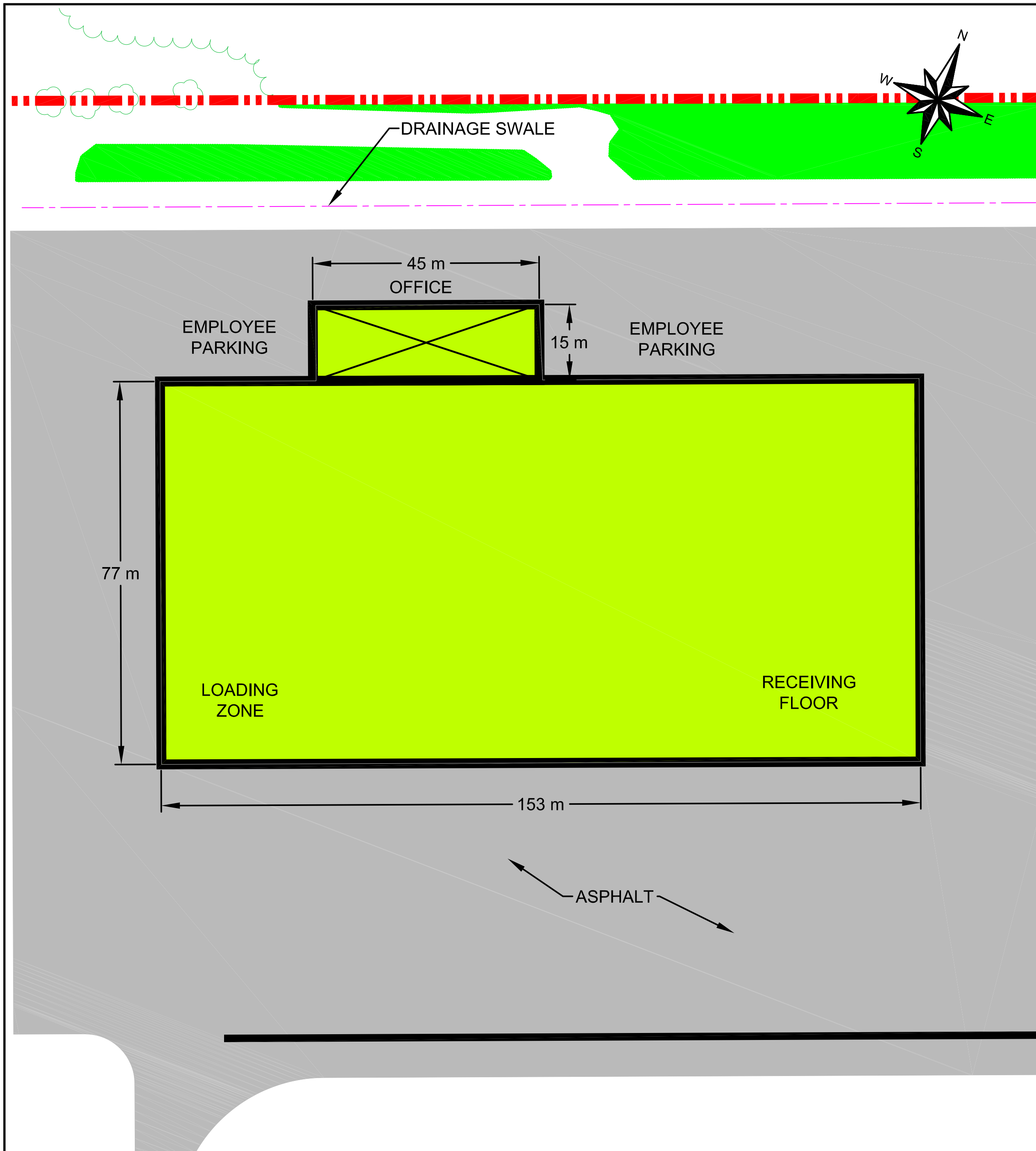

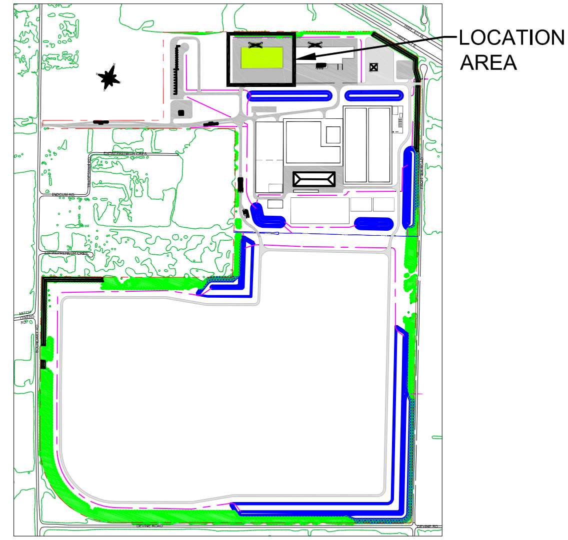

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2. DIMENSIONS SUBJECT TO REFINEMENTS.

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PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
CONSTRUCTION AND DEMOLITION PROCESSING FACILITY AREA PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	09 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

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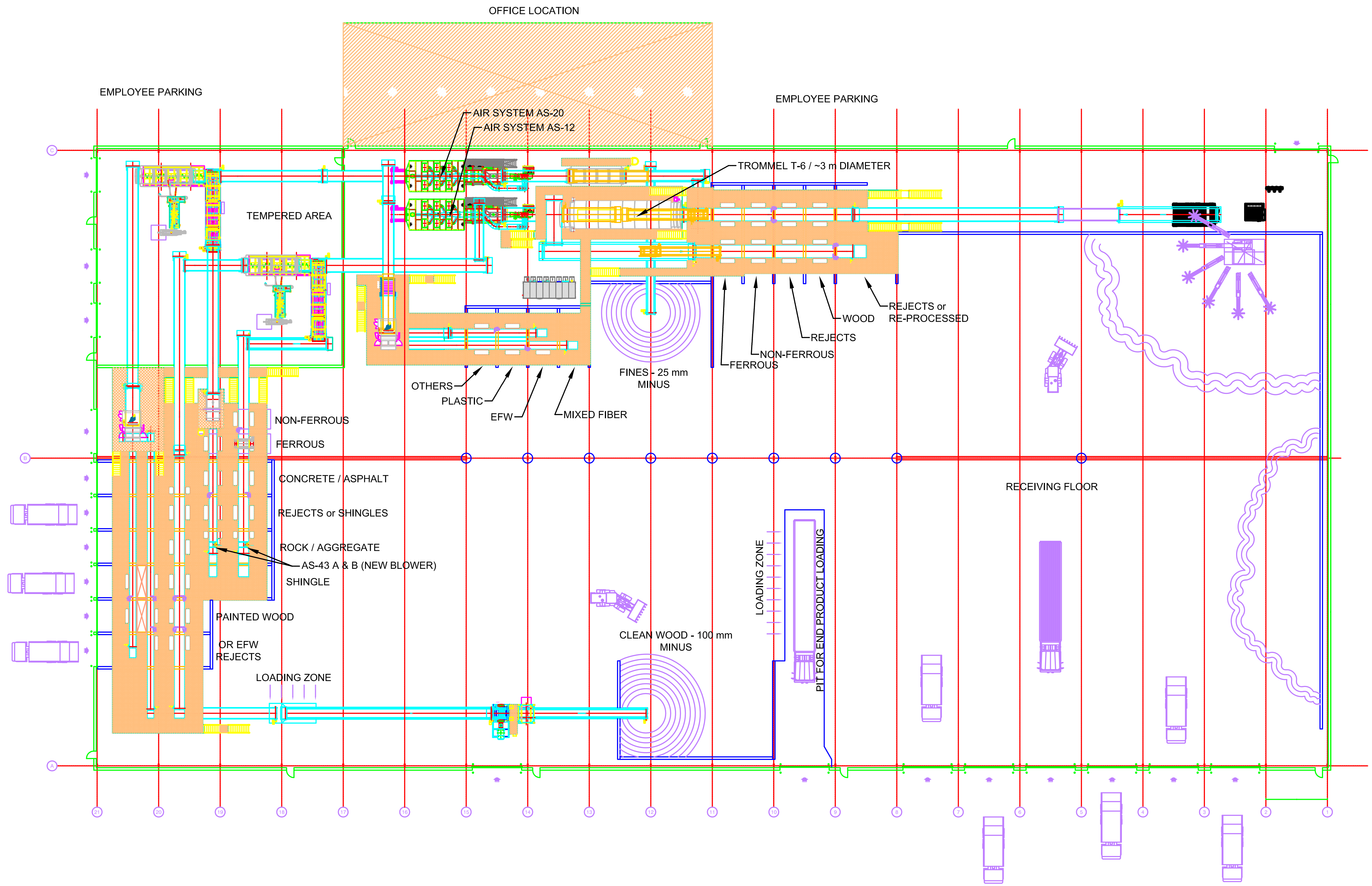

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2. COMPONENTS AND LAYOUT SUBJECT TO REFINEMENTS.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

CONSTRUCTION & DEMOLITION PROCESSING FACILITY LAYOUT

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	10 Dec. 2013
CHECK	P.L.E.	Aug, 2014
REVIEW	P.A.S.	Aug, 2014

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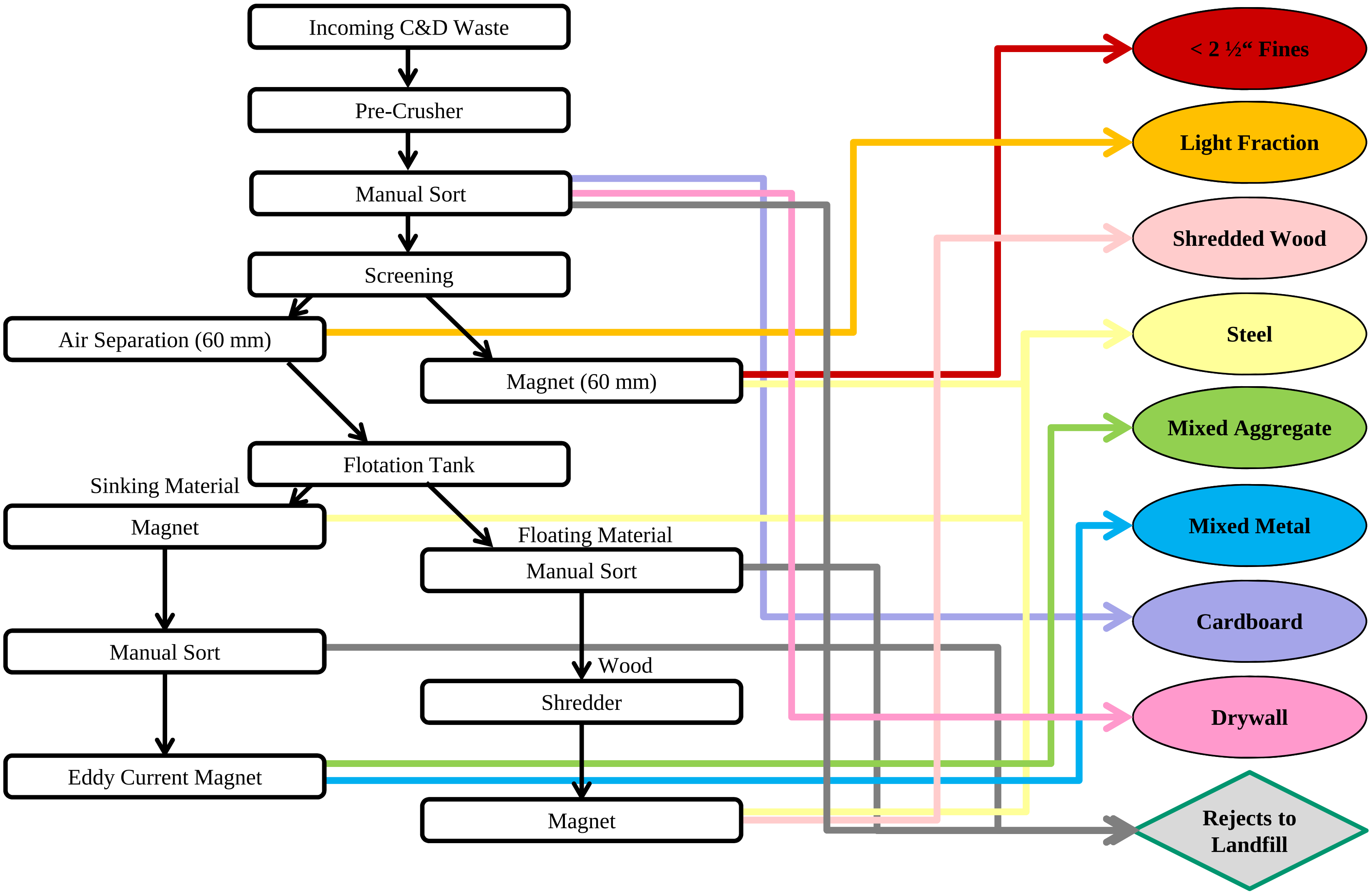

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
Construction and Demolition Processing Facility Operations Flow Chart

Golder Associates

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV.0
DESIGN	MKF	Nov. 2013	FIGURE 3	
GIS	--	--		
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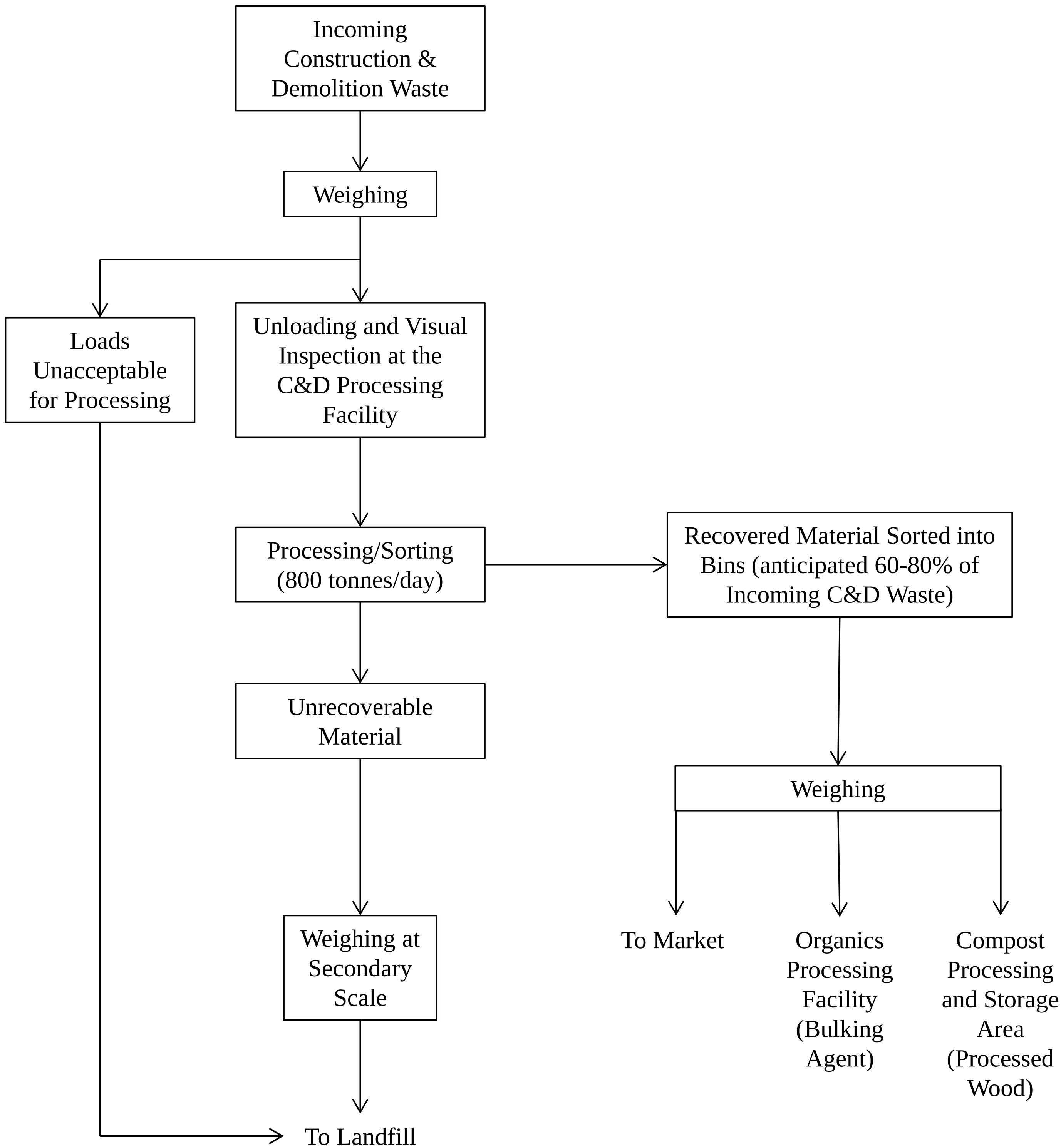

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
Construction and Demolition Processing Facility Material Balance

Golder Associates

PROJECT No. 12-1125-0045			PHASE No. 4500	
DESIGN	MKF	Nov. 2013	SCALE AS SHOWN	REV.0
GIS	--	--	FIGURE 4	
CHECK	PLE	Aug. 2014		
REVIEW	PAS	Aug. 2014		

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APPENDIX E

Materials Recovery Facility Design and Operations

December 2014

APPENDIX E

Materials Recovery Facility Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Table of Contents

1.0 INTRODUCTION

This appendix to the Design and Operations (D&O) Report has been prepared to describe the proposed materials recovery facility (MRF), a waste processing facility that is a component of the Capital Region Resource Recovery Centre (CRRRC). This appendix should be read in conjunction with the D&O Report for the complete CRRRC Site that is Volume IV of the document package. The D&O Report has been prepared to support an application for approval under the *Environmental Assessment Act* (EAA) (MOE, 2010a), and also for subsequent approvals under the *Environmental Protection Act* (EPA) (MOE, 2010b) and *Ontario Water Resources Act* (OWRA) (MOE, 2011) in support of the application for an Environmental Compliance Approval (ECA) for the CRRRC.

The proposed MRF will have a total footprint of approximately 13,000 square metres. It is anticipated that processing of waste materials from the industrial, commercial and institutional (IC&I) waste stream will be carried out at the MRF to separate out and recover a variety of materials, generally consisting of cardboard, paper, glass, plastics, ferrous and non-ferrous metals, wood and other fibres. Rejected and residual materials will be hauled to and disposed of in the on-Site landfill.

This D&O Report has been prepared to describe the design of the facility and the on-Site operations, which include the following activities:

- The receipt and processing of a maximum of 800 tonnes per day of IC&I waste;
- The receipt and processing of a maximum of 199,680 tonnes of IC&I waste annually;
- A maximum storage quantity of 850 tonnes of unprocessed IC&I material at any one time;
- Receiving hours of 6:00 a.m. to 6:00 p.m., Monday to Saturday; and,
- Operating hours of 7:00 a.m. to 11:00 p.m., Monday to Saturday.

The D&O Report has been prepared in accordance with the Ministry of the Environment and Climate Change (MOECC) Guide to Applying for an Environmental Compliance Approval (MOE, 2012).

1.1 Regulatory Requirements

Waste processing sites are subject to Part V of the EPA (MOE, 2010b). Section 27 of the EPA requires that an ECA be obtained from the Director of the MOECC for the establishment, operation, alterations, or enlargement of a waste processing site.

2.0 FACILITY DESIGN

2.1 Function of the Materials Recovery Facility

The function of the MRF is to receive and process solid, non-hazardous waste from the IC&I waste sector. Recovered materials will be sent to off-Site markets or utilized as a bulking agent in the organics processing facility, and rejected and residual materials will be hauled to the on-Site landfill.

Waste will be deposited on the receiving floor of the MRF (mixed loads and source separated loads will be deposited separately), sorted, baled, and then loaded into trucks or tractor trailers to be hauled off-Site to end markets, to the organics processing facility or to the on-Site landfill.

2.2 Facility Layout

Figure 1 shows the proposed plan of the MRF area and Figure 2 shows the proposed layout of the MRF building. The MRF will be developed as part of the initial Site development, and is located in the north portion of the Site, adjacent to the construction and demolition (C&D) processing facility.

The MRF will consist of a slab-on-grade industrial building with a footprint of approximately 13,000 square metres, and a height in the range of 13 to 14 metres, which will consist of:

- Approximately 3,000 square metres designated for the receipt of waste;
- Approximately 6,000 square metres designated for processing of waste;
- Approximately 700 square metres of office/employee space; and,
- Approximately 4,000 square metres designated for the storage and loading of products of the process.

Doors on the south wall of the building will be used for receiving and shipping of incoming and outgoing materials. A door(s) located on the north wall will be used infrequently to service equipment. The offices and employee facilities, including employee parking, will be on the north side of the main buildings.

The building will house the diversion equipment and processing activities. The MRF building will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system.

The building will be equipped with a dust collection system that will discharge through a bag house and cyclone with the air vented through the roof. The air ventilation rate is estimated to be 403,000 cubic feet per minute. The air change rate in the receiving area is estimated to be 6 changes per hour, 3 changes per hour in the processing area, and 0.5 changes per hour in the office/employee space.

Water collected by floor drains in the MRF will accumulate in underground holding tanks. The water will be removed with a vacuum truck for off-Site treatment or be delivered to the on-Site leachate pre-treatment facility.

2.3 Truck Traffic

There is sufficient queuing capacity on the access roads at the Site to allow for vehicles entering and exiting the CRRRC Site.

The MRF's design is to accept up to 199,680 tonnes of IC&I waste per year for processing. Based on shipping and receiving 6 days per week, the corresponding number of trucks will depend on the size of trucks dropping off IC&I material at the MRF, and the size of trucks hauling recovered materials off-Site, or rejected and residual materials to the landfill.

2.4 Wastes Accepted at the Site

2.4.1 Waste Characterization

The MRF will be used to recover materials from mixed and source separated loads of waste from the IC&I sector.

2.4.2 Waste Quantities

The MRF will have the capacity to process approximately 50 tonnes per hour of IC&I waste, or approximately 800 tonnes per day. The maximum amount of IC&I waste to be accepted at the MRF is 199,680 tonnes per year. It is estimated that overall diversion of IC&I material received at the CRRRC Site will range from approximately 11 to 26%; it is estimated that approximately 50% of IC&I materials received at the MRF will be recovered.

2.5 Waste Storage

Waste will be stored in accordance with Section 3.3.2 of the Ontario Fire Code (MCSCS, 2007), which stipulates the requirements for indoor general storage of combustible or non-combustible solids. Since the building has a sprinkler system the storage of waste will comply with the following:

- The area of individual storage piles will not exceed 1000 square metres;
- The clearance between sprinkler head deflectors and the tops of piles shall not be less than 457 millimetres; and,
- Aisles separating storage piles will be a minimum width of 2.4 metres extending the length of each storage pile.

The maximum amount of unprocessed waste to be stored at one time is 850 tonnes, which will be confined to the waste receiving and storage area as indicated on Figure 2. The maximum amount of processed materials to be stored at one time is 1,680 tonnes.

2.6 Closure Plan

The MRF will be decommissioned and closed prior to a change in use or sale of the property. A closure plan will be completed at least six months prior to Site closure.

The decommissioning and closure of the MRF will include the following procedures:

- All IC&I material storage areas will be emptied and the waste sent for disposal;
- All equipment will be either sold or reused at another facility;
- All floors will be swept and, if necessary, power washed and any wastewater would be collected and disposed in accordance with *Ontario Regulation* (O. Reg.) 347 (MOE, 1990); and,
- The exterior portions of the MRF area will be cleaned of any litter.

3.0 FACILITY OPERATIONS

3.1 Description of On-Site Operations

Inbound vehicles with IC&I waste material will enter the Site from Boundary Road and will proceed to the weigh scale. While vehicles are being weighed, the weigh scale operator will obtain and record information such as the source and description of the waste and the ECA number of the hauler. If, after inspection, the mixture of waste contained in the incoming load is suitable for processing, the vehicle driver will be directed by the weigh scale operator to the receiving area of the MRF, where the vehicle will unload into the storage area as directed by a MRF employee. If, after inspection, the mixture of waste contained in the incoming load is unsuitable for processing, the vehicle will be sent directly to the landfill for disposal. After unloading as directed, the empty vehicle will exit the Site.

Incoming vehicles from the scale containing materials destined for the MRF and vehicles transferring bins from the small load drop-off will enter the MRF building along the west part of the south side of the building and unload onto the floor; clean (source separated) loads will be kept separate from mixed loads. Larger recoverable or reject items will be manually sorted out of the incoming material. The incoming materials will then be loaded into a system of processing equipment that includes both mechanical recovery (ballistic separators, screens, magnets, air sorters and optical sorters) and manual sorting of materials. The operational flow chart for the MRF is shown on Figure 3. The recovered materials will generally consist of cardboard, paper, glass, plastics, ferrous and non-ferrous metals, wood and other fibres. The recovered materials will be baled and stored, and then loaded onto trucks along the eastern part of the south side of the building and hauled off-Site to end markets. Rejected and residual materials will be loaded onto trucks within the east end of the building and hauled for disposal in the on-Site landfill.

3.2 Hours and Days of Operation

The MRF will operate between the hours of 7:00 a.m. and 11:00 p.m., Monday through Saturday. Waste will be received at the CRRRC between the hours of 6:00 a.m. and 6:00 p.m. The Site is expected to operate between 300 and 312 days per year.

3.3 Material Balance

A material balance for the MRF is provided on Figure 4. The maximum processing capacity of IC&I waste at the MRF is 800 tonnes per day, to a maximum of 199,680 tonnes per year.

Of the IC&I material received at the MRF for processing, it is estimated that over time, up to 50% will be recovered during operations. Recovered materials will be sent to off-Site markets or used as a bulking material in the organics processing facility.

The remaining material not recoverable from operations at the MRF will be disposed in the on-Site landfill.

3.4 Waste Receiving Sites

Waste residuals from the MRF will be sent to the on-Site landfill.

3.5 Facility Equipment and Maintenance

The MRF operation will utilize the following equipment:

- Ford F-150 4x4 pickup truck;
- TwoCaterpillar 966 loaders;
- Two open top 120 cubic yard trailers;
- Caterpillar 2C6000 forklift;
- Caterpillar 246 skidsteer;
- Shunt tractor (shared with C&D processing facility)
- Magnets;
- Shredder;
- Conveyors;
- Screens;
- Ballistic Separators;
- Air Sorter; and,
- Optical Sorters.

Note that all models are presented above on an “or equivalent” basis.

A preventative maintenance program will be followed for each piece of equipment based on manufacturer specifications.

3.6 Staff Training

A training plan will be developed and maintained for all employees that operate the MRF. Trained personnel will supervise all receiving of waste at the MRF. All employees directly involved with activities relating to the facility will be trained in the following:

- Relevant waste management legislation, regulations and guidelines;
- Major environmental concerns pertaining to the waste being handled;
- Occupational health and safety concerns pertaining to the processes and waste to be handled;
- Management procedures including the use and operation of equipment for the processes and waste to be handled;
- Environmental emergency and contingency procedures for the processes and waste to be handled;
- The use and operation of the equipment to be used by the operator;

- Procedures for the refusal of unacceptable loads;
- Site specific written procedures for the control of nuisance conditions;
- Record keeping procedures; and,
- The requirements of the ECA.

A record of the employee training, including the date of training, the name and signature of the employee and a description of the training provided will be maintained.

3.7 Waste Screening Procedure

Waste will be accepted only from approved haulers that have a valid Waste Systems ECA, as per Section 16(1) of O. Reg. 347 (MOE, 1990). Additionally, small IC&I waste loads may be accepted at the small loads area. It is expected that this will make up a very small percentage of the total incoming waste stream.

All incoming vehicles must enter over the weigh scale to determine the weight of waste coming into the MRF. The scale attendant will do an initial screening of the load. After the initial weigh-in, incoming vehicles containing a mixture of IC&I materials suitable for processing will be directed to the MRF. An employee located at the MRF receiving area will inspect the incoming material to ensure that the load does not contain any unacceptable or prohibited wastes or materials. Loads that do contain prohibited materials will be rejected and will be reloaded onto the vehicle delivering the load.

In the unlikely event that unacceptable or prohibited material is not detected until the hauler has left the Site, the material will be segregated, characterized, and managed in accordance with O. Reg. 347. An incident report will be completed. Effort will be made to identify and contact the customer and/or generator of the materials to ensure that prohibited materials will not be delivered to the facility in the future.

3.8 Monitoring, Environmental Emergency and Contingency Plan

An Environmental Emergency and Contingency (E2C) Plan will be developed for the entire CRRRC Site as described in the D&O Report for the complete CRRRC Site.

Environmental monitoring related to the MRF will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to dust, noise, and odour.

3.9 Disruption of Shipment

Should there be a disruption of shipment of recovered materials, the MRF would be able to continue to accept waste until the MRF reaches the maximum approved storage capacity. At that time, the MRF would not accept additional waste for processing. If the shipment disruption continues such that the maximum approved storage time would be exceeded, then the material would be sent for disposal at the landfill. Additional material would not be accepted at the MRF until shipment of the recovered materials was possible.

4.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

M.K. Farnel, P.Eng.
Environmental Engineer

P.A.Smolkin, P.Eng.
Principal

ALC/MKF/PAS/sg
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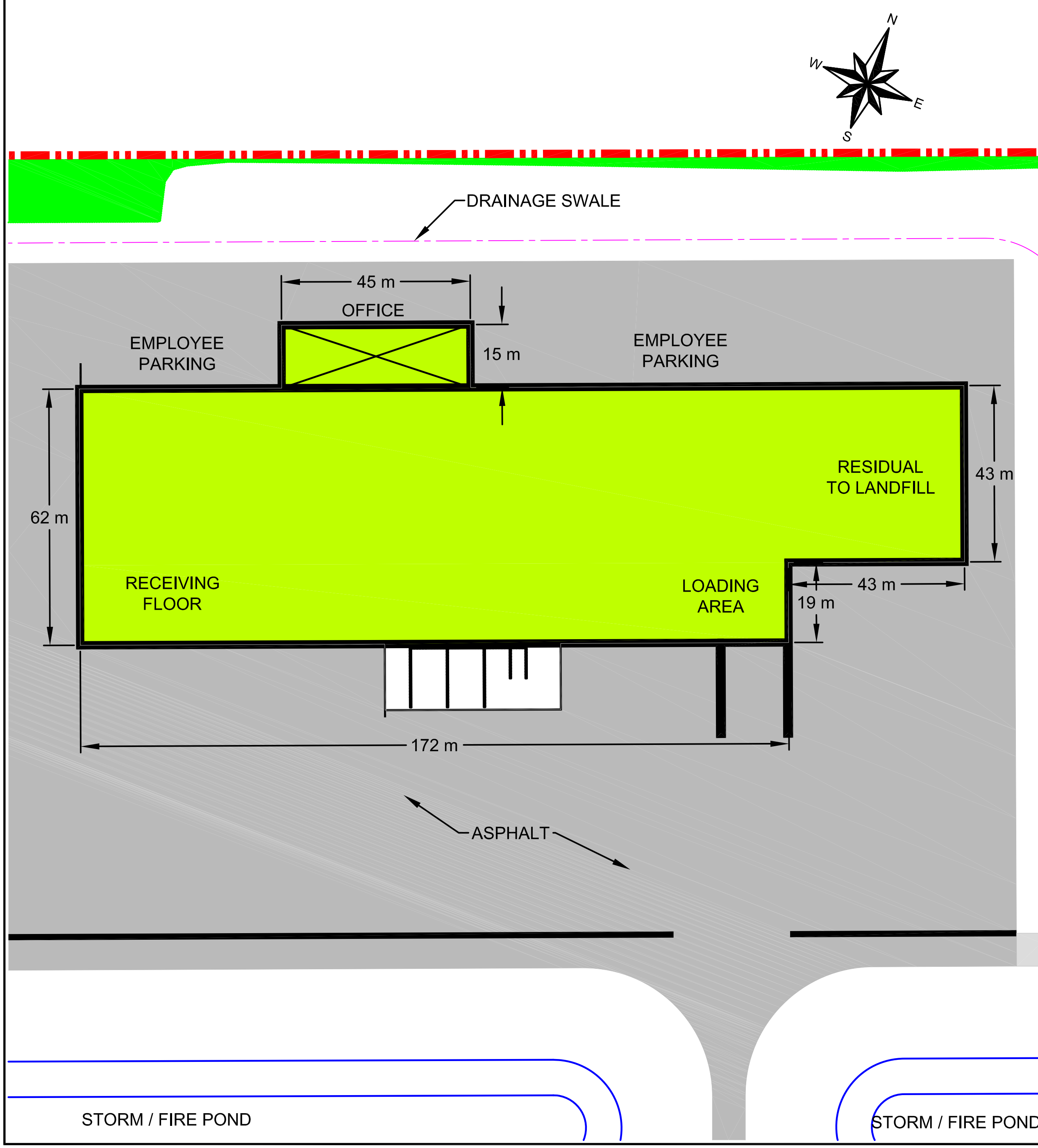

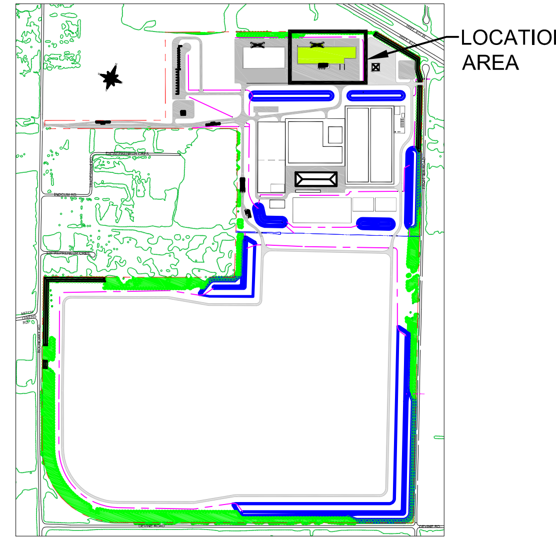

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2. DIMENSIONS SUBJECT TO REFINEMENTS.

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PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
MATERIALS RECOVERY FACILITY AREA PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	09 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

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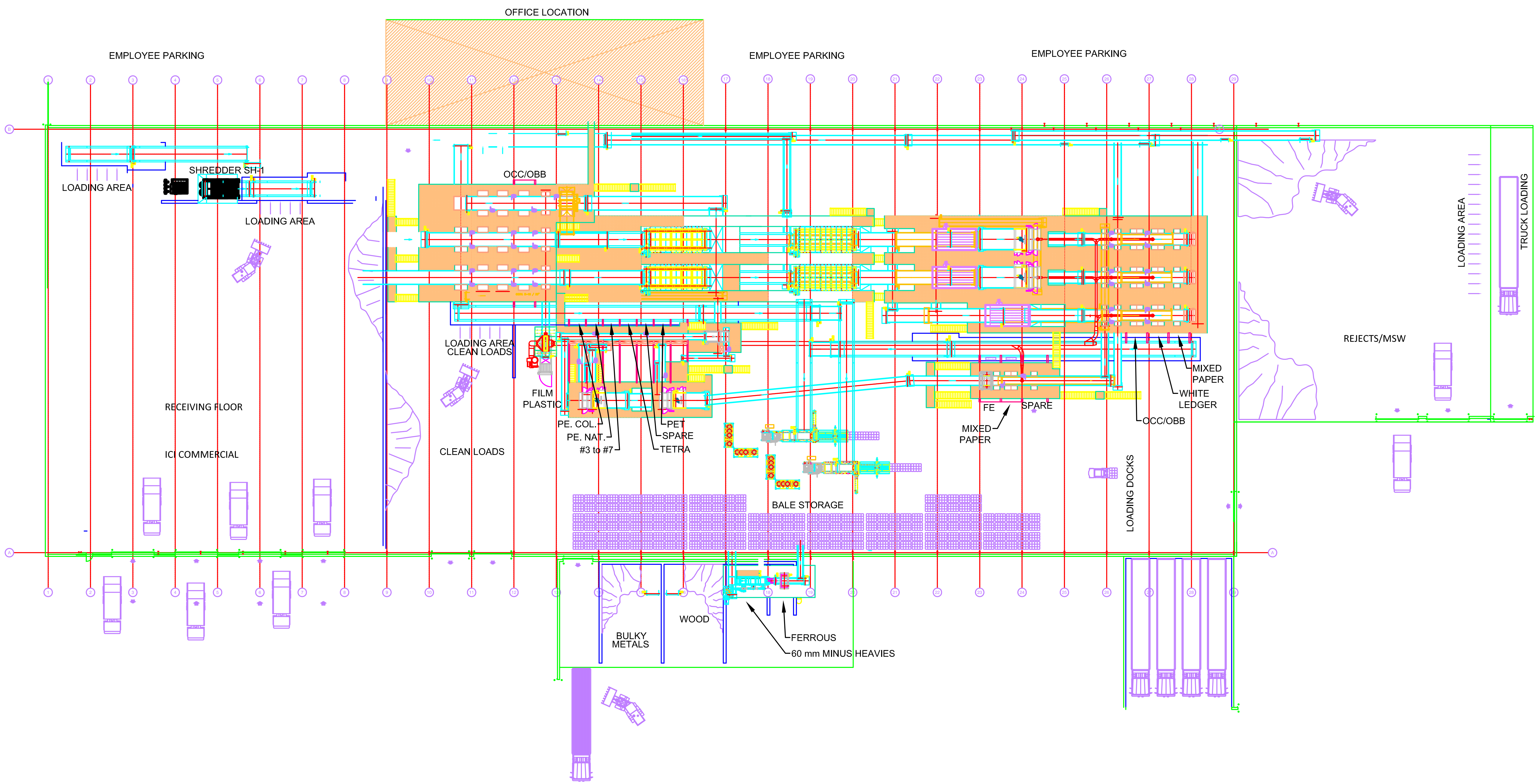

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2. COMPONENTS AND LAYOUT SUBJECT TO REFINEMENT.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

MATERIALS RECOVERY FACILITY LAYOUT

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	10 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

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Figure 2

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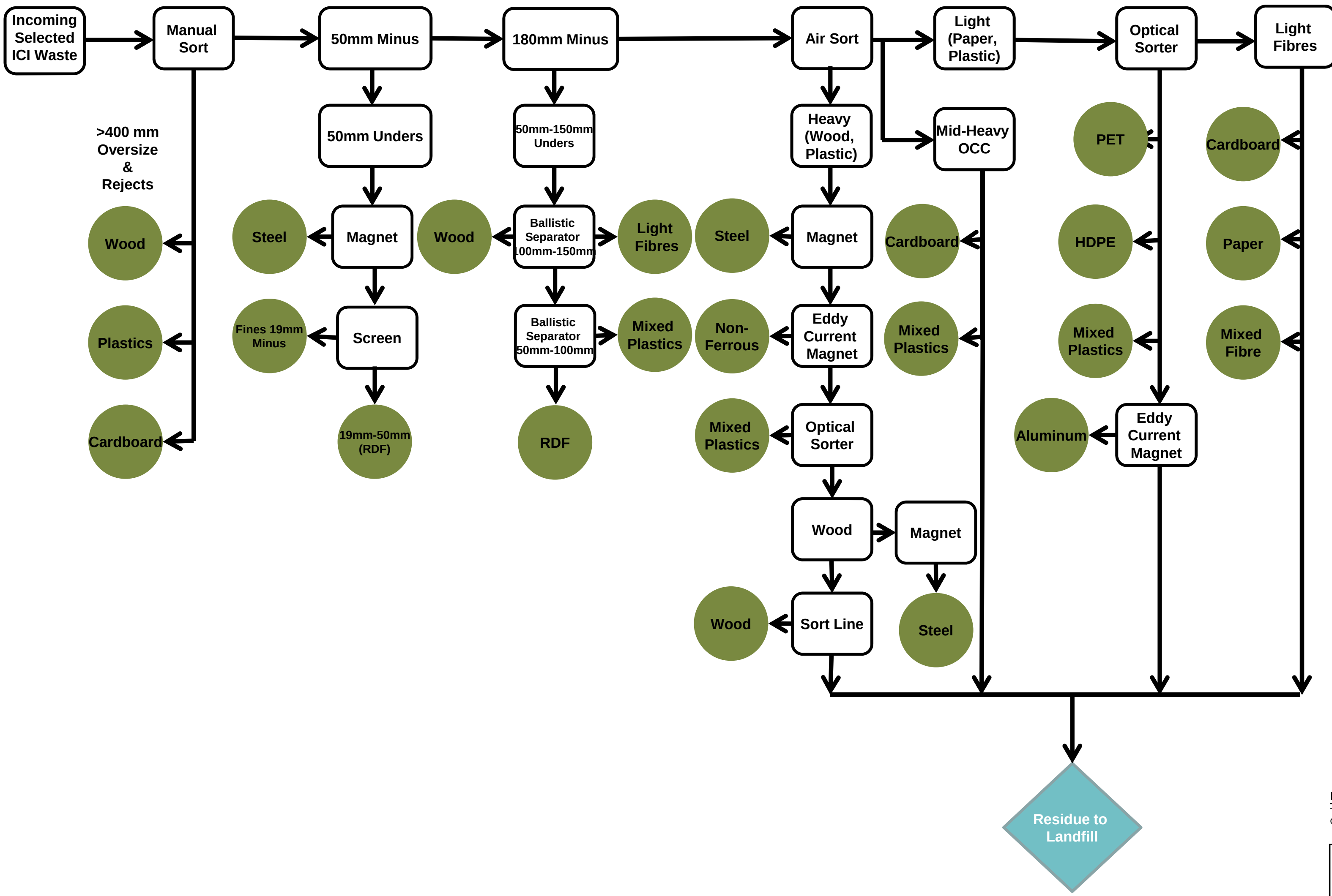

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
MATERIALS RECOVERY FACILITY
OPERATIONS FLOW CHART

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV.0
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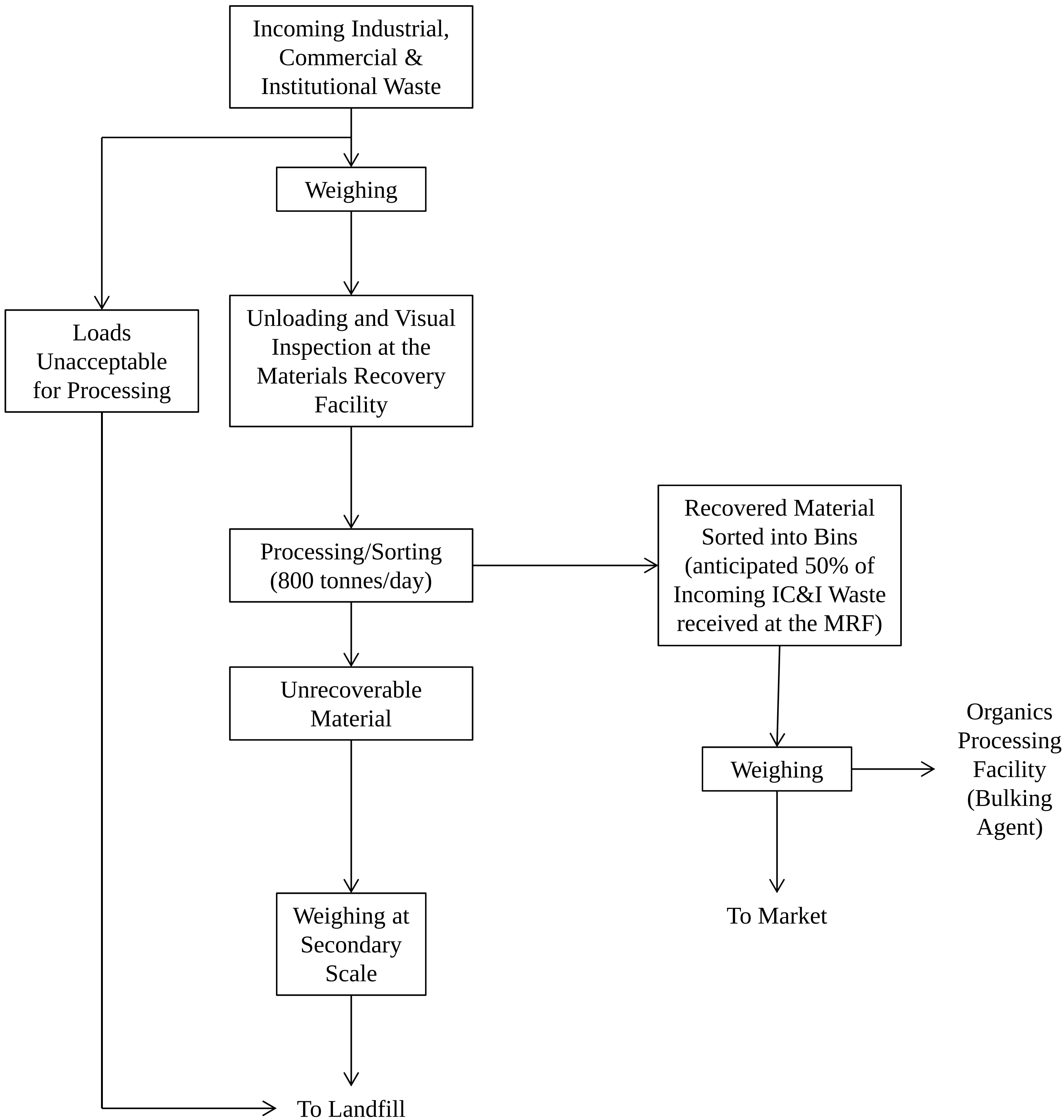

NOTE

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PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
Materials Recovery Facility
Material Balance

Golder Associates

PROJECT No. 12-1125-0045			PHASE No. 4500	
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APPENDIX F

Organics Processing Facility Design and Operations

December 2014

APPENDIX F

Organics Processing Facility Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Golder Associates

Table of Contents

FIGURES

1.0 INTRODUCTION

This appendix to the Design and Operations (D&O) Report has been prepared to describe the proposed organics processing facility, a waste processing facility that will operate as a component of the Capital Region Resource Recovery Centre (CRRRC). This appendix should be read in conjunction with the D&O Report for the complete CRRRC Site that is Volume IV of the document package. The D&O Report has been prepared to support an application for approval under the *Environmental Assessment Act* (EAA) (MOE, 2010a), and also for subsequent approvals under the *Environmental Protection Act* (EPA) (MOE, 2010b) and *Ontario Water Resources Act* (OWRA) (MOE, 2011) in support of the application for an Environmental Compliance Approval (ECA) for the CRRRC.

It is anticipated that processing of organic waste materials from the industrial, commercial and institutional (IC&I) waste stream will be carried out at the CRRRC. Both source separated organic (SSO) waste and mixed IC&I waste with sufficiently high organic content will be accepted for processing at the organics processing facility. Processed materials will be either sold to off-Site markets or used on-Site in accordance with existing regulations. Residual, physical contaminants screened out of the organic waste throughout the processing will be hauled to and disposed of in the on-Site landfill or sent to on-Site recovery facilities.

It is proposed that the organics processing facility will utilize BioPower (BP) technology in processing the organic waste received on-Site. Initially, a demonstration scale BP organics processing facility will accept primarily mixed organics from the IC&I waste stream, while the majority of SSO waste will be pre-processed and hauled off-Site to farm based anaerobic digesters (AD); pre-processed SSO waste may also be hauled to other approved commercial AD facilities in place of farm based ADs. Once the demonstration scale facility performance has been optimized and shown the effectiveness of the BP technology, the facility will be scaled up to accept a larger quantity of organic materials for processing as described below. Transport of pre-processed SSO waste to farm based ADs may also be continued as a component of the CRRRC's organic processing capability depending on market demand.

The organics processing facility has been sized based on the anticipated operational parameters and performance of the component processes to accommodate 50,000 tonnes per year of organics when it is running at the full scale. However, the demonstration scale of the organics processing facility will operate by processing up to 23,400 tonnes per year of organics. It is noted that the design and operation of the full-scale on-Site organics processing facility will be optimized based on the results of the demonstration scale facility.

This D&O Report has been prepared to describe the design of the organics processing facility and the operations, which include the following activities:

- Receive and pre-process up to a maximum of 20,000 tonnes of organic SSO waste per year destined for off-Site farm based AD or other approved commercial AD facilities;
- Receive up to a maximum of 4,000 tonnes of mixed IC&I waste with sufficient organics per month destined for the BP demonstration-scale operation, with a maximum annual limit of 23,400 tonnes per year;
- For the full scale BP process, maximum storage quantity of 1,800 tonnes of unprocessed organic waste material destined for the BP process in the pre-processing building, 600 tonnes of pre-processed organic waste destined for the BP primary reactor cells in the pre-processing building, and 1,000 cubic metres of pre-processed organic slurry for delivery to off-Site farm based AD at any one time in outdoor tanks;

- Receiving hours of 6:00 a.m. to 6:00 p.m., Monday to Saturday;
- Operating hours of 6:00 a.m. to 7:00 p.m., Monday to Saturday within the building; and,
- Operating hours of 7:00 a.m. to 7:00 p.m., Monday to Saturday at the primary reactor cells.

The Organics Processing Facility D&O Report, in conjunction with the D&O Report for the complete CRRRC Site, has been prepared in accordance with the Ministry of the Environment and Climate Change (MOECC) Guide to Applying for an Environmental Compliance Approval (MOE, 2012c).

1.1 Regulatory Requirements

Waste processing sites are subject to Part V of the EPA (MOE, 2010b). Section 27 of the EPA requires that an ECA be obtained from the Director of the MOECC for the establishment, operation, alterations, or enlargement of a waste processing site.

The Guideline for the Production of Compost in Ontario (MOE, 2012a) recommends planning, design and operational practices for aerobic composting facilities. The companion Ontario Compost Quality Standards (MOE, 2012b) sets environmentally protective standards for the production of compost for beneficial use and applies to compost produced by aerobic composting of non-hazardous organic materials. The guideline was used as guidance when developing this appendix to the D&O report.

Part IV and Part V of O.Reg. 101/94 (MOE, 1994) applies to sites whose only function is to accept and transfer municipal waste as described in O.Reg. 347 (which includes waste from the IC&I and construction and demolition (C&D) sectors) for recycling or to compost leaf and yard waste. Part IV and Part V of O.Reg 101/94 were used as guidance when developing this appendix to the D&O report.

2.0 ORGANICS PROCESSING FACILITY DESIGN

2.1 Function of the Organics Processing Facility

The function of the organics processing facility is to receive and process non-hazardous organic waste from the IC&I waste stream. Both SSO and mixed IC&I waste with a sufficiently high organic content will be accepted at the organics processing facility. The majority of SSO waste received at the Site will at least initially be pre-processed and sent to off-Site farm based or other approved commercial ADs. Mixed IC&I waste will be processed on-Site, initially in a demonstration-scale facility, with the product of the processing sent to the compost processing and storage area where it will undergo final processing/curing before being sold to off-Site markets or used on-Site.

2.2 Facility Layout

Figure 1 shows the proposed layout of the organics processing facility. The facility is located within the north part of the Site, just south of the C&D) processing facility and the materials recovery facility (MRF), and immediately adjacent to the compost processing and storage area.

The organics processing facility will consist of the following areas:

- The pre-processing building, which is anticipated to serve for the pre-processing, demonstration scale and the full scale receiving and storage, has been assumed to have a footprint area of approximately 3,000 square metres and a height of approximately 12 metres;
- The primary reactor cells will be built on an ongoing basis based on the quantity of material to be processed, and are anticipated to ultimately consist of two main cells that are up to 70 metres wide by 300 metres long, with sloped sides and a height up to approximately 6.5 to 7 metres;
- The secondary digester building will have dimensions of approximately 20 by 30 metres, and a height of approximately 10 metres; and,
- The compost processing and storage pad will occupy an area of approximately 3.5 hectares and will have a paved surface.

Both liquor (liquid by-product from digestion) collected by floor drains in the pre-processing building and liquor from the secondary digester building will be collected in underground holding tanks. The liquor will be re-used in the process as much as possible; surplus will be sent to the on-Site leachate pre-treatment facility. Liquor collected from the secondary digester building may also be considered for off-Site use on farms.

The facility will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system.

2.3 Wastes Accepted at the Site

2.3.1 Waste Characterization

The organics processing facility will accept organic waste from the IC&I stream. Organic IC&I waste will be accepted in two forms:

1) SSO Waste: clean, high moisture, SSO loads (generally less than 30% total solids and less than 25% physical contamination); and,

2) Mixed IC&I Waste: IC&I loads that have a sufficiently high organic fraction (generally greater than 50% organics and greater than 30% total solids).

2.3.2 Waste Quantities

The demonstration scale facility will accept up to 23,400 tonnes per year of mixed IC&I waste with sufficient organic content.

The full scale organics processing facility will accept a maximum of 50,000 tonnes per year of organic waste (mixed IC&I and SSO) destined for the primary reactor.

The organics processing facility will accept a maximum of 20,000 tonnes per year (out of the total 50,000 tonnes per year) of SSO waste for pre-processing before being transported to off-Site farm based or other approved commercial AD processing.

2.3.3 Waste Storage

SSO destined for the farm based or other approved commercial ADs will typically have one day of storage volume in the receiving hopper. After the SSO has been pre-processed into an organic slurry, it will be transferred to a tank(s) with a capacity to store 1,000 cubic metres of slurry.

Unprocessed mixed waste with a sufficiently high organic content destined for the primary reactor can be stored for up to three days on the receiving floor in the pre-processing building, which equates to approximately 1,800 tonnes. There will also be storage capacity in the pre-processing building for approximately 600 tonnes of pre-processed organic waste for delivery to the primary reactor.

It is anticipated that the organics received will typically be mixed and removed from the pre-processing building on the day they arrive, limiting the time that they create an odour source in the building. If it is necessary to leave odorous material in the building, it would be covered with a carbon source material to mitigate odours as required.

2.4 BioPower Demonstration Facility

It is proposed that a demonstration scale facility will be operated for demonstration of the BP technology. The purpose of the demonstration is to:

- Confirm the effectiveness of the BP technology in treating organic waste;
- Provide information to enhance and optimize the BP technology; and,
- Refine process design and operating parameters for operation on a full-scale commercial basis.

The demonstration will be performed by constructing and operating a facility that incorporates all of the processes and facilities associated with the BP technology. These facilities will be expanded as required and incorporated into the full-scale plant following completion of the demonstration phase, depending on the results of the demonstration phase and market demand. The principal facilities to be used in the course of the demonstration are:

- Organics pre-processing building;
- Biofilter for treatment of air from the organics pre-processing building;
- Primary reactor;
- Secondary reactor;
- Negative pressure extraction system;
- Flare;
- Equipment for blending organic materials, transportation and placement of blended material in the primary reactor, installation of a cover system, excavation and transportation of digested product, processing of digested product, processing/curing of digested product, refurbishment of primary reactor for re-use; and,
- Monitoring and analytical equipment.

The demonstration project at the CRRRC will be conducted within the area designated in the Site layout plan for operation of the full-scale organic processing facility as shown on Figure 1.

The BP process is a system for continuous anaerobic digestion of organic waste to produce biogas and digested product. The system has a primary reactor with multiple reactor zones, each of which is filled, in sequence, with organic waste blended with bulking agent (e.g., wood chips). The organic waste remains in the reactor zone in which it is placed until it is removed by excavation following digestion and curing. The waste in each zone is allowed to decompose anaerobically until gas production is essentially complete, at which point the process is converted to aerobic decomposition, followed by excavation of the digested cured product. Thus the newest zone is being filled, and the oldest excavated, while the others are operating in the anaerobic phase. A secondary anaerobic reactor digests the organic liquor generated in the primary reactor, to produce biogas and spent liquor. Most of the spent liquor is returned to the primary reactor, as required, to enhance anaerobic decomposition; the balance may be considered for alternative uses off-Site, such as nutrients on farms, or combined with the landfill leachate for pre-treatment. The biogas collected from the system is flared or treated and used as fuel for the operation of the facility itself, or converted to electricity. The organic waste decomposition process is controlled within the primary reactor such that anaerobic digestion is optimized between the primary and secondary reactors.

All the individual unit operations are simple, reliable and proven. All individual operations have been used successfully and implemented many times in other waste management operations and within the BP process none are required to be operated outside their normal operating parameters. Odour will be controlled by capturing and combusting the gas generated from the process, with a biofilter for treating building air and as back-up to the flare.

The primary reactor cells will be built in stages and consist of an encapsulation design. The encapsulation design will consist of a shallow excavation with a geomembrane bottom liner, an underdrain system to remove the liquor generated by the digestion process, an upper insulating layer and a geomembrane cover as shown on Figure 2. Piping will be placed within the organic material to allow recirculation of collected liquor and for extraction of biogas and odour control. The primary reactor cells will be built on an ongoing basis based on the quantity of material to be processed, and are anticipated to ultimately consist of two main cells that are up to 70 metres wide by 300 metres long, with sloped sides and heights up to approximately 6.5 to 7 metres. The material will be temporarily covered when placed in the cell until additional material is placed in the adjoining area. The anaerobic digestion period within the cell is anticipated to be approximately 12 to 18 months.

2.5 BioPower Full-Scale Facility

As the demonstration progresses, data will be gathered and the performance assessed from three perspectives: environmental, operational and economic. Part V EPA (MOE, 2010b) approval will be sought, depending on the results, for conversion of the system to full-scale commercial operation. In practical terms, full-scale operation will entail the construction of additional primary reactors to meet market demand and possibly the scale-up of the secondary digester by adding one or more additional units. Pumps, piping and leachate storage will also be scaled up as required. The precise system requirements will be specified in the Part V application.

2.6 Pre-Processing for Off-Site AD Processing

In order to ensure organics diversion capability during the demonstration period for the BP facility and to meet market demand, it is proposed to provide capacity for SSO and pre-process them into an organic slurry to be taken by tanker to approved off-Site farm based (or other approved commercial) ADs for final processing. Should this operation prove successful and there be continued interest/demand from ADs, Taggart Miller may elect to continue it for source-separated organics while operating the BP facility for organic streams for which that technology is more appropriate.

The pre-processing area for SSO waste to be transferred to off-Site ADs will be within the receiving and storage building and consist of a lined receiving pit, a clam/crane to transfer SSO waste to a feed hopper attached to a masher, an intermediate storage tank, hydraulic squeezing equipment for the separation of physical contaminants from the SSO waste, and an outdoor storage tank for the pre-processed slurry from which tankers are loaded for transfer of the material off-Site.

The total area of the receiving and storage building, which will house the pre-processing activities, has been assumed to have a footprint of approximately 3,000 square metres and a height of approximately 12 metres. The organic pre-processing building, as well as internal and external storage tanks, will be kept under negative pressure to reduce the potential for fugitive odour emissions and the air will be exhausted and treated through a biofilter.

The current receiving and storage building design approach keeps the trucks outside the facility as they unload. Alternatively the building envelope could be extended to have the trucks enclosed in a secondary structure to increase the ability to keep the processing building under negative pressure and reduce potential fugitive odour emissions. The receiving area for the primary reactor cell pre-processing will be similarly designed to allow the trucks to discharge while minimizing the volume of air requiring treatment.

3.0 ORGANICS PROCESSING FACILITY OPERATIONS

3.1 Hours and Days of Operation

The organics processing facility will operate between the hours of 6:00 a.m. and 7:00 p.m., Monday through Saturday in the building and 7:00 a.m. and 7:00 p.m., Monday through Saturday at the primary reactor cells. Waste will be received at the CRRRC between the hours of 6:00 a.m. and 6:00 p.m. The Site is expected to operate between 300 and 312 days per year.

3.2 Organics Processing

The operational flow chart for the organics processing facility is shown on Figure 3. The following sections describe the different aspects of the organics processing facility.

3.2.1 BioPower Demonstration Facility

Operation of the demonstration unit will parallel the planned operation of a full-scale commercial facility:

Organic waste will be delivered to the organics pre-processing building where it will be blended with a bulking agent and other material to optimize the carbon:nitrogen ratio and permeability of the waste.

The blended material will then be transported to and placed into the primary reactor. A layer of cover soil or other material will be placed over blended material in the primary reactor at the end of the operating day. The primary reactor will be progressively filled until it reaches the maximum fill elevation; at that point a cover consisting of soil/compost insulating layer and a geomembrane will be placed over the completed portion of the primary reactor. Inoculum, containing the appropriate microbes, may be added to the blended material in order to enhance the biological degradation process. During filling, air injection and liquor injection pipes will be progressively installed.

Complete portions of the primary reactor will be equipped with a negative pressure extraction system to remove biogas produced by decomposition. This gas will be flared or used as fuel for energy production.

Liquor percolating from the blended material in the primary reactor will be collected in the drainage system and pumped to the secondary reactor. Biogas produced in the secondary reactor will be combined with that generated in the primary reactor(s) and flared or used as fuel for energy production. Effluent from the secondary reactor will be recirculated to the primary reactor, considered for alternative off-Site uses, such as nutrients on farms, or discharged to the CRRRC leachate pre-treatment system.

Once the organic material in a primary reactor zone has been digested, the reactor zone will be drained and turned aerobic by progressive introduction of air. The resultant gases will be extracted from the reactor and used as combustion air in the flare or energy recovery facility, or treated in the biofilter.

After the digested product in the primary reactor has been aerobically stabilized, it will be removed and transported to the compost processing and storage area, where it will be further processed/cured for approximately 6 months, screened to remove contaminants, and the resulting cured digested product assessed for use as a soil conditioner/compost product, failing which it will be used as daily cover in the landfill. Digested product will be cured in open windrows or trapezoidal piles located downgradient (in terms of surface water runoff) from other curing materials (leaf and yard waste, clean wood waste) accepted at the compost processing and storage area.

The quality of the runoff from curing digested product is unknown and as such runoff from the curing windrows/trapezoidal piles will be collected in a stormwater management pond. As part of the demonstration process, regular water quality analysis of the pond is proposed. Depending on the results of the water quality analysis, the pond water can be re-used in the on-Site composting process, re-used for on-Site irrigation or sent for off-Site treatment to the City of Ottawa wastewater treatment plant. It is noted that, as a contingency, aerators may be required to reduce odour in this pond. Further, the processing of organics in the demonstration primary reactor will take 12 to 18 months. Therefore, the compost pad will not be needed for curing of digested product for at least 12 to 18 months, during which time the pond will only receive runoff associated with windrow/trapezoidal pile curing of leaf and yard waste.

During the demonstration phase the primary reactor will be monitored for:

- Temperature (ambient and within the reactor);
- Moisture content of waste;
- Nitrogen levels in waste;
- Biogas production rate;
- Biogas quality (methane; carbon dioxide; sulphur compounds; ammonia);
- Liquor production rate;
- Liquor character (BOD; COD; Nitrate/Nitrite; ammonia - N; P; K; TOC; metals, solids, volatile fatty acids);
- Reactor surface settlement;
- Liquor recirculation rate;
- Moisture addition; and,
- Hydraulic conductivity.

The secondary reactor will be monitored for:

- Biogas production rate;
- Biogas quality; and,
- Effluent quality.

Data will be analyzed and used to adjust operating conditions as appropriate. The monitoring program may be adjusted in response to ongoing data review and analysis.

The characteristics/quality of compost produced by the BP process will be monitored in accordance with MOECC compost guidelines (MOE, 2012b).

3.2.2 BioPower Full-Scale Facility

The demonstration will be performed for a minimum of one complete treatment cycle (filling primary reactor, anaerobic treatment of organics in primary reactor and liquor in secondary reactor, aerobic stabilization of material in primary reactor, emptying of primary reactor, screening and processing/curing of digested product, and analysis of compost quality). For planning purposes, it is anticipated that the demonstration will operate for a period of 24 to 36 months.

As the demonstration progresses, data will be gathered and the performance assessed from three perspectives: environmental, operational and economic. Part V EPA (MOE 2010b) approval will be sought for conversion of the system to full-scale commercial operation. The precise system requirements will be specified in the Part V application. Operationally, the transition from demonstration to full-scale is expected to be seamless, since the demonstration system will be fully incorporated into the commercial plant.

3.2.3 Pre-Processing for Off-Site AD Processing

Pre-processing of SSO waste will consist of the following:

- Trucks will tip clean high moisture SSO through elevated overhead doors and into a lined receiving pit.
- An overhead clam/crane system will pick up material and feed it to a feed hopper, which will meter the flow off waste to the masher.
- The masher, an enclosed component used to reduce the size of the SSO waste, will drop the mashed organic waste, now a slurry, into an intermediate storage tank.
- Material from the intermediate storage tank will be pumped to the hydraulic squeezing equipment, which forces the slurry through small openings to separate the more liquid slurry from any physical contaminants. The wet slurry (organics) is then pumped to an enclosed tank outside the building.
- The physical contaminants separated from the organic slurry may still have some residual organics trapped with them depending on the quality and nature of the materials received. Depending on the amount of organics remaining within the separated physical contaminants, they will either be mixed with organic materials accepted for processing in the BP digester or sent to the on-Site landfill. If being landfilled, the contaminants would be stored in a bin that is emptied at the landfill once it is full to reduce the potential for odour.
- The pre-processed SSO slurry will be pumped onto tankers and delivered to the off-Site AD facilities.

3.3 Waste Receiving Sites

Screened physical contaminants from the organics processing facility will be sent to the on-Site landfill or to other on-Site recovery facilities.

3.4 Organics Processing Facility Equipment and Maintenance

The organics processing facility operation will utilize the following mobile equipment:

- Ford F-150 4x4 pickup truck (shared with compost processing and storage area);
- Triaxle 400 HP dump truck;
- Caterpillar 966 loader (shared with compost processing and storage area);
- Caterpillar 246 skidsteer;
- McCloskey 36X100 ST conveyor (uncovered);
- Caterpillar M318 excavator (shared with compost processing and storage area);
- Supreme 1000T Eco mixer; and,
- A compost pasteurizer.

Note that all models are presented on an “or equivalent” basis.

A preventative maintenance program will be followed for each piece of equipment based on manufacturer’s specifications.

3.5 Staff Training

A training plan will be developed and maintained for all employees that operate the organics processing facility. Trained personnel will supervise all receiving of waste at the organics processing facility. All employees directly involved with activities relating to the facility will be trained in the following:

- Relevant waste management legislation, regulations and guidelines;
- Major environmental concerns pertaining to the waste being handled;
- Occupational health and safety concerns pertaining to the processes and waste to be handled;
- Management procedures including the use and operation of equipment for the processes and waste to be handled;
- Environmental emergency and contingency procedures for the processes and waste to be handled;
- The use and operation of the equipment to be used by the operator;
- Procedures for the refusal of unacceptable loads;
- Site specific written procedures for the control of nuisance conditions;
- Record keeping procedures; and,
- The requirements of the ECA.

A record of the employee training, including the date of training, the name and signature of the employee and a description of the training provided will be maintained.

3.6 Quality Control

3.6.1 Waste Screening Procedure

All incoming vehicles must enter and exit over the weigh scale to determine the weight of waste coming into the organics processing facility. The scale attendant will do an initial screening of the load. After the initial weigh-in, provided the incoming vehicle contains sufficient organics of suitable quality for processing, it will be directed to the organics processing facility. An employee located at the organics processing facility receiving area will inspect the incoming material to ensure that the load does not contain any unacceptable or prohibited wastes or materials. Loads that contain prohibited materials will be rejected and will be reloaded onto the vehicle delivering the load.

In the unlikely event that unacceptable or prohibited material is not detected until the hauler has left the Site, the material will be segregated, characterized, and managed in accordance with O.Reg. 347 (MOE, 1990). An incident report will be completed. Effort will be made to identify and contact the customer and/or generator of the materials to ensure that prohibited materials will not be delivered to the facility in the future.

3.6.2 End Product Quality

A sampling program will be developed and undertaken to assess the quality of the final products of the organics processing facility. Compost will be sampled to meet the requirements of the Ontario Compost Quality Standards (MOE, 2012b); liquor from the secondary digester and pre-processed organic slurry will be sampled and tested to meet the requirements of the *Nutrient Management Act* (MOE, 2002) or as required by the approvals of the receiving facility.

Finished products will not be removed from the Site until the product has been sampled and analyzed and their quality shown to meet the applicable quality requirements.

The results of the quality analysis will dictate the final use of the product.

Cured digested product that is not of acceptable quality for other uses could be returned to the start of the organics processing facility and incorporated into the incoming feedstock or sent to the landfill as daily cover, and possibly used to support vegetation growth on the landfill final cover.

Liquor from the secondary digester and pre-processed organic slurry will be sampled and tested as required by the *Nutrient Management Act* (MOE, 2002) or other approvals to determine the suitability of the material for use off-Site. Liquor not suitable for use off-Site will either be re-used in the process or sent for pre-treatment at the on-Site leachate pre-treatment facility.

4.0 ODOUR MANAGEMENT PLAN

The following measures will be taken to reduce odour at the organics processing facility:

- The material in the receiving hopper and the material being fed to the metering hopper is likely the highest odour generating source for the SSO in the off-Site AD pre-processing line. Material will usually be processed on a frequent basis and thus reduce the contact time between the material and the open air within the enclosed pre-processing building. Once the material enters the masher, the odour generating potential is reduced, since the material is enclosed within piping or storage tanks until loaded into enclosed tankers for shipment to the farms.
- The organic pre-processing building, as well as internal and external storage tanks, will be kept under negative pressure to reduce the potential for fugitive odour emissions and the air will be exhausted and treated through a biofilter.
- If it is necessary to leave odorous material in the pre-processing building, it would be covered with a carbon source material to mitigate odours.
- Physical contaminants that will be landfilled would be stored in a bin that is emptied at the landfill once it is full to reduce the potential for odour.
- The gases from the primary reactor will be extracted from the reactor and used as combustion air in the flare or energy recovery facility, or treated in the biofilter.

5.0 MONITORING, ENVIRONMENTAL EMERGENCY AND CONTINGENCY PLAN

An Environmental Emergency and Contingency (E2C) Plan will be developed for the entire CRRRC Site as described in the D&O Report for the complete CRRRC Site.

Environmental monitoring related to the organics processing facility will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to groundwater, leachate, surface water, sediment, dust, noise, odour and biology.

6.0 ORGANICS PROCESSING FACILITY CLOSURE PLAN

Should the organics processing facility no longer be needed for the processing of organic IC&I waste, it will be decommissioned and closed prior to a change in use or sale of the property. If it is determined that the organics processing facility will close, an assessment of the organics processing facility will take place and a closure plan will be completed and submitted to the District Manager of the MOECC.

In general the closure plan will:

- Cease acceptance of waste;
- Continue operations until all waste at the organics processing facility has been processed. Alternatively, unfinished product may be transferred to another approved composting facility to complete the process, or be landfilled;
- Transfer final product to markets;
- Remove all residual waste to final disposal;
- Remove all equipment from the organics pre-processing and secondary reactor buildings and power wash the buildings;
- Remove and dispose of the contents of the slurry tank and leachate tank; and,
- Dismantle and remove the biofilter.

7.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

M.K. Farnel, P.Eng.
Environmental Engineer

P.A. Smolkin, P.Eng.
Principal

ALC/MKF/PAS/sg
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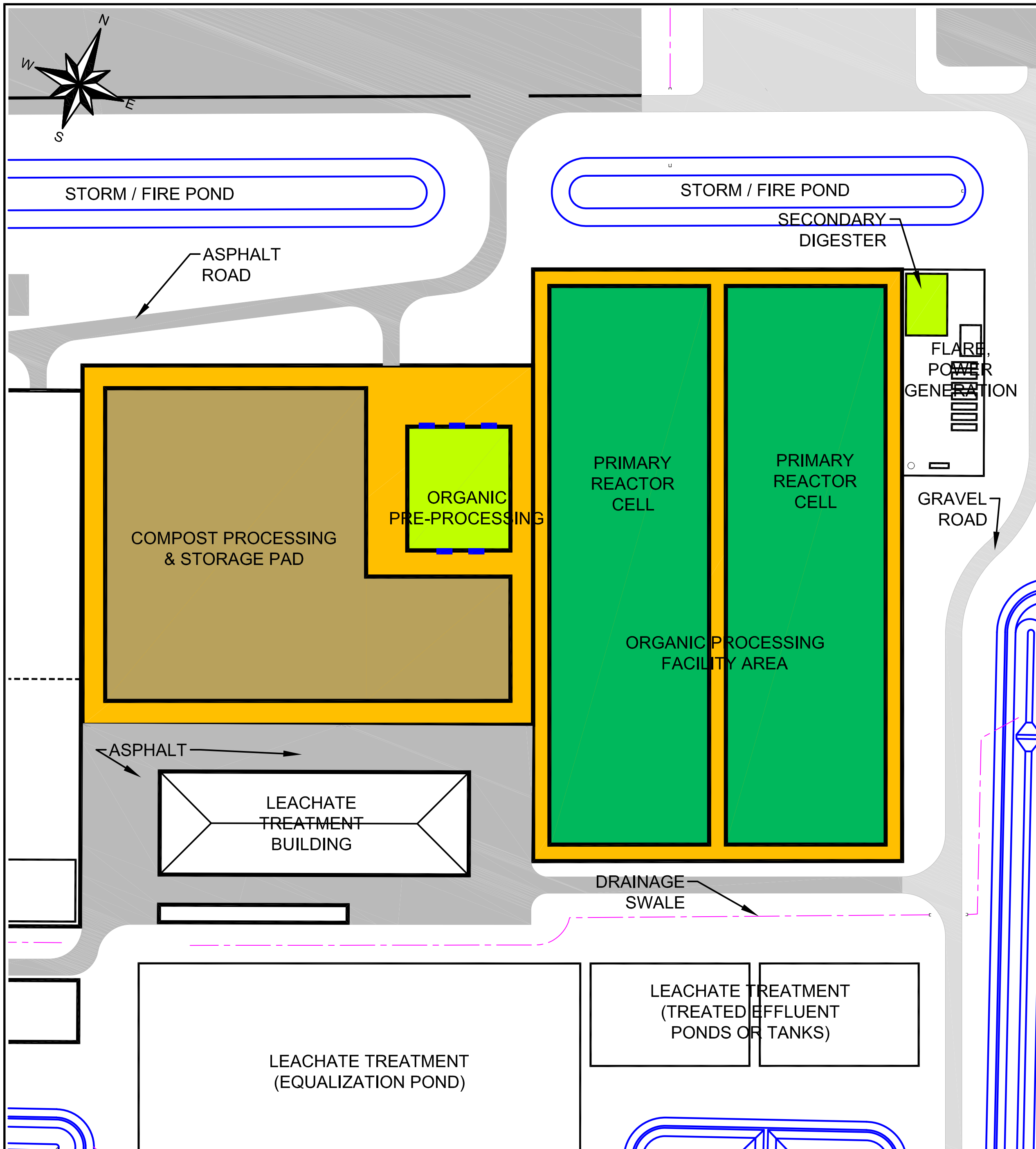

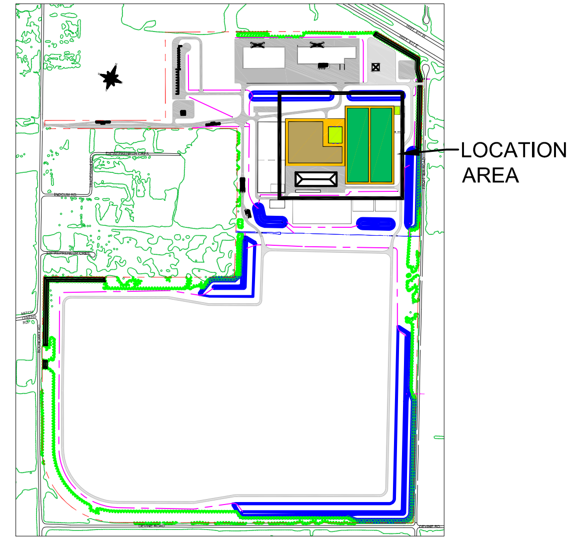

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PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
ORGANICS PROCESSING FACILITY AREA PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	09 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

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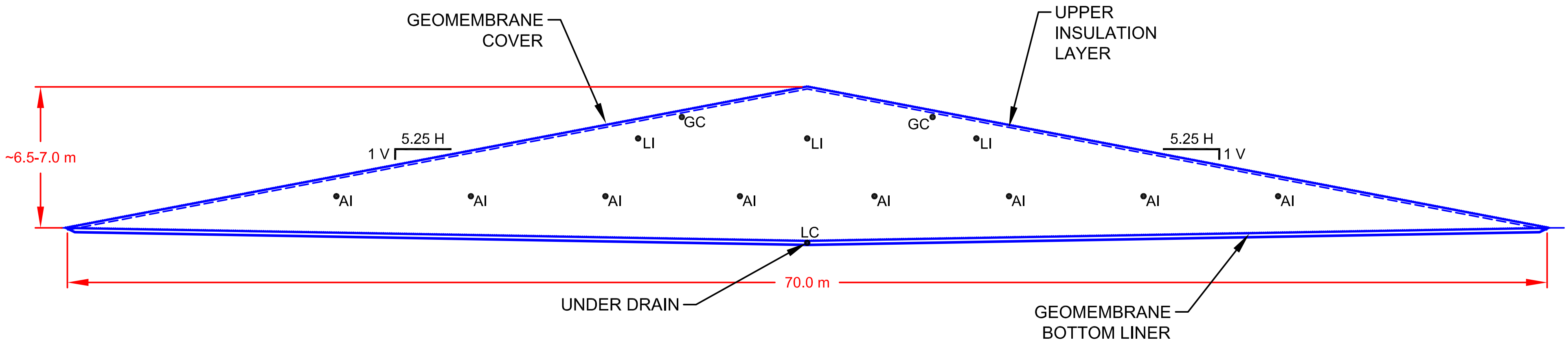
LC = LIQUOR COLLECTION PIPES
AI = AIR INJECTION PIPES
LI = LIQUOR INJECTION PIPES



CROSS-SECTION VIEW

SCALE: N.T.S.

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
PRIMARY REACTOR CELL DETAIL

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	A.C.	16 Dec. 2013
CAD	M.L.F.	16 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

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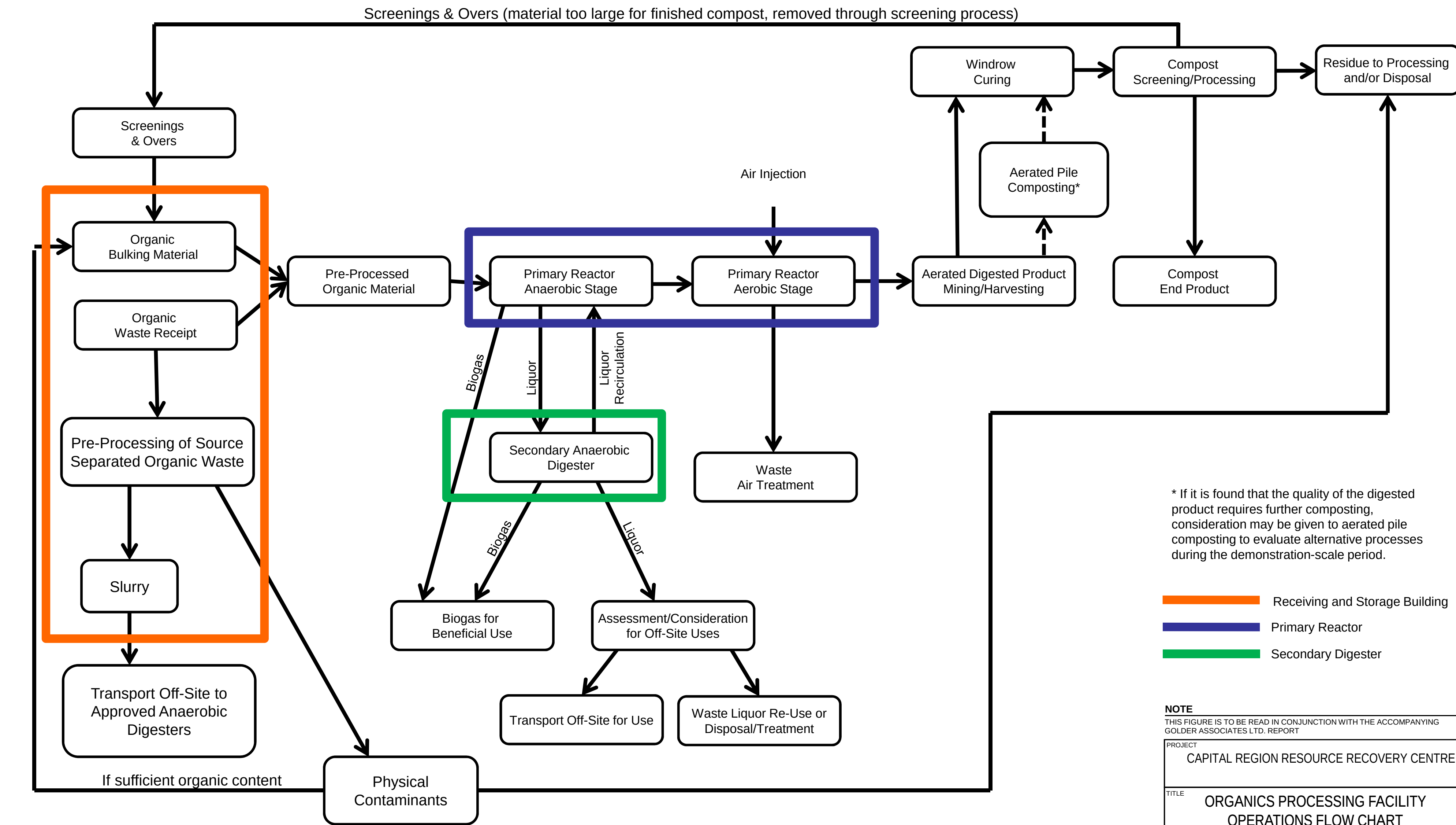

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
ORGANICS PROCESSING FACILITY
OPERATIONS FLOW CHART

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV.0
DESIGN	ALC	Nov. 2013	FIGURE 3	
GIS	--	---		
CHECK	PLE	Aug. 2014		
REVIEW	PAS	Aug. 2014		

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APPENDIX G

Compost Processing and Storage Area Design and Operations

December 2014

APPENDIX G

Compost Processing and Storage Area Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Golder Associates

Table of Contents

FIGURES

1.0 INTRODUCTION

This appendix to the Design and Operations (D&O) Report has been prepared to describe the proposed compost processing and storage area, a processing area that will operate as a component of the Capital Region Resource Recovery Centre (CRRRC). This appendix should be read in conjunction with the D&O Report for the complete CRRRC Site that is Volume IV of the document package. The D&O Report has been prepared to support an application for approval under the *Environmental Assessment Act* (EAA) (MOE, 2010a), and also for subsequent approvals under the *Environmental Protection Act* (EPA) (MOE, 2010b) and *Ontario Water Resources Act* (OWRA) (MOE, 2011) in support of the application for an Environmental Compliance Approval (ECA) for the CRRRC.

The compost processing and storage area will require a total footprint of 3.5 hectares, and will be located in the northern part of the Site, adjacent to the organics processing facility (see Appendix F of Volume IV). The proposed compost processing and storage area consists of a paved processing and storage pad, and is designed to process and compost incoming leaf and yard (L&Y) waste and clean wood from the construction and demolition (C&D) processing facility, and to process/cure digested product from the organics processing facility.

This D&O Report has been prepared to describe the design of the compost processing and storage area and the on-Site operations, which include the following activities:

- The receipt and processing of a maximum of 20,000 tonnes per year of L&Y waste;
- The processing/curing of digested product from the organics processing facility (which will receive up to a maximum of 50,000 tonnes per year for processing);
- A maximum storage quantity of 400 tonnes of L&Y waste waiting to be ground and 20,000 tonnes of finished product;
- Receiving hours of 6:00 a.m. to 6:00 p.m., Monday to Saturday; and,
- Operating hours of 6:00 a.m. to 7:00 p.m., Monday to Saturday.

The Compost Processing and Storage Area D&O Report, in conjunction with the D&O Report for the complete CRRRC Site, has been prepared in accordance with the Ministry of the Environment and Climate Change (MOECC) Guide to Applying for an Environmental Compliance Approval (MOE, 2012c), and with the MOECC Ontario Compost Quality Standards (MOE, 2012b).

1.1 Regulations

The Guideline for the Production of Compost in Ontario (MOE, 2012a) recommends planning, design and operational practices for aerobic composting facilities. The companion Ontario Compost Quality Standards (MOE, 2012b) sets environmentally protective standards for the production of compost for beneficial use and applies to compost produced by aerobic composting of non-hazardous organic materials. The design and operations of the compost processing and storage area have been developed using the Ontario Compost Quality Standards and the Guideline for the Production of Compost in Ontario.

Part IV and Part V of *Ontario Regulation* (O. Reg.) 101/94 (MOE, 1994) applies to sites whose only function is to accept and transfer municipal waste, as defined in O.Reg. 347 (MOE, 1990), for recycling or to compost L&Y waste. Part IV and Part V of O.Reg 101/94 were used as guidance when developing this appendix to the D&O report for the compost processing and storage area.

Materials produced from the compost processing and storage area that are categorized as waste materials under O.Reg. 347 (MOE, 1990) will be managed in accordance with this regulation.

2.0 AREA DESIGN AND LAYOUT

2.1 Sources, Types and Estimated Quantities of Waste

The CRRRC compost processing and storage area will receive L&Y waste from the Industrial, Commercial and Institutional (IC&I) sector, clean wood waste from the on-Site C&D processing facility, and digested product from the on-Site organics processing facility.

2.1.1 Leaf and Yard Waste

The sources of L&Y waste will include:

- Collection from the IC&I sector; and,
- Drop-off of small loads (i.e., independent landscapers, property maintenance contractors).

The L&Y waste types to be accepted include leaves, brush, branches, hedge and tree trimmings, garden plants and trimmings, sod, and tree stumps. L&Y waste received in biodegradable bags, with the exception of plastic biodegradable bags, will be accepted. L&Y waste in non-biodegradable (or plastic biodegradable) bags will not be accepted.

It is estimated that the compost processing and storage area will receive approximately 20,000 tonnes of L&Y waste per year. L&Y waste will be received at the compost processing and storage area via the primary scale upon arrival at the CRRRC Site, or from the small loads drop-off area.

2.1.2 Organics Processing Facility Digested Product

Digested product will be received at the compost processing and storage area from the on-Site organics processing facility, initially from the demonstration-scale operation and then the full scale operation. The digested product is the result of the processing of source-separated organics (SSO) and organics from the mixed IC&I waste stream. The proposed processing involves anaerobic digestion of the organic materials, mixed with a bulking agent and carbon source, for a period of approximately 12 to 18 months, followed by aeration prior to placement at the compost processing and storage area. Biogas and liquor generated during the process are removed from the digested product during the treatment cycle.

2.1.3 Wood Waste

Clean wood from the on-Site C&D processing facility may be accepted at the compost processing and storage area from time to time, as needed for mixing with other materials for composting. Clean wood is clean ground wood product from the C&D processing facility excluding painted, treated or laminated wood.

2.2 Area Design

2.2.1 Layout

The approximately 3.5 hectare paved compost processing and storage area will house the receiving, storage, composting and curing operations. The general layout of the compost processing and storage area is illustrated on Figure 1. The CRRRC compost processing and storage area will be comprised of an outdoor windrow/trapezoidal pile composting operation for L&Y and wood waste. Processing/curing of the digested product from the on-Site organics processing facility will also occur on the outdoor compost pad, separate from L&Y materials, and downgradient (in terms of surface water runoff) of the windrow/trapezoidal pile curing of L&Y and wood waste.

2.2.2 Water Management

The paved compost processing and storage area will be sloped to a series of catchbasins. The surface water runoff that enters the catchbasins will be conveyed to a stormwater management pond referred to as pond 4a. Pond 4a will be a two celled storage pond dedicated to receive runoff from the proposed compost pad area. One cell will be dedicated to receive runoff from final curing areas of the pad while the other will be for runoff from the remainder. This pond is sized to contain runoff equivalent to 110 % of a 1:25 year, 24 hour event for the pad area, without discharge to off-Site surface water. The stored water within the pond cells will be managed to maintain adequate capacity by re-using the water from the appropriate cell for compost pile spraying and Site irrigation. To ensure Site irrigation is a viable option, water quality samples from both cells of pond 4a will be collected for analysis during the demonstration phase of the organics processing facility. Should water quality be such that Site irrigation is not possible, it is contemplated that surplus water from pond 4a would be taken to the City of Ottawa wastewater treatment plant with the pre-treated wastewater from the Site.

Further, aerators would be considered for this pond as a contingency, if odour were to become an issue.

Further details on the design of stormwater management pond 4a are provided in Volume IV, Appendix A – Stormwater Management System Design.

2.3 Area Capacity

The compost processing and storage area operations will take place on an outdoor asphalt pad. In general, the Site is designed for:

- The receipt and processing of a maximum of 20,000 tonnes per year of L&Y and wood waste; and,
- The processing/curing of digested product from the organics processing facility (which will receive up to a maximum of 50,000 tonnes per year for processing). Digested product from the organics processing facility will be removed progressively from the primary reactor cells and placed at the compost processing and storage area for final processing/curing. The need for any further processing of the digested product and length of the curing period will be determined during the initial, demonstration scale operation of the BioPower organics processing facility.

The asphalt pad has been sized based on the area required for receipt, pre-processing, windrow or trapezoidal composting, processing/curing of digested product, screening and storage of the final product.

2.4 Waste Storage

The compost processing and storage area can store the following:

- A maximum of 400 tonnes of unprocessed L&Y waste; and,
- A maximum of 20,000 tonnes of final product.

It is expected that the digested product from the organics processing facility will be placed directly into its processing/curing configuration and as such will not be included in the storage tonnage.

3.0 COMPOST PROCESSING AND STORAGE AREA OPERATIONS

3.1 Hours of Operation

The compost processing and storage area will operate between the hours of 6:00 a.m. and 7:00 p.m., Monday through Saturday. Waste will be received at the CRRRC between the hours of 6:00 a.m. and 6:00 p.m. The Site is expected to operate between 300 and 312 days per year.

3.2 Operating Parameters

Composting is a controlled aerobic microbiological process that decomposes organic matter into carbon dioxide, water, minerals and stabilized organic matter. The operational criteria that the compost processing and storage area procedures are designed to meet are:

- A minimum C:N ratio of 20:1 for the curing of digested product from the organics processing facility and a minimum 25:1 for the L&Y waste operation; C:N ratios are controlled through appropriate mixing of feedstocks;
- A target of 10% oxygen content, which is controlled through targeting a compost mass porosity of 20% free air space and turning of windrows/trapezoidal piles;
- A moisture content between 40% and 55% with an optimal target of 50%. Moisture levels, which are initially set during feedstock preparation, can be controlled through turning (windrows/piles), by addition of water from on-Site sources, by increasing compost mass temperature and by boosting the percentage of bulking amendments in the compost mass;
- A particle size of between 2.5 and 5 centimetres achieved by grinding the waste during the pre-processing phase; and,
- Temperatures between 40 and 60 degrees Celsius depending on the compost processing phase.

Activities and processes associated with the operation include the receiving of waste, pre-processing (grinding, and mixing), formation of windrows for composting (L&Y and clean wood waste), active composting, curing (of aerobically composted material and of digested product from the organics processing facility) and screening. The manner in which the composting operations will be carried out is described in the following sections.

3.3 Waste Acceptance Procedure

Additionally, small L&Y waste loads may be accepted at the small loads area; it is expected that this will make up a very small percentage of the total incoming waste stream. All incoming vehicles must enter and exit over the weigh scale to determine the weight of waste coming into the compost processing and storage area. The scale attendant will do an initial visual screening of the load. After the initial weigh-in, and assuming the initial screening indicates suitable material, the incoming vehicle will be directed to the compost processing and storage area. An employee located at the compost processing and storage area receiving area will do a final inspection of the incoming material to ensure that the load does not contain any unacceptable or prohibited wastes or materials. Loads that do contain prohibited materials will be rejected and will be reloaded onto the vehicle delivering the load.

In the unlikely event that unacceptable or prohibited material is not detected until the hauler has left the Site, the material will be segregated, characterized, and managed in accordance with O. Reg. 347 (MOE, 1990). An incident report will be completed. Effort will be made to identify and contact the customer and/or generator of the materials to ensure that prohibited materials will not be delivered to the Site in the future.

3.4 Composting Procedures

The operational flow chart for the compost processing and storage area is shown on Figure 2. The following sections describe the different aspects of the compost processing and storage area.

3.4.1 Pre-Processing

Pre-processing of L&Y waste will involve grinding of material and mixing. L&Y waste accepted at the compost processing and storage area may be stored for up to one week (up to a maximum quantity of 400 tonnes) prior to pre-processing.

Digested product from the primary reactor cells of the organics processing facility may be mixed with shredded L&Y waste to enhance aerobic activity prior to curing.

Clean, chipped wood waste from the C&D processing facility will be mixed with L&Y waste or digested product for composting from time to time, as required.

3.4.2 Composting

The windrows/trapezoidal piles will be oriented such that they run parallel to the constructed slope of the asphalt pad to allow for proper drainage. Windrows will be formed to measure approximately five to eight metres wide, three to four metres high and up to fifty metres in length. The dimensions of windrows may vary depending on feedstock characteristics, time of year, ambient temperatures and other factors affecting composting operations. Trapezoidal piles will vary in length and width depending on the amount of feedstock received and operational limitations on size. Spacing between the windrows/trapezoidal piles will be approximately 2 metres to allow movement between, and the routine turning of piles. The orientation and spacing between windrows/trapezoidal piles may be modified from time-to-time at the discretion of the operator.

The shape of the windrows/trapezoidal piles can be modified as necessary, depending on moisture requirements. For example, if additional moisture is required, the top of windrows/piles can be of concave shape to promote capture of precipitation. If it is desirable to shed excess rainfall, the top of the window/pile can be convex. This will be monitored and adjusted as necessary during operation.

After windrow/trapezoidal pile formation, the location on the composting pad, as well as the month, day and year of formation of the windrow/trapezoidal pile, will be recorded and tracked.

The composting process will be managed so that it enters into a high rate or active phase. It is also the part of the compost processing used to inactivate any pathogens that may be in the incoming feedstocks. This part of the composting process is characterized by temperatures exceeding 55°C. The windrows/trapezoidal piles will be maintained at 55°C for at least fifteen days. This fifteen day period will not necessarily be consecutive, but will be cumulative. Windrows/piles will be turned a minimum of five times during this period.

The temperature of each windrow/pile will be measured in accordance with the operating schedule for the Site (i.e., measurements not recorded on Sundays or statutory holidays) at a depth of at least one metre deep into the windrow/pile mass, at a minimum of five representative locations. The mean temperature of each windrow/trapezoidal pile will be calculated and recorded. Moisture content will also be monitored by squeeze test or sampling for laboratory analysis, if required.

It is also possible that an aerated pile composting process may be utilized on the pad, wherein air is introduced to the material to be composted in order to sustain elevated oxygen content within the material and thereby further assist/accelerate the pathogen kill and composting process. If this process is to be utilized, the compost pad would be designed/equipped to supply the air and collect the liquid generated from this process; the liquid would be re-used to moisture-condition the material.

3.4.3 Curing

Once a windrow/pile has achieved 55 degrees Celsius on fifteen separate days, (or three days if using aerated pile composting), the compost mass will be relocated on the asphalt pad to the curing area. Digested product from the organics processing facility will also be cured in this area. The location on the pad, as well as the month, day and year of formation of the curing windrow/pile will be recorded and tracked. Curing windrows/piles will be left to cure until the final compost meets the Provincial requirements for compost quality (MOE, 2012b). This curing process will be a minimum of thirty days but can take up to six months. Curing windrows/piles will be maintained such that conditions for curing under the Ontario Compost Quality Standards are met.

During the curing stage, the temperature of each windrow/pile will be measured at a depth at least one metre deep into the windrow/pile mass, at a minimum of five representative locations, on at least a weekly basis. The mean temperature of each windrow/pile will be calculated and recorded. While the windrows/piles are in the curing stage they will be turned on a frequency of not less than once per month. L&Y waste compost that has cured for 6 months or more will be considered stable without further testing. For L&Y waste compost that has cured for less than 6 months, standard Solvita testing will be used on-Site as an indicator of maturity. Off-Site sample testing by an accredited laboratory will be used in determining final stability of the finished product.

3.4.4 Screening

At or near the end of the curing period, the product will be screened to eliminate oversized residues (overs). Overs will be stockpiled at the compost processing and storage area and inspected. Overs largely consisting of wood materials may be re-shredded and re-composted. More contaminated, or otherwise unsuitable, overs will be transferred to the on-Site landfill for use as daily cover.

3.5 Compost Final Use

The final product derived from the composting and curing of L&Y waste will be sold to landscapers, soil blenders and farmers as a soil amendment. The final product derived from the digested product from the organics processing facility will be assessed for potential commercial sale. The final product may also be used on-Site for various uses.

3.6 Waste Receiving Sites

Waste residuals screened out of the compost and cured digested product as overs will be sent to the on-Site landfill.

3.7 Equipment

The compost processing and storage area operation will utilize the following mobile equipment:

- Ford F-150 4x4 pickup truck (shared with organics processing facility);
- 3 Caterpillar 966 loaders (one shared with organics processing facility);
- Rotochopper B-66 chipper/shredder;
- McCloskey 36×100 ST uncovered conveyor;
- Caterpillar M318 excavator;
- Vermeer CT1010TX compost turner;
- 2 McCloskey 621/628 screens; and,
- Komptech Hurrikan air classifier.

Note that all models are presented on an "or equivalent" basis.

A preventative maintenance program will be followed for each piece of equipment based on manufacturer's specifications.

3.8 Staff Training

A training plan will be developed and maintained for all employees that operate the compost processing and storage area. Trained personnel will supervise all receiving of waste at the compost processing and storage area. All employees directly involved with activities relating to the area will be trained in the following:

- Relevant waste management legislation, regulations and guidelines;
- Major environmental concerns pertaining to the waste being handled;
- Occupational health and safety concerns pertaining to the processes and waste to be handled;
- Management procedures including the use and operation of equipment for the processes and waste to be handled;
- Environmental emergency and contingency procedures for the processes and waste to be handled;
- The use and operation of the equipment to be used by the operator;
- Procedures for the refusal of unacceptable loads;
- Site specific written procedures for the control of nuisance conditions;
- Record keeping procedures; and,
- The requirements of the ECA.

A record of the employee training, including the date of training, the name and signature of the employee and a description of the training provided will be maintained.

3.9 Quality Control

3.9.1 Feedstock Quality

An acceptance procedure for L&Y waste as described in Section 3.3 will be followed. The feedstock will meet the quality guidelines as per the Ontario Compost Quality Standards (MOE, 2012b).

Digested product from the organics processing facility and wood waste from the C&D processing facility will have previously undergone screening when it was accepted at the organics processing facility or the C&D processing facility.

3.9.2 Cross-Contamination

Good material management practices will minimize the likelihood of cross-contamination. Cross-contamination-reducing practices designed into the operating procedures include the following:

- Equipment used for the processing and turning of materials that have yet to complete the requirements for pathogen inactivation will be decontaminated prior to their use in the processing and turning of curing materials;
- Placement of L&Y and wood waste materials upgradient (in terms of surface water) from the digested product from the organics processing facility;
- Dedicated bucket for the transfer and turning of curing materials;
- Separation of active composting stage and curing materials; and,
- Designated receiving area.

3.9.3 Final Product Sampling and Analysis

Sampling of the final compost will be conducted to determine the quality of the final product. Sampling and analysis will be conducted as required by the Ontario Compost Quality Standards (MOE, 2012b) as amended and/or any other applicable regulations/standards.

Finished product will not be removed from the Site until the curing period is complete and until the product has been sampled and analyzed and the quality shown to meet the applicable quality requirements.

The results of the analysis will dictate the final use of the compost. If compost analyses indicate that the final product meets the applicable requirements, the material is considered a product and not a waste.

Compost derived from L&Y waste only that is not of acceptable quality for use will be returned to the start of the windrow composting process and incorporated into the incoming feedstock, or sent to the landfill as daily cover, or possibly used to support vegetation growth on the landfill final cover. Compost derived from digested product that is not of acceptable quality for use will be returned to the start of the organics processing facility and incorporated into the incoming feedstock, or sent to the landfill as daily cover, or possibly used to support vegetation growth on the landfill final cover.

3.9.4 Data Review

Prior to the release of finished compost, the data collected in the composting process will be reviewed.

The data reviewed for the digested product from the organics processing facility operation will include the following:

- Date that the material was pre-processed and loaded into the primary reactor;
- Date that the digested product was removed from the primary reactor and formed into curing windrows/trapezoidal piles or possibly aerated piles;
- Temperature readings, date of windrow/pile turnings and end date of curing period; and,
- Analytical results with respect to finished product quality, compost maturity, foreign matter, pathogens and trace elements.

The data reviewed for the open windrow/pile composting operation will include the following:

- Component make-up of the windrow/pile;
- Date and time of windrow/pile formation;
- Temperature readings, date that temperature readings were taken and date of windrow/pile turning to ensure that pathogen inactivation requirements have been met;
- Date that windrows/piles were transferred and re-formed on curing pad;
- End date of curing period; and,
- Analytical results with respect to finished product quality, maturity, foreign matter and trace elements.

4.0 ODOUR MANAGEMENT PLAN

Odour at the compost processing and storage area can be reduced through proper compost management, best management practices and odour monitoring.

4.1 Compost Management

It is important to ensure that the L&Y waste is prepared properly so that the feedstock has the proper carbon to nitrogen (C:N) ratio. L&Y waste being composted in outdoor windrows/trapezoidal piles should have a C:N ratio of 25:1 to 30:1. The presence of an ammonia odour is a sign that nitrogen levels are too high, and in some cases leaves or other carbon sources should be incorporated into the windrow/pile so that a suitable C:N ratio is restored, (i.e., roughly 1 part green to 3 parts brown material).

Odours also become problematic when the compost mass becomes anaerobic. Providing sufficient wood chips or overs to achieve 20% porosity and ensuring that the compost mass is maintained at less than 60% moisture to prevent over saturation will help maintain aerobic conditions.

4.2 Best Management Practices

The following best management practices will be maintained to prevent the generation of odours:

- Loads of grass clippings will be incorporated into windrows/trapezoidal piles on the day of receipt and no later than within four days of receipt;
- Any standing water on the compost pad will be removed, and modifications made to the pad/ pad drainage to prevent water from ponding;
- Windrows/piles will be turned based on temperature, moisture and oxygen requirements to prevent anaerobic conditions;
- The windrows/trapezoidal piles will be turned only when wind direction and atmospheric pressure conditions are suitable. Windrow/pile turning will be avoided during weather inversions, during early morning and late evening and during east winds (i.e., when winds are blowing in the direction of sensitive receptors). Windrow/pile handling will be minimized during humid climate conditions; and,
- Any material in an advanced anaerobic state, if it cannot be brought back to an aerobic state, will be landfilled.

4.3 Contingencies

An aerator(s) for the stormwater pond receiving runoff from the compost processing and storage area would be implemented if required due to objectionable odour.

4.4 Odour Monitoring

Subjective compost processing and storage area odour monitoring will be conducted on a continuous basis. If any compost processing and storage area odours are detected, the cause of the odour will be investigated and the problem corrected. The date and time of the odour problem, the compost processing and storage area activities that were happening that may have caused the odour, and the corrective action will be recorded in order to implement continual improvement management practices.

5.0 MONITORING, ENVIRONMENTAL EMERGENCY AND CONTINGENCY PLAN

An Environmental Emergency and Contingency (E2C) Plan will be developed for the entire CRRRC Site as described in the D&O Report for the complete CRRRC Site.

Environmental monitoring related to the compost processing and storage area will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to groundwater, leachate, surface water, sediment, dust, noise, odour and biology.

6.0 CLOSURE PLAN

The compost processing and storage area will be decommissioned and closed prior to a change in use or sale of the property. A closure plan will be completed and submitted to the District Manager of the MOECC at least six months prior to closure.

In general the closure plan will:

- Cease acceptance of L&Y waste and digested product from the organics processing facility;
- Continue operations until all L&Y waste has been processed and digested product from the organics processing facility has been cured. Alternatively, unfinished product may be transferred to another approved composting facility to complete the process, or be landfilled;
- Transfer final product to markets;
- Remove all residual waste to final disposal; and,
- Remove all equipment.

7.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

M.K. Farnel, P.Eng.
Environmental Engineer

P.A. Smolkin, P.Eng.
Principal

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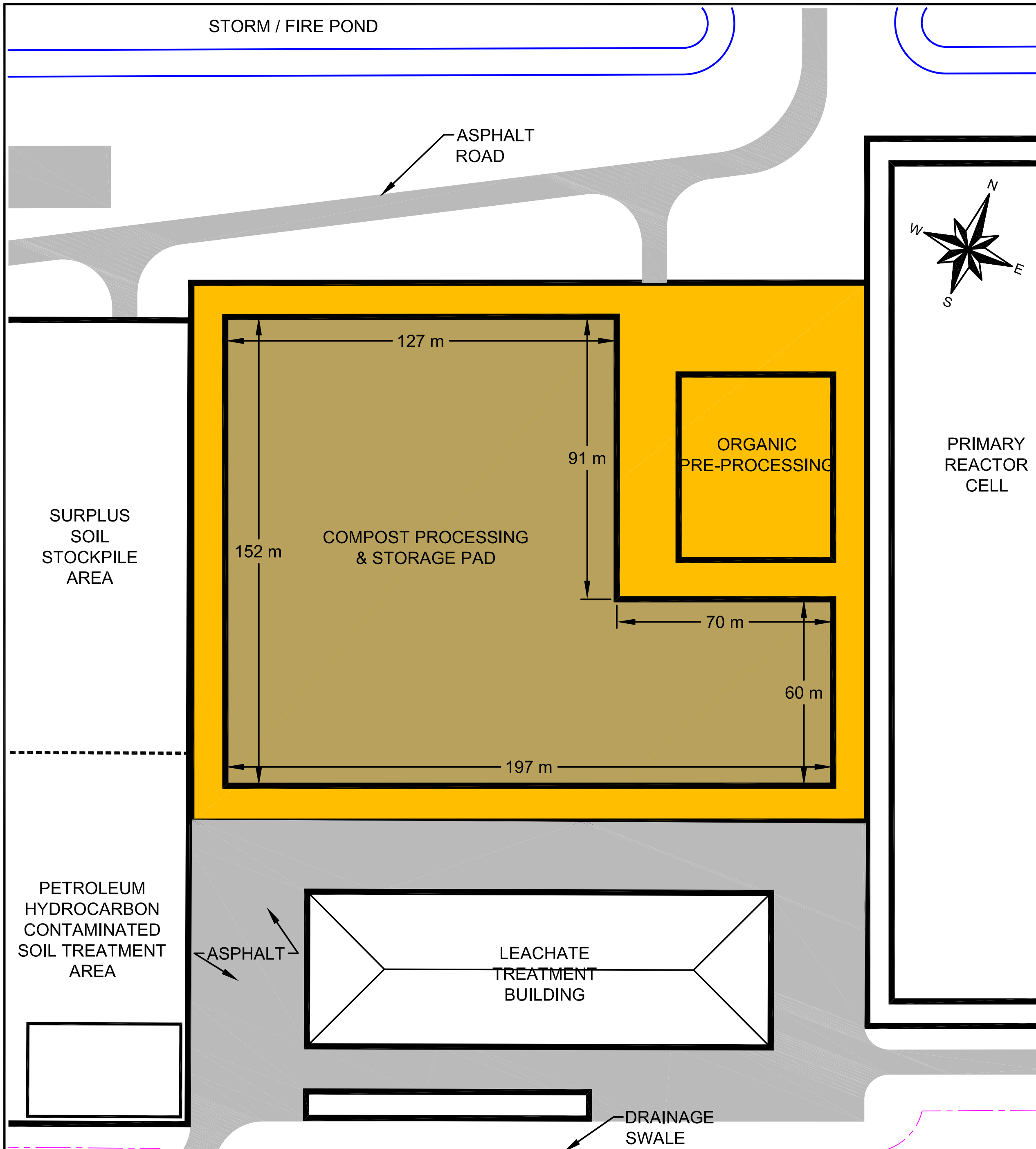

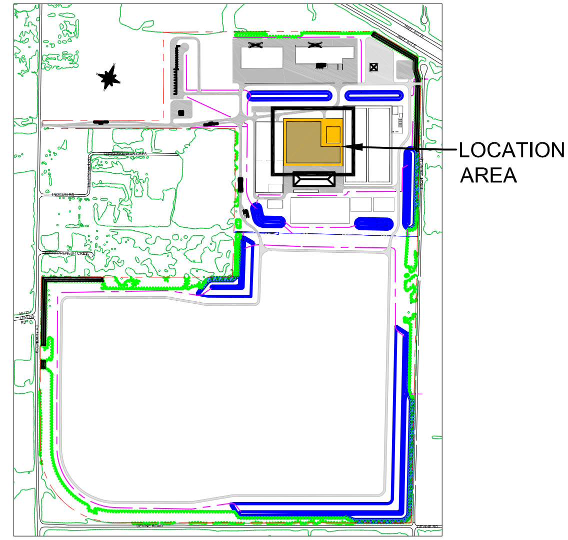

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REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
COMPOST PROCESSING AND STORAGE AREA PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	09 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

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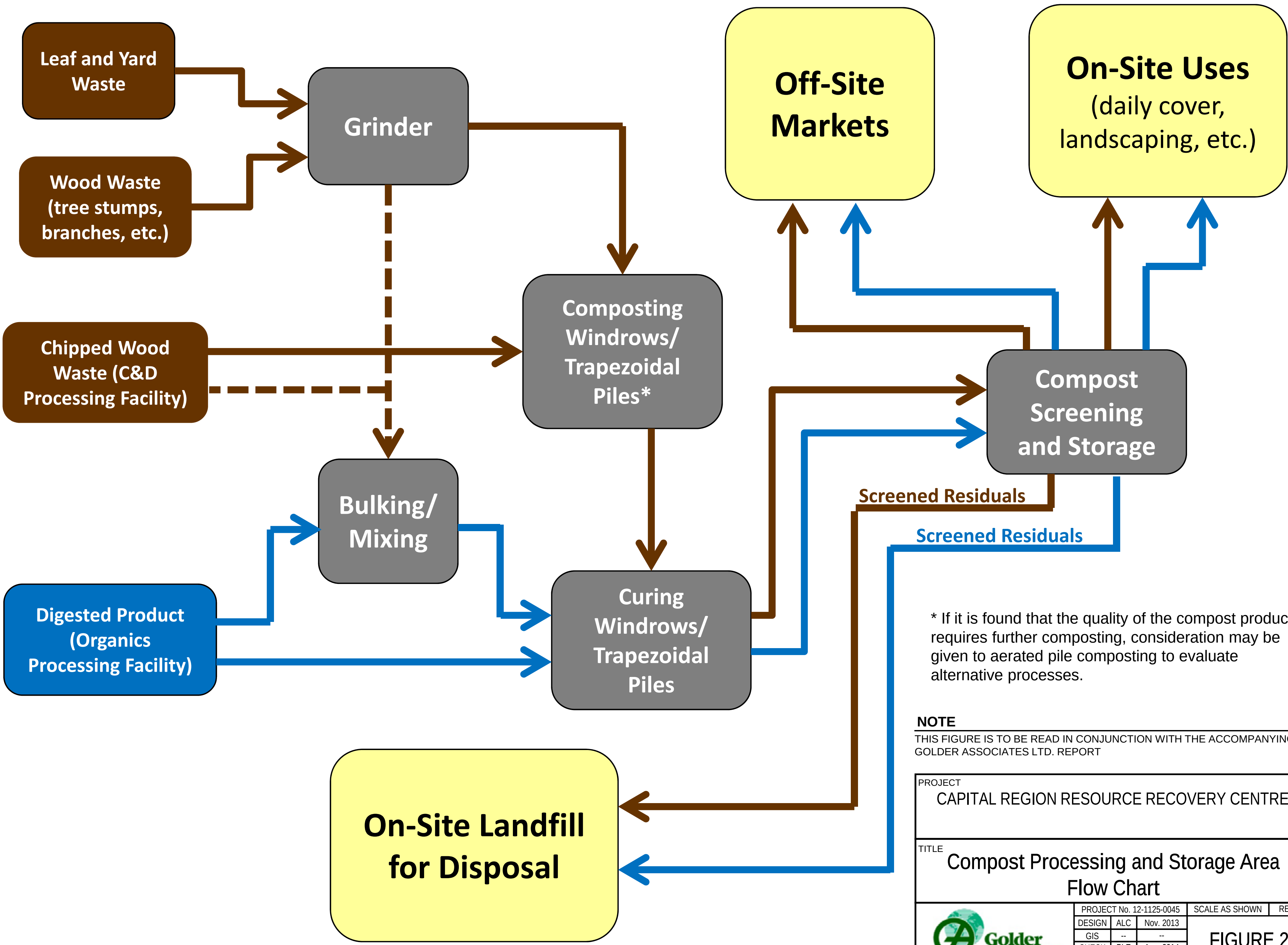
Figure 1



* If it is found that the quality of the compost product requires further composting, consideration may be given to aerated pile composting to evaluate alternative processes.

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

Compost Processing and Storage Area Flow Chart

Golder Associates

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV.0
DESIGN	ALC	Nov. 2013	FIGURE 2	
GIS	--	--		
CHECK	PLE	Aug. 2014		
REVIEW	PAS	Aug. 2014		

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APPENDIX H

Petroleum Hydrocarbon Contaminated Soil Treatment Design and Operations

December 2014

APPENDIX H

Petroleum Hydrocarbon Contaminated Soil Treatment Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Table of Contents

1.0 INTRODUCTION

This appendix to the Design and Operations (D&O) Report has been prepared to describe the proposed petroleum hydrocarbon (PHC) contaminated soil treatment area, a processing area that is a component of the Capital Region Resource Recovery Centre (CRRRC). This appendix should be read in conjunction with the D&O Report for the complete CRRRC Site that is Volume IV of the document package. The D&O Report has been prepared to support an application for approval under the *Environmental Assessment Act* (EAA) (MOE, 2010a), and also for subsequent approvals under the *Environmental Protection Act* (EPA) (MOE, 2010b) and *Ontario Water Resources Act* (OWRA) (MOE, 2011) in support of the application for an Environmental Compliance Approval (ECA) for the CRRRC.

The proposed PHC contaminated soil treatment area will have a total footprint of approximately 1.2 ha. It is anticipated that PHC contaminated soil that has been processed through the treatment system will be used primarily as daily cover in landfill operations at the CRRRC.

This D&O Report has been prepared to describe the design of the PHC contaminated soil treatment area and the on-Site operations, which include the following activities:

- Contaminated soil will be received at the Site on an event-basis up to a maximum annual limit for treatment of 25,000 tonnes per year;
- A maximum storage quantity at any one time of 12,500 tonnes;
- Receiving hours of 6:00 a.m. to 6:00 p.m., Monday to Saturday; and,
- Operating hours of 6:00 a.m. to 7:00 p.m., Monday to Saturday.

The PHC Contaminated Soil Treatment Area D&O Report, in conjunction with the D&O Report for the complete CRRRC Site, has been prepared in accordance with the Ministry of the Environment and Climate Change (MOECC) Guide to Applying for an Environmental Compliance Approval (MOE, 2012).

1.1 Regulatory Requirements

Waste processing sites are subject to Part V of the EPA (MOE, 2010b). Section 27 of the EPA requires that an ECA be obtained from the Director of the MOECC for the establishment, operation, alterations, or enlargement of a waste processing site.

The proposed approach to PHC treatment at the CRRRC is to have an approved treatment process for use as required under current and future MOECC requirements for such soil use.

If/when new legislation may come into effect, the initial approach/system can be modified/upgraded to that required to achieve the legislated treatment objectives.

2.0 AREA DESIGN

2.1 Function of the Treatment System

The function of the PHC contaminated soil treatment area is to receive and process PHC contaminated soil. Processing will reduce the concentration of the most volatile constituents within the PHCs thereby reducing PHC air emissions when the soil is used as daily cover.

The treatment system for PHC contaminated soil will be developed as part of the initial Site development. The location of the soil treatment system on the CRRRC Site is shown on Figure 1. The initial treatment system approach consists of one or two biopile cells connected to a single treatment unit that controls air extraction rate, moisture and nutrients in the biopiles. Nutrient addition is optional since the main purpose of the initial treatment system approach is to aerate the soil to promote volatilization of the lighter PHCs.

Additional treatment of PHC contaminated soil may be implemented if Ontario regulations are developed that specify PHC concentrations for soil to be used within a landfill (thereby requiring increased capacity for treatment of PHC contaminated soil), or if business demands it. The proposed treatment system will then consist of up to six biopiles in addition to the two biopiles to be developed as part of the initial stage of the treatment system. Increasing the number of blowers or performing other upgrades to the treatment unit may also be required to meet future demand for PHC contaminated soil treatment. A PHC soil storage building may also be implemented at that point.

2.2 Treatment Area Layout

The initial and subsequent treatment area layout is shown on Figure 2. The treatment area will have a total footprint of 1.2 hectares. Initially, the 1.2 hectare footprint will be occupied by the following:

- Approximately 660 square metres of PHC contaminated soil unloading and storage on a concrete pad;
- Approximately 1,200 square metres for one or two biopile cells; and,
- A treatment unit.

The next stage of development of the 1.2 hectare treatment area is anticipated to consist of the following:

- Approximately 1,500 square metres of soil unloading and storage within a building;
- Approximately 4,800 square metres for up to eight biopile cells; and,
- A treatment unit.

Incoming PHC impacted soil may first require the removal of oversize materials, i.e., concrete, cobbles, boulders, and then storage on a concrete pad until there is sufficient quantity that at least one of the biopiles is ready to be filled. The soil stored on the pad will be covered with a woven coated reinforced polyethylene liner (tarp). Depending on the effectiveness of this tarping, rainwater runoff may have to be captured by a water collection system and mixed with the landfill leachate for treatment. The concrete slab will be equipped with a sump pump and storage tank to collect water draining from the PHC soil (part of the water collected in the storage tank could be used to increase the moisture content of the biopiles; part may have to be treated and/or disposed of off-Site).

Each biopile cell will have a working volume of approximately 700 to 1,000 cubic metres, which is large enough to process a significant volume of soil, but still small enough to allow for efficient operation and maintenance. The distance between cells will be approximately 8 to 10 metres to allow for heavy vehicle access around each cell for soil loading/excavation. The cell layout will be configured to allow for equipment access around each cell for soil loading/excavation as well as for operation and maintenance. The cell base would be provided with a geomembrane liner to contain the liquid produced from the process. Piping would be provided in the base to both collect liquid and to add and remove air from the soil; an irrigation piping system would be installed at the top of the soil to supply water, to provide amendments and nutrients, and recirculate the collected liquid. A central treatment unit would be provided to regulate and optimize the conditions within the biopile to achieve the pre-treatment or treatment. The extracted air would be managed through a biofilter before final polishing with an activated carbon filter.

2.3 Truck Traffic

There is sufficient queuing capacity on the access roads at the Site to allow for vehicles entering and exiting the CRRRC Site.

It is anticipated that up to approximately 60,000 tonnes of soil will be accepted at the CRRRC Site each year; assuming that 30- to 35-tonne trucks will transport the soil, approximately 1,700 to 2,000 trucks per year will transport soil to the CRRRC. Of this 60,000 tonnes, 25,000 tonnes is assumed to be contaminated by PHCs. It is estimated that approximately 5,000 tonnes of the PHC contaminated soil will initially be processed annually through the PHC contaminated soil treatment area; this corresponds to approximately 140 to 170 trucks. The number of trucks will increase correspondingly should PHC soil receipts exceed 5,000 tonnes annually.

2.4 Wastes Accepted at the Site

2.4.1 Waste Characterization

PHC impacted soil will be treated as required prior to use as daily cover in the landfill component of the CRRRC to prevent off-Site odour impacts. Should regulations require pre-treatment of PHC impacted soil prior to use as daily cover in the future, the system will be used to meet those requirements.

2.4.2 Waste Quantities

The initial treatment approach will treat up to 5,000 tonnes of the anticipated 25,000 tonnes/year of incoming soil contaminated with PHCs. The remaining incoming soil contaminated with PHCs will be directly used as daily cover in landfill operations at the CRRRC. If/when new legislation may come into effect that specifies PHC concentrations for soil to be used at a landfill, the initial treatment system can be modified/upgraded to treat up to 25,000 tonnes of soil per year. The proposed design for the final area is shown in Figure 2.

2.5 Waste Storage

The maximum amount of soil to be stored on each concrete storage pad is 2,500 tonnes. The maximum amount of soil to be stored within the storage building, should it be constructed, is 12,500 tonnes. Stockpiled PHC contaminated soil can be stored on the concrete pad for a maximum of 3 months, and within the storage building for a maximum of 8 months.

2.6 Closure Plan

The PHC contaminated soil treatment area will be decommissioned and closed prior to a change in use or sale of the property. An assessment of the treatment area will take place and a closure plan will be completed at least six months prior to area closure.

The decommissioning and closure of the area will include the following procedures:

- All treated and untreated soil will be removed from the area and used in the landfill as daily cover;
- All equipment will be either sold or reused at another area;
- If the building has been constructed, all floors will be swept and, if necessary, power washed and any wastewater would be collected and disposed in accordance with *Ontario Regulation* (O. Reg. 347) (MOE, 1990); and,
- The exterior portions of the treatment area will be cleaned of any litter.

3.0 TREATMENT AREA OPERATIONS

3.1 Description of On-Site Operations

Preapproved shipments of PHC contaminated soil will be delivered to the Site in trucks. All inbound vehicles will enter the Site from Boundary Road and will proceed to the weigh scale. While vehicles are being weighed, the weigh scale operator will obtain and record information such as the source and description of the soil and the ECA number of the hauler. The vehicle driver will be directed by the weigh scale operator to the PHC soil storage area, where the vehicle will unload into the storage area. Oversized materials (such as boulders and cobbles) will be removed from the soil. Soil that is not observed to be contaminated with PHCs will be transported to the surplus soil storage area. After unloading as directed, the empty vehicle will exit the Site.

Impacted soil will be transferred from the storage area to one of the biopile cells when there is sufficient soil and/or when space in the biopile cell becomes available. Figures 3 and 4 show schematics of the proposed design configuration of the biopile cells. The biopile base will consist of a soil foundation berm and a low permeability 1.5 millimetre high density polyethylene (HDPE) geomembrane liner covered by geotextile. Horizontal HDPE slotted pipes covered with a geotextile sock will be installed along the bottom of the cell (over the geotextile) to allow for soil aeration and water drainage. The slotted pipes from each cell will be connected to the air blowers to extract air and aerate the soil, as well as to recover any leachate (water within the air stream will be removed using a knock-out drum). The base of the biopile will be sloped toward the slotted pipe to allow for leachate collection, if any. Sand will be placed around the pipes with gravel in the adjacent areas to ensure a uniform air extraction and allow for leachate collection. A second layer of geotextile will be installed over the sand and gravel, to form the base layer above which the PHC impacted soil is placed. A thin layer of sand above the geotextile will be placed to help protect the geotextile when the soil is removed from the cell at the end of the treatment period. Irrigation lines will be installed over the top of the PHC impacted soil before the cell is covered with a woven coated reinforced polyethylene liner. The water irrigation system may be used to supply the soil and bacteria with water, nutrients and surfactants during the treatment process (optional) and to recirculate the PHC treatment system leachate that is rich in soluble nutrient and bacterial flora. The biopile system is not expected to produce excess water and there should be no wastewater discharge from the process. However, in abnormal circumstances such as the infiltration of rainwater, this water could be pumped out (for treatment or off-Site disposal) and/or recirculated into the biopile. The lifetime of the biopile liner will depend on the care taken during soil loading and excavation, but could be expected to last for 5 to 7 years, after which time it would need to be replaced.

The PHC impacted soil will be placed in the biopiles up to a maximum total height of 1.6 to 2.5 metres using a loader after being mixed with nutrients (optional) and a bulking agent (wood chips or straw, up to 10% of soil volume) to increase the air permeability when required (depending in part on the type of soil). Alternatively, nutrients can be added once the soil is shaped in the biopile.

The air will be extracted from each cell for a minimum of 12 hours per day at a total air flow rate of approximately 400 cubic feet per minute (cfm) using two regenerative blowers. The air would be first treated with biofilters (filter bed containing mature compost, peat and wood chips) installed near the biopile before a final polishing with an activated carbon filter. Volatile organic compounds (VOCs) in air emissions will be monitored through air sampling ports located on the carbon filter stack.

For this design approach, it is assumed that the soil will be treated in the biopile cells for approximately 60 days. Sampling of the soil in the biopiles can be conducted during and at the end of the expected treatment time to assess the treatment performance, but as previously stated for the initial treatment approach not to meet any specific treatment objective. The treatment time and nutrient addition could be modified based on the treatment performance.

The treatment unit consists of two regenerative blowers, a knock-out drum to remove water droplets from the air flow, a leachate tank, an activated carbon filter downstream of a biofilter, an extraction air manifold, a leachate recirculation pump and a control panel. The treatment unit can be modular to allow for increase in the number of blowers or equipment upgrades to meet future demand. Figure 5 shows a schematic of the proposed treatment unit design.

3.2 Hours and Days of Operation

The PHC contaminated soil treatment area will accept contaminated soil materials between the hours of 6:00 a.m. and 6:00 p.m., Monday to Saturday. Soil treatment operations will occur between the hours of 6:00 a.m. and 7:00 p.m. Soil treatment is expected to operate approximately 312 days per year.

3.3 Material Balance

Up to 25,000 tonnes of PHC contaminated soil is anticipated to be accepted annually at the PHC contaminated soil treatment area. It has been assumed for initial design that approximately 5,000 tonnes per year will be processed through the PHC contaminated soil treatment area prior to being used as daily cover in the on-Site landfill; the remaining soil will be directly used as daily cover material at the on-Site landfill. Further build-out of the area to a maximum of eight biopile cells will be triggered by increased demand and/or regulatory requirements for soil quality prior to being used as daily cover in landfills. A maximum of 25,000 tonnes of PHC contaminated soil will be processed and used on site as daily cover or provided for off-Site use if there is market demand and its quality meets the applicable regulatory guideline.

3.4 Area Equipment and Maintenance

Site equipment to be used during operations at the PHC contaminated soil treatment area includes:

- Caterpillar 966 Loader (shared with the landfill and for surplus soil management); and,
- The treatment unit.

Note that all models are presented on an “or equivalent” basis.

Some of the main operation and maintenance tasks to optimize the treatment performance may include:

- Preventative equipment maintenance programs based on manufacturer recommendations;
- Aeration system flow measurements and adjustment;
- Gas sampling;
- Blower and knock-out drum pressure readings;
- Water meter and tank readings; and,
- Moisture and nutrient addition (optional).

3.5 Staff Training

A training plan will be developed and maintained for all employees that work in the PHC contaminated soil treatment area. Trained personnel will supervise all receiving of soil at the PHC contaminated soil treatment area. All employees directly involved with activities relating to the area will be trained in the following:

- Relevant waste and soil management legislation, regulations and guidelines;
- Major environmental concerns pertaining to the contaminated soil being handled;
- Occupational health and safety concerns pertaining to the processes and soil to be handled;
- Management procedures including the use and operation of equipment for the processes and soil to be handled;
- Environmental emergency and contingency procedures for the processes and soil to be handled;
- The use and operation of the equipment to be used by the operator;
- Procedures for the refusal of unacceptable loads;
- Site specific written procedures for the control of nuisance conditions;
- Record keeping procedures; and,
- The requirements of the ECA.

A record of the employee training, including the date of training, the name and signature of the employee and a description of the training provided will be maintained.

3.6 Soil Screening Procedure

Incoming shipments of PHC impacted soil will be preapproved by the site operator. A laboratory analysis indicating that the soil meets O.Reg. 347 (MOE, 1990) (as amended) Schedule 4 Leachate Criteria as a solid, non-hazardous waste must be provided and approved prior to shipment of the soil. All incoming vehicles must enter over the weigh scale to determine the weight of soil coming into the PHC contaminated soil treatment area. After the initial weigh-in, the incoming vehicle will be directed to the PHC contaminated soil treatment area. An employee located at the treatment area will inspect the incoming material to ensure that the load does not contain any unacceptable or prohibited wastes or materials. Loads that do contain prohibited materials will be rejected and will be reloaded onto the vehicle delivering the load.

In the unlikely event that unacceptable or prohibited material is not detected until the hauler has left the Site, the material will be segregated, characterized, and managed in accordance with O. Reg. 347 (MOE, 1990). Effort will be made to identify and contact the customer and/or generator of the materials to ensure that prohibited materials will not be delivered to the area in the future.

3.7 Monitoring, Environmental Emergency and Contingency Plan

An Environmental Emergency and Contingency (E2C) Plan will be developed for the entire CRRRC Site as described in the D&O Report for the complete CRRRC Site.

Environmental monitoring related to the PHC contaminated soil treatment component of the CRRRC will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to groundwater, dust, noise and odour.

4.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

M.K. Farnel, P.Eng.
Environmental Engineer

P.A. Smolkin, P.Eng.
Principal

ALC/MKF/PAS/sg
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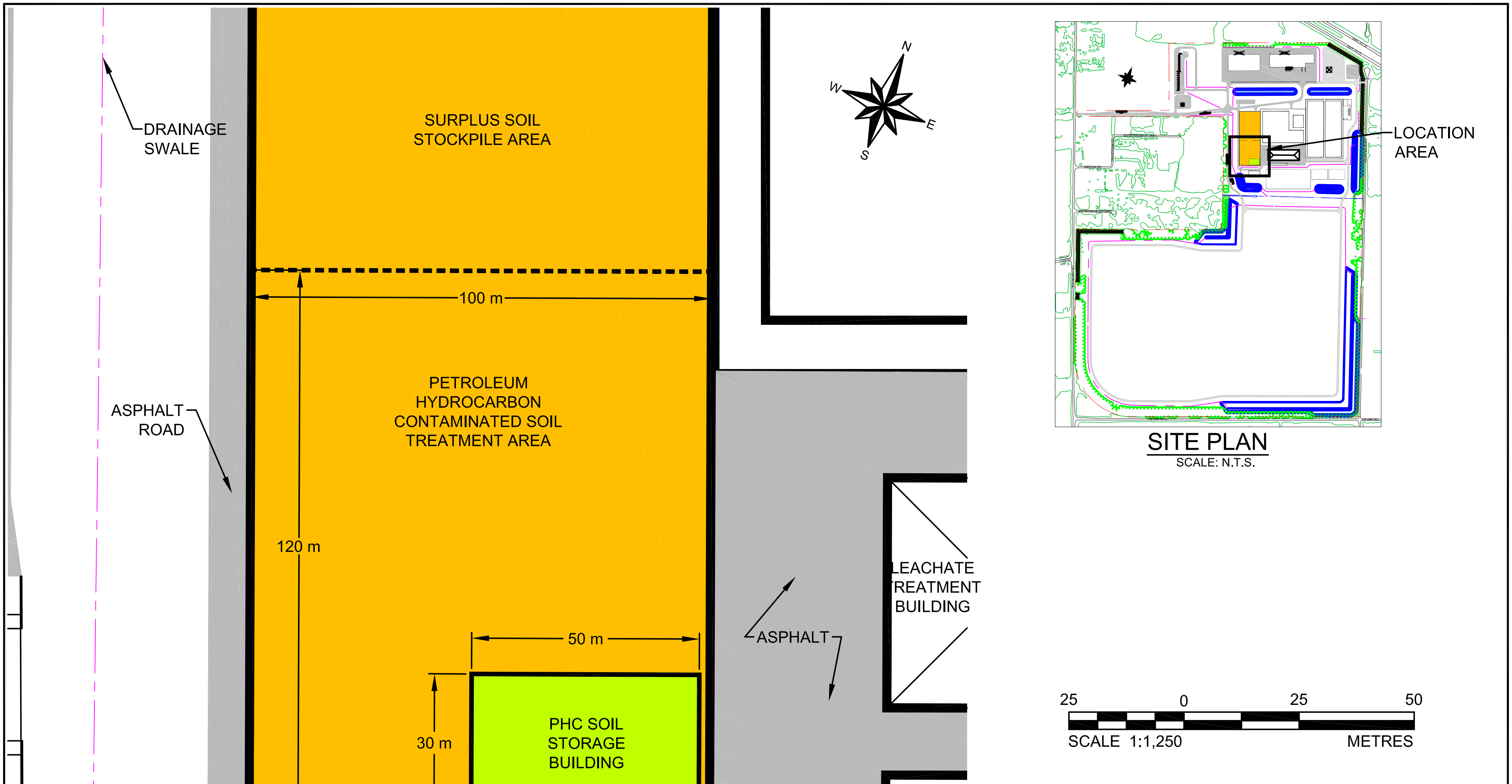

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
PETROLEUM HYDROCARBON CONTAMINATED SOIL TREATMENT AREA

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN		
CAD	M.L.F.	09 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-V4-Soil-Fig 1.dwg
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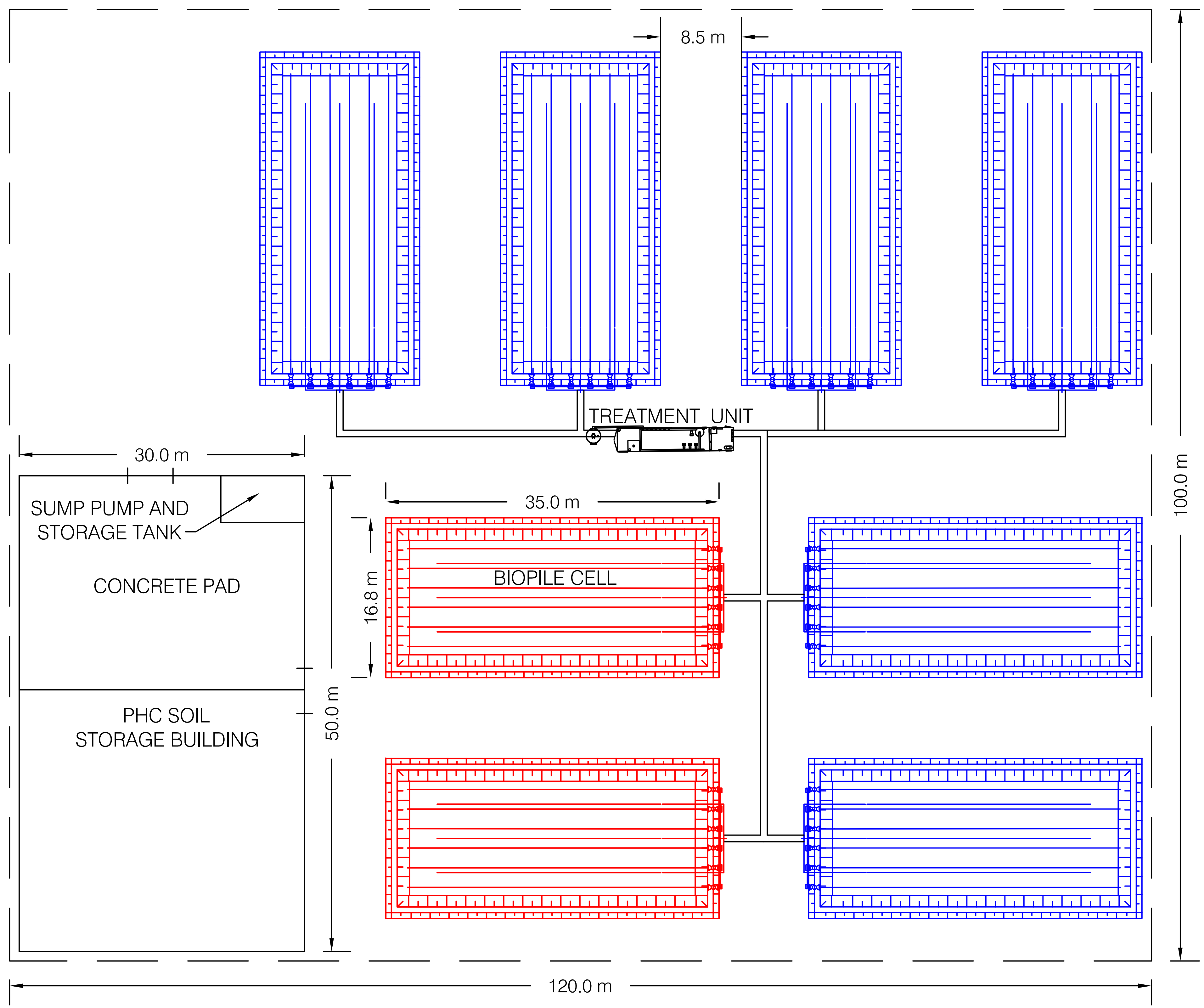
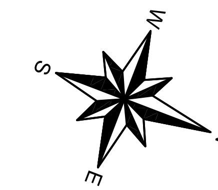
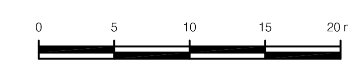
DRAWING No.
Figure 1





LEGEND

- INITIAL PHC TREATMENT SYSTEM
- FUTURE PHC TREATMENT SYSTEM



NOTE

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PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LAYOUT OF PETROLEUM HYDROCARBON CONTAMINATED SOIL TREATMENT AREA

Golder Associates
Ottawa, Ontario

PROJECT No. 12–1125–0045			FILE No. 1211250045-V4-Soil-Fig 2.dwg
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CADD	PL/JEM	Nov. 2013	
CHECK	PLE	Aug. 2014	**FIGURE 2**
REVIEW	PAS	Aug. 2014	

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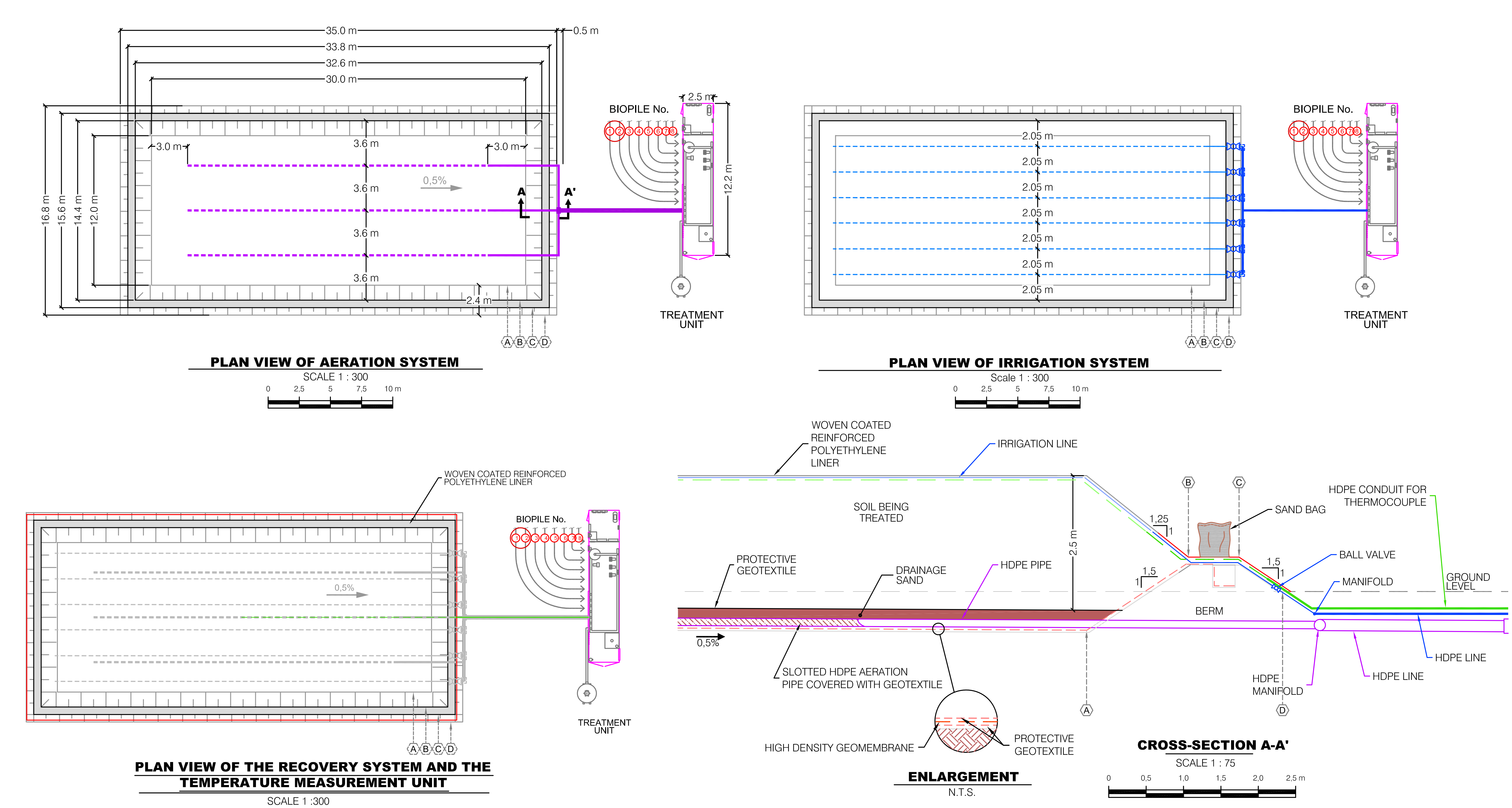

LEGEND

(red circle)	INITIAL PHC TREATMENT SYSTEM CONSISTS OF 2 BIOPILE CELLS		IRRIGATION LINE		HDPE CONDUIT FOR THERMOCOUPLE
	SLOTTED AERATION PIPE		FLEXIBLE IRRIGATION LINE (POROUS)		THERMOCOUPLE
	SOLID AERATION PIPE		FLEXIBLE IRRIGATION LINE		BALL VALVE

NOTE
THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
PLAN VIEW BIOPILE TREATMENT

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			FILE No. 1211250045-V4-Soil-Fig 3.dwg	
DESIGN	FD/SM	Oct. 2013	SCALE AS SHOWN	REV.
CADD	CB/JEM	Nov. 2013		
CHECK	PLE	Aug. 2014	FIGURE 3	
REVIEW	PAS	Aug. 2014		

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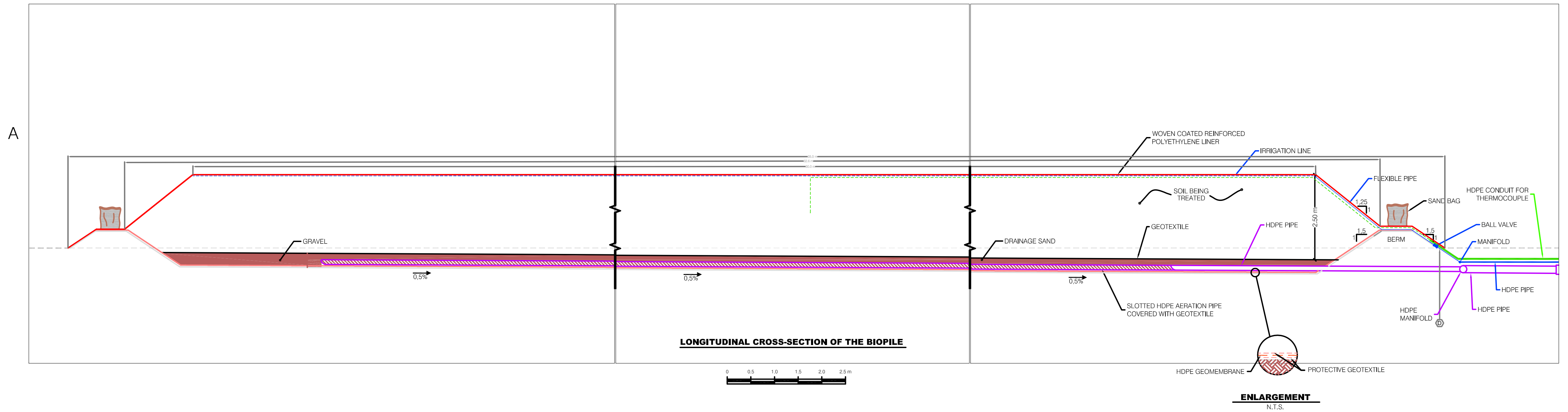

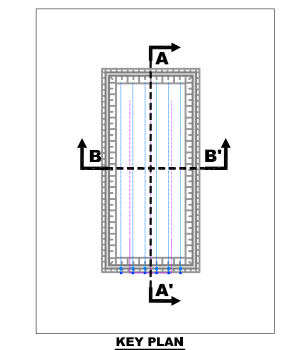

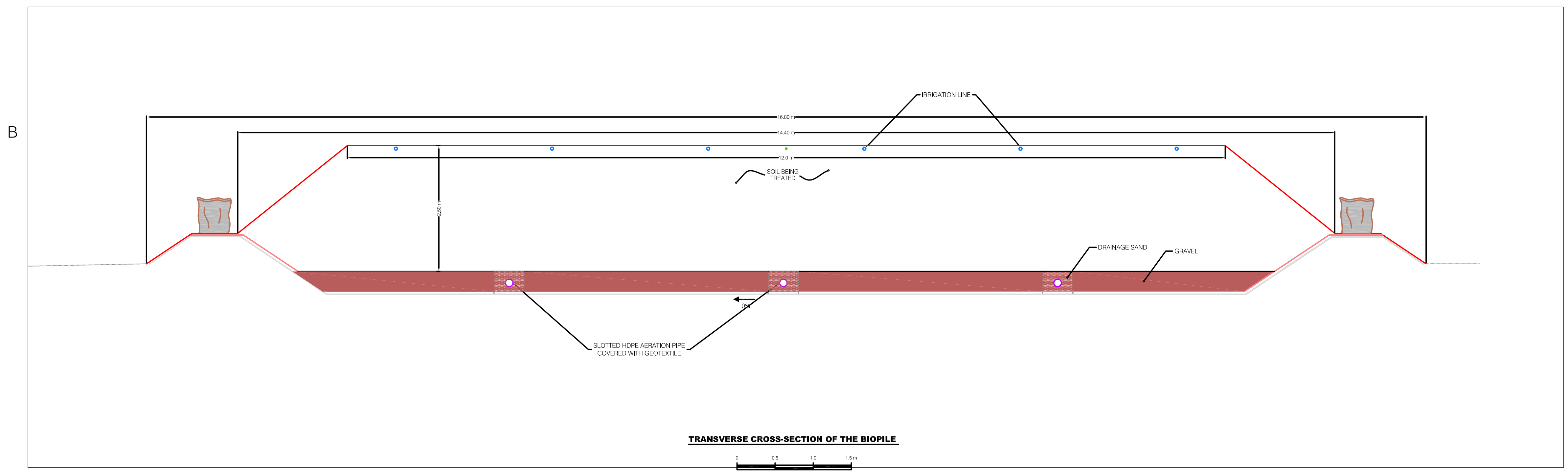

LEGEND

HDPE SLOTTED IRRIGATION LINE	FLEXIBLE IRRIGATION LINE (POROUS)
HDPE SOLID AERATION PIPE	FLEXIBLE IRRIGATION LINE
HDPE SOLID AERATION PIPE	IRRIGATION LINE
	BALL VALVE
THERMOCOUPLE	HDPE PIPE FOR THERMOCOUPLE

NOTE

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PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

CROSS SECTION BIOPILE TREATMENT

Golder Associates
Ottawa, Ontario

PROJECT No. 12–1125–0045			FILE No. 1211250045-V4-Soil-Fig 4.dwg
DESIGN	FD/SM	Oct. 2013	SCALE AS SHOWN REV.
CADD	CB/JEM	Oct. 2013	FIGURE 4
CHECK	PLE	Aug. 2014	
REVIEW	PAS	Aug. 2014	

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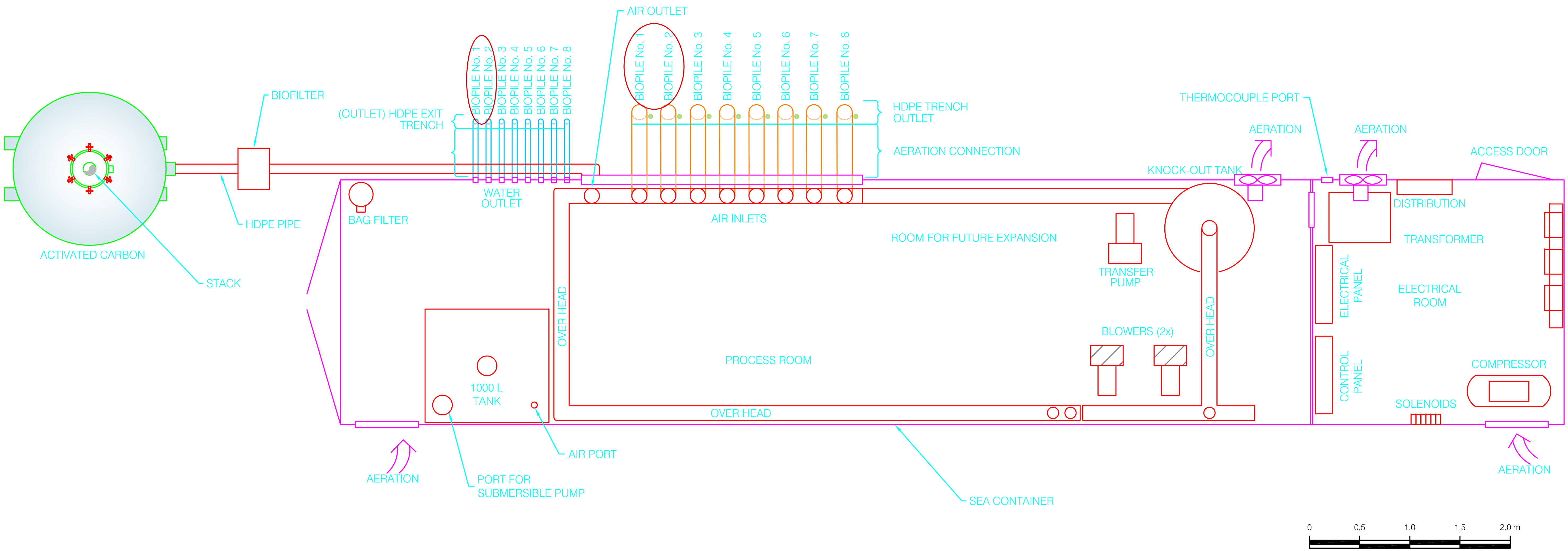

LEGEND

INITIAL PHC TREATMENT SYSTEM CONSISTS OF 2 BIOPILE CELLS

VENTILATION SYSTEM

IRRIGATION SYSTEM

TEMPERATURE MEASUREMENT SYSTEM

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT.

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

TREATMENT UNIT

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			FILE No. 1211250045-V4-Soil-Fig 5.dwg
DESIGN	FD/SM	Oct. 2013	SCALE AS SHOWN REV.
CADD	PL/JEM	Nov. 2013	
CHECK	PLE	Aug. 2014	**FIGURE 5**
REVIEW	PAS	Aug. 2014	

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Golder Associates

APPENDIX I

Landfill Design and Operations

December 2014

APPENDIX I

Landfill Design and Operations
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Table of Contents

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Purpose

This report presents the proposed design and operations (D&O) plan for the landfill component of the Taggart Miller Capital Region Resource Recovery Centre (CRRRC). This landfill portion of the CRRRC is highlighted in Figure 1.

1.2 Organization of Report

The D&O components addressed in this Appendix I are as follows:

- Waste characteristics and quantities to be landfilled;
- Grading plans and proposed final landfill geometry;
- Leachate collection;
- Excavated soil management;
- Landfill gas (LFG) and odour management;
- Site development and phasing;
- Construction activities;
- Site equipment;
- Fire control;
- Winter operations;
- Daily and intermediate cover;
- Inspection and maintenance (landfill, leachate collection system and LFG collection system); and,
- Landfill closure.

Other routine operational components, Site access, stormwater management and monitoring requirements are discussed within the overall facility D&O report and/or its Appendices.

All D&O components described in this report have been prepared to meet the regulatory requirements in the Landfill Standards (MOE, 1998b) and the associated *Ontario Regulation* (O.Reg.) 232/98 (MOE, 1998a).

1.3 Related Documentation

This report has been prepared as an Appendix to the overall facility D&O report and should be read in conjunction with it and its other Appendices. The overall facility D&O in its entirety has been prepared in support of an application for approval under the *Environmental Assessment Act* (EAA) (MOE, 2010a), and also for an Environmental Compliance Approval (ECA) under the *Environmental Protection Act* (EPA) (MOE, 2010b) and *Ontario Water Resources Act* (OWRA) (MOE, 2011) for the CRRRC.

2.0 WASTE STREAM

2.1 Waste Characteristics

The landfill component of the CRRRC is proposed to support the diversion operations for a planning period of 30 years. This is based on an assumed five year ramp up of waste and soil receipts to a maximum of 450,000 tonnes per year and an assumed ultimate diversion rate in the range of 43 to 57 % (including the use of soil for daily cover) over time. The landfill will receive residuals primarily from the on-Site construction and demolition (C&D) processing facility (C&D waste stream) and the on-Site materials recovery facility (MRF) (industrial, commercial and institutional (IC&I) waste stream), as well as residuals from other diversion and processing activities, and waste materials that are not reasonably capable of diversion at the time of receipt.

2.2 Waste Quantities

Based on the parameters in Section 2.1, and assuming a compacted waste density of 0.85 tonnes per cubic metre and a 4:1 waste:daily cover ratio, the landfill component of the CRRRC was assumed to require between approximately 9.4 and 10.7 million cubic metres of airspace volume for a planning period of 30 years.

3.0 LANDFILL DESIGN

3.1 Overview

Based on the results of the geological, hydrogeological and geotechnical investigations and analyses that were carried out at the Site (refer to Volume III of the Environmental Assessment (EA) documentation), it was determined that the presence of the clay deposit beneath this Site requires relatively flat sideslopes in order that the landfill has adequate stability. As such, the landfill design has 14H:1V sideslopes above a 3.5-metre high perimeter berm up to approximately elevation 89 metres above sea level (masl) or 12 to 13.5 metres above ground level, and then a 20H:1V slope up to a central peak or ridge area. The maximum height of the designed final landfill contours is approximately 25 metres above ground level. Based on the slope geometries and waste height constraints it was determined that the total landfill footprint area required to provide the necessary airspace volume to meet the overall facility's projected needs for 30 years is approximately 84 hectares. The waste disposal area (footprint) and proposed top of landfill (final cover) contours are illustrated in Figure 2 and cross-sections showing the general waste mound geometry are provided in Figures 4a and 4b. This configuration corresponds to an airspace volume of approximately 10,170,000 cubic metres for waste and daily cover. An allowance for a 0.75-metre thick (approximately) final soil cover has been provided. Final cover construction will take place after filling in a part of the landfill is complete.

3.2 Landfill Buffer Zones

Buffer zones around the east, south and west sides of the landfill component of the CRRRC will have a minimum width of 100 metres between the limits of waste disposal and the property boundaries so as to be consistent with the generic requirements of the Landfill Standards (MOE, 1998b). Based on the design of the stormwater ponds and corresponding geotechnical considerations, the width of the proposed buffer area adjacent to the east side, the east half of the south side and the northwest corner of the landfill has been increased from 100 metres to 125 metres (see Figure 1). The buffer widths are also shown on the cross-sections on Figures 4a and 4b.

3.3 Access

As described in the overall facility D&O report, the primary Site access will be from Boundary Road near the northwest corner of the CRRRC property. The main access road will be a two way road to the in-bound scale with a separate truck queuing lane. A separate single out-bound lane with an out-bound scale is also proposed (see Figure 1). Considering a queuing lane length of about 400 metres, as well as an in-bound lane length of another 450 metres, the total on-Site queuing lane length that will be available will be approximately 950 metres between Boundary Road and the in-bound scale. As such, it is expected that all queuing of waiting Site-related traffic will be on-Site and there will be no back up of incoming traffic onto Boundary Road. The main access road will be paved.

A secondary Site access/exit location is proposed near the northern end of Frontier Road primarily for Site personnel.

A small load drop-off area is proposed near the primary Site access location off Boundary Road. Vehicles will enter the Site over the in-bound scales and proceed to this facility to drop off their material in the appropriate bunker, and then exit the Site. A separate road is provided for on-Site trucks to access the containers within the bunkers, load them and take them to either a MRF or, where diversion is not possible/practical, directly to disposal in the landfill area. The roadways associated with the small load drop-off area will be paved.

A secondary scale is proposed on-Site along the main haul road from the primary Site access location to the landfill. This scale will be used to record tonnages coming from the diversion facilities to the landfill.

A truck tire wash is proposed between the landfill and the secondary scale area, to be used as required by trucks exiting the landfill.

As shown in Figure 1, secondary access roads will not be paved (gravel surface). In addition to the secondary roads shown in Figure 1, additional secondary roads will be constructed, as required, within the landfill footprint to access the active waste disposal area and Phases that are under construction. The perimeter secondary access road will be built progressively around the landfill as Site development advances and as it becomes needed.

3.4 Containment Berms

The landfill base will be excavated 1.5 to 2.5 metres below the existing ground level and will be surrounded with a perimeter containment berm. The perimeter berm will be constructed to approximately a 3.5 metre height using the excavated soils and/or similar types of imported materials. The perimeter berm will have a top platform width of around 36 metres to provide adequate overall landfill stability, with 7 horizontal: 1 vertical (7H:1V) sideslopes. The berm will also accommodate a perimeter road, header piping for leachate and LFG and other service lines, and provide conveyance of runoff to the stormwater management system. An approximately 20 metre wide bench will be provided between the exterior toe of the perimeter berm and adjacent facilities within the buffer, providing both access and working area around the landfill.

3.5 Base Grades

The design of the landfill base recognizes that consolidation settlement of the silty clay deposit will occur and that the largest settlements will be below the central portion of the landfill where the waste thickness is greatest. The silty clay subgrade (or surficial silty sand where it exists below the landfill base) will be shaped by excavation at a minimum 0.5 percent fall toward the centre-line of various drainage basins or “troughs” where a leachate header pipe (LHP) will be installed.

The layout of the base, including main subgrade slope break lines, constructed base grades and spot elevations is shown on Figure 5.

3.6 Leachate Containment and Collection System

For leachate containment, a Site-specific design approach has been followed. The natural low permeability silty clay deposit will provide the low permeability bottom “liner” for the landfill. The perimeter berm will incorporate a constructed low permeability hydraulic barrier (a geosynthetic clay liner or “GCL”) extending the full height of the berm and down through the surficial silty sand layer or weathered clay zone and keyed into the underlying upper silty clay. This would cut off the potential pathway for off-Site leachate migration via the berm fill and surficial silty sand layer. A typical cross-section showing the perimeter leachate containment is shown on Figure 7.

The leachate collection system will consist of the following components (from bottom to top) over the low permeability clay deposit that provides a natural liner:

- A non-woven separator geotextile;
- A leachate collection granular drainage blanket;
- A non-woven filter geotextile; and,
- A protective sand layer.

Embedded within the granular drainage blanket will be a network of leachate collection pipes. Leachate will be conveyed through the leachate collection pipes and a granular drainage blanket to collection manholes. The final design of the leachate collection system will conform to the requirements stipulated in 'Schedule 1' of the Landfill Standards (MOE, 1998b) for a primary leachate collection system with a 100-year service life.

3.6.1 Leachate Collection Pipes

The landfill base will be shaped to specified initial design grades and a series of trenches will be excavated for the placement of high density polyethylene (HDPE) perforated leachate collection piping (LCP), installed such that the maximum drainage path before leachate can potentially intercept a LCP is not more than 50 metres in length. This is consistent with 'Schedule 1' of the Landfill Standards (MOE, 1998b) for a primary leachate collection system with a 100-year service life. LCP extending up the containment berm slopes to the cleanout locations will be solid HDPE pipe. In this area the 7H:1V slopes should be sufficient to convey leachate through the granular drainage blanket towards the sump locations in the central parts of the landfill, and the drainage path will be less than 50 metres along the sideslopes.

The LCP will run parallel to the overall subgrade slopes with the exception of the outer 125 to 150 metre flanks of the overall landfill base on the north and south sides where they will be placed on an angle to the slope, as shown in Figure 6. The purpose of placing the LCP on an angle in these areas is to facilitate constructing a consistent subgrade slope, without the need for a "sawtooth" shape to ensure a maximum drainage path length of 50 metres to the nearest collection pipe. All LCP will connect to a perforated HDPE LHP which will, in turn, convey collected leachate to a sump. In order to obtain the required minimum 0.5 percent grades within the pipes, initial placement of LCP and LHP will require trenching below the excavated subgrade elevation by up to approximately 1.6 metres (see detail on Figure 7).

Cleanout access to the LCP and LHP will be provided around the perimeter of the landfill. Where access to the exterior is not feasible (i.e., flushing equipment has a maximum access/capacity length of approximately 300 metres), additional vertical cleanouts will be installed within the footprint. The interior and exterior cleanouts will provide access required for flushing/cleaning of the pipes and for camera equipment to facilitate inspection as part of system maintenance. Proposed cleanout locations and the overall leachate collection system piping layout are shown on Figure 6.

All LCP, LHP and cleanouts will have minimum diameter of 200 millimetres to accommodate flushing and inspection equipment. It is noted that the internal diameter of these pipes will exceed the minimum diameter of 150 mm specified in 'Schedule 1' of the Landfill Standards (MOE, 1998b). In addition, pipe perforations will be a minimum of 12 millimetres in diameter, also consistent with 'Schedule 1' for a primary leachate collection system with a 100-year service life.

3.6.2 Leachate Manholes

A series of nine leachate sumps (manholes) will be provided within the landfill; they will be located at the lowest points of the base grading, both when constructed initially and allowing for the longer term consolidation of the clay as the waste is placed. The leachate collection system design will accommodate the expected settlement of the subgrade. As the settlement of the clay occurs, the slope of the base and piping will increase from that originally constructed, thereby enhancing the transmission of leachate to the interior leachate sumps.

Vertical manhole sections will be added to provide access to the leachate sumps as landfilling progresses in each sump/manhole area. In order to minimize the number of internal locations with infrastructure that will need to be accommodated as landfilling progresses, it is also proposed to include vertical LHP cleanouts at each manhole location. The cleanout pipes at each manhole location as well as vertical cleanouts at other stand-alone locations within the landfill will also be raised by adding successive pipe sections as landfilling progresses in these areas.

The top section of each leachate manhole is proposed to be a stainless steel section instead of HDPE. This will facilitate connections to the leachate forcemain and electrical conduit as well as providing strength to support the leachate sump pump via a cable. The top stainless steel section of the manhole would be removed and reinstated as each section of HDPE manhole pipe is added. Efforts to minimize drag-down forces on the manhole piping will be made and may include the use of plastic sheeting or wrapping. The top of each manhole location will be protected when in use at interim heights by mounding cover fill material around the manhole or by constructing temporary barriers (e.g., from scrap tires, concrete manhole sections, etc.). A typical detail for the proposed manhole configuration is shown on Figure 7.

Leachate removal from each sump will be by means of submersible pumps and via piping to a forcemain that will convey the collected leachate for treatment. Proposed sump locations and the proposed alignment of the leachate forcemain are shown on Figure 1.

3.6.3 Leachate Pump Control Station and Forcemain

Leachate removal from each sump will be accomplished by means of removable submersible pumps that will be activated by electronic leachate level sensors. Pump controls and electrical panels will be consolidated in a single Leachate Pump Control Station (see Figure 1). The control station will be sized to accommodate the required controls as successive manholes are built and commissioned.

Three main north-south orientated leachate forcemain laterals are proposed that will feed leachate into an external forcemain running along the northern edge of the landfill and then north to the leachate pre-treatment facility. The external leachate forcemain will cross the Simpson Drain (together with the LFG header piping) at a single location to minimize disruption to the drain during construction (see Figure 1).

The diameter of the leachate forcemain laterals will be sized in sections with increasing diameters from south to north to accommodate increased flow as additional manholes are built and connected. Each lateral will ultimately connect three manholes to the external leachate forcemain.

The leachate forcemain laterals will be buried within the waste. Should breakage occur, the system will be designed such that a new leachate forcemain lateral could easily be connected and the broken lateral left cut-off within the waste mound. Temporary overland hose could also be used to convey leachate from the manholes to the external leachate forcemain.

3.6.4 Drainage Layer

It is proposed that the leachate collection pipes will be bedded in a continuous layer of crushed clear stone extending completely across the base of the landfill. The thickness and gradation of the drainage stone will meet or exceed the requirements in 'Schedule 1' of the Landfill Standards (MOE, 1998b) for a 100-year service life.

A suitable separator geotextile will be installed between the drainage stone and the silty sand or clay subgrade. A filter geotextile will be installed over the drainage stone, protected by a sand layer to prevent fine materials from the waste from being washed into the drainage layer.

3.6.5 Settlement Effects on Leachate Collection System

Settlement predictions are discussed in the Geology, Hydrogeology and Geotechnical Report (Volume III). The maximum settlement of the subgrade predicted within the 100-year service life of the leachate collection system is between approximately 6 and 8 metres. This settlement will be greatest under areas overlain by the highest waste thickness. The proposed sump locations have been selected based on areas within each Phase that are expected to experience the greatest amount of subgrade settlement. Landfill phasing is discussed further in Section 4.0 of this report. Redundancy has also been built into the proposed leachate collection system piping network by maintaining continuity of the leachate header piping between adjacent Phases and manholes such that leachate could flow to an adjacent subgrade drainage area or Phase should localized higher degrees of subgrade settlement be experienced.

Settlement of the subgrade near the outer limits of the landfill footprint is expected to be relatively negligible. Therefore, it is considered that it would not be practical to provide positive drainage to the outside of the landfill footprint that would overcome the eventual maximum differential settlement. This is the reason for the proposed internal manhole locations.

In order to minimize the initial excavation depth and maintain minimum as-constructed subgrade slopes of 0.5 percent, steps in the proposed subgrade are proposed along lines running east-west approximately 125 to 150 metres from the north and south edges of the waste footprint. The leachate header and sumps that will collect leachate from these drainage areas or “flanks” are located at the low end of this step. The proposed subgrade steps are visible in Sections B-B’ and C-C’ on Figures 4a and 4b, respectively.

As settlement of the subgrade occurs, there will be a need for flexibility in the lengths of the leachate collection pipes and header pipe. As such, it is proposed that slip couplings will be used to connect lengths of pipe as an alternative to welding. During final detailed design, the expected elongation of pipe sections will be calculated to ensure adequate slip coupling lengths.

All geotextile seams (separator and filter geotextiles) will be sewn (either factory seams or machine-sewn during installation) to ensure that adjacent geotextile panels are not pulled apart from each other during construction and subsequently as subgrade settlement occurs. The expected tensile forces that will be developed in the geotextiles and required elongation will be considered during final detailed design and when specifying the required geotextile products/properties.

3.7 Leachate Treatment

Leachate collected from the landfill leachate collection system will be conveyed via forcemain to an on-Site leachate pre-treatment facility. The design and operations for this facility are described in detail in Appendix J of the overall facility D&O report.

3.8 Leachate Detection and Secondary Containment System

To allow for monitoring of the performance of the landfill's leachate containment system (the natural clay deposit, the LCS, and perimeter berm with the perimeter GCL) and provide secondary containment in the unlikely event that leachate enters the surficial silty sand layer outside of the landfill footprint, a leachate detection and secondary containment system (LDSCS) will be positioned beneath the perimeter berm along the hydraulically downgradient (eastern) edge of the landfill component of the CRRRC, as shown on Figure 1. This monitoring and secondary containment feature will be provided along the entire length of the east side of the landfill and will be constructed in conjunction with the construction of the perimeter berm.

As shown on Figure 7, the LDSCS will be a 1 metre wide trench dug through the base of the upper silty sand into the top of the underlying silty clay, and extending approximately 860 metres from the north end of the landfill to the south end of the landfill as shown highlighted in pink on the attached plan figure. The alignment of the LDSCS is approximately 110 metres inside the east property boundary. The trench would be filled with a highly permeable 25 mm clear stone. A 200 mm diameter perforated pipe would be placed within the clear stone, approximately 150 mm above the base of the trench. As shown on Figure 6, the base of the trench (and piping) will be graded at a 0.5 percent slope in a "sawtooth" pattern to four manholes along the length of the LDSCS, while not extending more than 1 metre below the base of the surficial silty sand. The contents of the trench will be wrapped in a geotextile.

The LDSCS will passively collect groundwater from the surrounding surficial silty sand. With the presence of the overlying perimeter berm and the landfill acting as a hydraulic trap and locally lowering the water table in the immediate vicinity of the landfill footprint, it is expected that after initial pumping to evacuate the system prior to commencing landfilling, the volume of groundwater subsequently entering the LDSCS will be relatively small.

Monitoring of the LDSCS as described in Section 13.2 of the Volume III report will provide information on the quality and quantity of water entering the system, which will be used to determine whether the quality of water entering the system from the surficial silty sand layer has been impacted by leachate.

3.9 Final Contours and Waste Capacity

The final proposed landfill contours are illustrated on Figure 2, assuming a total final cover thickness of approximately 0.75 metres. The proposed top of waste and top of final cover slopes are illustrated in the cross-sections included in Figures 4a and 4b. Settlement effects on the final cover elevation and geometry and related considerations are discussed in Section 4.6 of this report.

As discussed in Section 3.1 of this report, the final landfill slopes will range between 14H:1V and 20H:1V (i.e., 5 percent or greater but less than 4H:1V), which is consistent with the requirements of the Landfill Standards (MOE, 1998b).

The waste mound depicted in Figures 2, 4a and 4b corresponds to a total volumetric capacity of approximately 10,170,000 cubic metres for waste and daily cover, without accounting for settlement.

3.10 Excavated Soil Management

Soil that is excavated during construction of the landfill base area will be used for construction of the perimeter landfill containment berms and the Site screening berms. It is expected that there will be an overall fill deficit for construction of the containment and screening berms and that imported fill will be required to complete portions of the berms. The total estimated volume of material to be excavated as part of landfill base construction is approximately 640,000 cubic metres. There will also be approximately 70,000 cubic metres of soil from excavation of stormwater management features and leachate ponds that will be available for re-use. The total volume of fill required to construct the containment and screening berms is estimated to be approximately 820,000 cubic metres. There will also be additional fill requirements for general grade raise in the northern portion of the Site where diversion facilities and other Site infrastructure will be built.

Despite the overall fill deficit for the various on-Site earthworks, it is expected that landfill construction will proceed at a rate that will necessitate temporary handling of surplus uncontaminated soils received from construction projects. As such, a surplus soil management area has been designated near the west central portion of the Site area north of the Simpson Drain (see Figure 1). The ongoing operation in this area, as well as other areas of the Site where surplus soil may be temporarily stored until such time that it is required for re-use, will basically consist of the dumping and dozing of incoming soil into a stockpile(s), and removal of this soil for re-use on-Site. It is anticipated that the temporary stockpiles could be up to approximately 5 metres in height.

3.11 Landfill Gas and Odour Management System

The following sections present a summary of the projected rates of LFG generation and describe the design of the LFG collection system for the proposed landfill component of the CRRRC.

3.11.1 Estimate of Landfill Gas Production

Estimates of LFG generation rates were prepared for the landfill component of the CRRRC using the LandGEM model (US EPA, 1991) developed by the United States Environmental Protection Agency (US EPA). The LandGEM model is based on a first-order decay model of LFG generation.

The methodology and results are presented in detail in the technical memorandum provided in Attachment A. A summary of the LFG generation rates estimated for the landfill component of the CRRRC using the LandGEM (US EPA, 1991) model are presented in Table 1.

Table 1: Estimated LFG and Methane Generation Rates (Using Maximum Projected Waste Tonnages)

Year	Total LFG		Total Methane*	
	m^3/hour	scfm	m^3/hour	scfm
5	1,115	655	555	330
10	2,240	1,320	1,120	660
15	3,165	1,865	1,585	930
20	3,925	2,310	1,960	1,155
25	4,545	2,675	2,270	1,335
30 (Peak)	5,050	2,975	2,525	1,485
35	4,135	2,435	2,070	1,215
40	3,385	1,995	1,695	995
45	2,770	1,630	1,385	815
50	2,270	1,335	1,135	670

Notes: * Assumes LFG is comprised of 50% methane.
m^3 = cubic metres
scfm = standard cubic feet per minute

Actual LFG generation rates may differ, perhaps significantly, from the model results due to differing future waste composition, annual waste tonnages, and the uncertainties associated with modelling a highly complex facility such as a landfill.

It should be noted that the theoretical LFG generation rates estimated are not the same as the LFG collection rate, since the future LFG collection system would not be able to collect all of the LFG generated.

3.11.2 Design of Landfill Gas Collection System

The active LFG collection system will consist of horizontal collector piping, header piping, condensate management facilities, an extraction facility and an enclosed flare. This collection system will also be able to supply a possible power generation facility.

The proposed LFG collection system will conform to the most recent version of B149.6-11 Code for Digester Gas and Landfill Gas Installations (CSA, 2011), which has been adopted by the Technical Safety and Standards Authority (TSSA) for use in Ontario as of December 2012. The LFG collection system will also be designed for the predicted subgrade settlement.

A description of the proposed LFG collection system is provided below. Design drawings and details for EPA (MOE, 2010b) approvals purposes are presented in the attached Figures 8 through 11.

Horizontal Collector Piping

Perforated horizontal collector pipes will be installed in Phases 1, 2, 3, 4, 6 and 7 of the landfill, as shown in Figures 8 and 9. The lower layer of horizontal collector pipes will be installed to maximize LFG collection as landfilling progresses in Phases 1 through 4 and phases 6 and 7. The upper layer of horizontal collectors will be installed on top of Phases 1 through 4 prior to landfilling in Phase 5, and on top of Phases 6 and 7 prior to landfilling in Phase 8.

The general layout of the horizontal collector pipes is east-west in Phases 1 and 2 and north-south in Phases 3, 4, 6 and 7. Horizontal collector pipes have been spaced approximately 30 to 50 metres apart based on waste thicknesses and estimated horizontal collector capture zones. Typical elevations and lengths of horizontal collectors are shown in Figure 9; exact elevations and lengths will vary with each collector.

The LFG horizontal collector pipes will be constructed using perforated HDPE LFG collector pipe attached to a non-perforated HDPE LFG conveyance pipe. The perforated horizontal collector pipes will be encased in a gravel drainage pack, with perforations appropriately sized to reduce the intrusion of gravel, and spaced to promote LFG collection. Drainage from the gravel drainage pack will be provided into the leachate collection layer or into the header pipe and condensate trap.

Each horizontal collector will be equipped with a flow control and monitoring port that will allow for the monitoring of LFG pressure and quality, measurement of LFG flow rates, and a valve to facilitate the regulation and balancing of LFG flow.

In addition, a perforated horizontal collector will be installed near the inside crest of the perimeter berm to collect LFG that enters the leachate collection granular drainage layer.

Main Header Piping

The main header pipe will transmit the LFG from the horizontal collector piping to the extraction plant and flare (or power generation facility). The main header pipe will be constructed within the landfill perimeter berm in a loop along the perimeter of the waste footprint (progressively, as each landfill phase is constructed). The direction of LFG flow in the header pipe will be from the perimeter of the landfill footprint towards the extraction plant in the northeast portion of the CRRRC Site.

The header pipe will be constructed of HDPE of suitable diameter to provide for an effective vacuum to be applied to the LFG collection wellfield. The header pipe will be installed with the pipe obvert at a depth below ground surface suitable for frost protection, or the pipe will be insulated. To provide for drainage of condensate, a minimum header pipe grade of approximately 1.0% will be provided for pipe segments sloping away (i.e., negative gradient) from the extraction plant and -0.5% for pipe segments sloping towards (i.e., positive gradient) the extraction plant. The actual pipe gradients will be determined as part of detailed design.

The typical header piping layout and details are presented in Figures 8, 9 and 10.

Condensate Traps

LFG will cool as it travels along the header piping, causing moisture in the LFG to condense in the piping. Liquid condensate in the header pipe will be conveyed by gravity into condensate traps, reducing the potential for blockage of LFG flow in the header pipe caused by an accumulation of liquid condensate from saturated LFG. More than one condensate trap will be required in the header pipe around the landfill footprint and along the header pipe to the extraction plant. A generalized condensate trap detail is presented in Figure 11. While condensate traps will be provided, uneven settlement of the subgrade may require that portions of the header be regraded in the future.

Liquid condensate will be conveyed from the condensate trap(s) into the leachate pre-treatment system via pneumatic pumps.

Extraction Plant

A LFG extraction plant will provide a vacuum to both the LFG collection system and the organics processing facility, and would convey the LFG/biogas to the flare, and to a possible future utilization facility or on-Site heating application. The extraction plant will be located in the northeast portion of the Site near the secondary digester, outside of the approved waste footprint. The main components of the extraction plant will be one or more centrifugal blowers, LFG treatment facilities, monitoring instrumentation and controls, and an air compressor.

Centrifugal Blower

One or more centrifugal blowers will be installed in the extraction plant. The blower(s) will be used to create a vacuum of up to 15 to 25 inches water column at each horizontal collector connected to the LFG collection system, and will convey the LFG to the flare. A separate blower system may be used to provide a vacuum to the organics processing facility.

The blower(s) will be equipped with a direct-drive motor and a variable frequency drive to provide suitable control at low flow rates. The blower(s) and associated motor and controls will meet the requirements of CSA B149.6-11. The blower(s) will be connected to a programmable logic controller (PLC) and to an external manually operated emergency shut-down device in accordance with CSA B149.6-11 (CSA, 2011).

LFG Treatment Facilities

A condensate knockout will remove most water droplets and mist as well as dirt from the LFG. The resultant liquid condensate will be disposed into the leachate pre-treatment system.

Monitoring Instrumentation and Controls

Automated control and monitoring within the extraction plant will be conducted via a PLC computer. The PLC will control the blower(s), flare and automatic shut-off valves, with input from various sensors including the gas concentration instrumentation. A datalogger will store data from the flare, blower and other instrumentation.

A flow meter will provide flow measurement for a range of LFG flow rates.

A methane and oxygen gas analyzer system will continuously measure and display concentrations of methane and oxygen in the LFG. Due to instrumentation limitations and the length of the connection line with the LFG pipe, there will be a time lag in response of the instrument to actual LFG concentrations in the pipe.

A pressure sensor will be installed to measure the LFG pressure generated immediately downstream of the blowers. A second pressure sensor will be located upstream of the condensate knockout.

A safety shut-off valve will be installed upstream of the blower and a check valve and second safety shut-off valve will be installed downstream of the blower as required by CSA B149.6-11 (CSA, 2011). Safety shut-off valves are actuated valves that can be shut off by the PLC.

Air Compressor

An air compressor will be located at the extraction plant and will be used to supply compressed air to condensate trap pump(s), safety shut-off valves, and the LFG instrumentation sampling system.

Enclosed Flare and Utilization Facility

An enclosed flare will be located in the northeast portion of the Site near the extraction plant and secondary digester.

The enclosed flare will have a capacity of some 2,000 to 2,500 scfm of LFG at 50% methane plus possibly additional capacity for biogas from the organics processing facility. A flare turn-down ratio of 4:1 is anticipated. An enclosed flare is specified because of its high hydrocarbon destruction efficiency and its flame will not be visible. The flare is estimated to have a diameter of approximately 3 metres and a height of approximately 12 metres. The enclosed flare will have a destruction efficiency of total organic compounds of approximately 99%. The temperature of the flare will be controlled by thermocouples at various heights inside the flare. An ultraviolet flame sensor, connected to the PLC, will enable the blower to be shut down if the flame extinguishes. The enclosed flare will meet the requirements of CSA B149.6-11 (CSA, 2011).

A flame arrestor (intended to reduce the flame temperature in the event of a flash-back) and a thermal valve (intended to shut in the event of a slow burn-back), both required by CSA B149.6-11 (CSA, 2011), will be located upstream of the enclosed flare. The header pipe leading from the extraction plant to the flare will be supported appropriately with pipe supports. The enclosed flare will be surrounded by a fence in accordance with CSA B149.6-11.

Two smaller flares (instead of one larger one) may be used for combustion if it is decided to combust biogas from the organics processing facility and that from the landfill in separate flares. The general location of the two flares would be at the same as that currently selected for the single flare.

A utilization facility may be installed in the future to generate electricity or to upgrade the gas to natural gas pipeline quality. A future utilization facility would be located in the northeast portion of the Site near the flare and would accept both LFG from the LFG collection system and biogas from the organics processing facility. The flare would be retained to provide a method of destroying the gas if the utilization facility is unavailable for any reason.

3.12 Stormwater Management

Design of drainage requirements from the landfill (as required by O.Reg. 232/98 (MOE, 1998a)) and from the diversion areas was carried out and the proposed stormwater management system is described in Appendix A of the overall facility D&O report. The approach to system design is to closely match post-development flows to pre-development flows by providing the required retention time in on-Site ponds, and by doing so also provide total suspended soils removal. The approach also aimed at dividing up the Site into three drainage areas that are similar in size to the three pre-development drainage areas leading to the three surface water discharge locations from the Site. The three discharge locations, which all flow eastward and enter Shaw's Creek, are to the Regimbald Municipal Drain to the northeast, to the Simpson Municipal Drain in the central portion of the Site, and the southern portion of the Site to an existing ditch leading to the Wilson-Johnston Municipal Drain. The stormwater management system consists of Site grading, ditching and culverts leading to linear stormwater ponds; two of the ponds will receive stormwater drainage from a portion of the diversion areas to provide a large fire pond (as per the building code) to provide water for firefighting purposes, if required.

Stormwater management considerations during construction of the landfill Site is discussed in Section 4.2 of this report.

4.0 OPERATIONS

4.1 Landfill Development

4.1.1 Phasing

The landfill has been planned to be developed in eight Phases. The Phase divisions recognize the layout of the base grades and the leachate collection system, and will allow for sequential construction of the overall landfill footprint. The proposed phasing is shown on Figure 3, and filling will generally progress from northeast to southwest within the landfill footprint. Interim waste slopes between Phases will be required to be constructed at grades no steeper than 14H:1V and the toe of the temporary slope on the upper Phase (Phase 5) will be required to be set back a minimum of 70 metres from the top of the temporary slopes on Phases 3 and 4. These temporary slopes are illustrated in the cross-sections on Figures 4a and 4b.

4.1.2 Landfill Development Schedule and Sequence

Sequential filling in Phases 1 through 4 will progress up to a height of approximately 12 to 13.5 metres above ground level (approximate elevation 89 masl). Phase 5 waste will be placed on part of the top of Phases 1 through 4 up to its final elevation. Phases 6 and 7 will then be filled similar to Phases 1 through 4, and Phase 8 filling will take place on top of Phases 6 and 7 (and Phases 3 and 4) to complete the landfill. The area of each stage varies from approximately 11 to 21 hectares, and it is estimated will provide airspace for operating periods ranging from approximately 2 to 6 years. The operating period for each Phase is variable because certain Phases have to be initially built with relatively flat temporary interior waste slopes on two sides (thereby reducing the available airspace above the footprint of that Phase), while filling in others involves the placement of waste above the temporary waste slopes within the previous adjacent Phase(s) footprints. The phasing is described in the table below.

Table 2: Landfill Development Schedule

Phase	Footprint Area (ha)	Estimated Years of Operation
1	21.6	4.5
2	12.9	3.6
3	11.0	2.3
4	11.3	4.8
5	On top of Phases 1 to 4	1.7
6	13.9	3.2
7	13.3	6.6
8	On top of phases 3 to 7	3.3
Totals	84	30

Recognizing that the actual rate of landfill airspace consumption will depend on the annual tonnage received and the diversion performance of the CRRRC over time (including the development of end markets), it is proposed that the landfill airspace be approved under the EPA in stages. Considering the proposed phasing shown on Figure 3, the practical approach is to split the landfill into two stages so that, as described above, the first stage of the landfill can be built to a completed configuration prior to starting to fill the second phase.

The two stages are:

- Stage 1 consisting of Phases 1 through 5, which corresponds to approximately 5.7 million cubic metres of airspace and an estimated operating life of approximately 17 years; and,
- Stage 2 consisting of Phases 6 through 8, which corresponds to approximately 4.4 million cubic metres of airspace and an estimated operating life of approximately 13 years.

Although the impact assessment in the environmental assessment has been done for the full landfill configuration as set out in this report, and EA approval is being sought for the projected total airspace described in Section 3.1 above, EPA approval will only be sought initially for Phases 1 through 5 of the landfill configuration. An application for EPA approval of Phases 6 through 8 will be made when necessary.

4.2 Construction Activities

Landfill construction will take place progressively in advance of waste placement in Phases 1, 2, 3, 4, 6 and 7. In general, construction activities will include:

- Clearing, grubbing and stripping of topsoil;
- Base excavation and shaping;
- LDSCS construction;
- Perimeter containment berm construction;
- Geosynthetics installation (separator geotextile, GCL, filter geotextile);
- Manhole/sump construction;
- Placement of granular materials (including drainage stone and protective sand); and,
- Installation of leachate collection and header piping and appurtenances.

Phases 1, 3 and 6 will require the construction of two manholes whereas only one manhole will be required to be constructed during the preparation of Phases 2, 4 and 7. Temporary berms will be constructed, as needed at the limits of temporarily completed Phases, to protect the loose ends of the geosynthetic layers and for the purpose of leachate containment within the completed and commissioned portions of the landfill. Temporary berms may also be constructed within partially constructed Phases in an effort to manage stormwater that accumulates in areas under construction or as construction progresses separately from the leachate that is being generated in the landfilled areas. This may be relevant in Phase 1 at the subgrade drainage divide between the two manholes that are allocated to this Phase. It may not be necessary in the other Phases that have two manholes (i.e., Phases 3 and 6) as the step in the subgrade immediately south of the northern manholes in these Phases will isolate leachate generated in the northern flanks of these Phases from the more southern portions of these Phases.

Prior to commencing landfill operations, the LDSCS will be evacuated of whatever unaltered groundwater has entered the system.

4.2.1 Mitigation Measures

Mitigation measures relevant to the construction period have been identified for various potential environmental concerns. In general, landfill construction will conform to the appropriate construction procedures and best management practices to minimize impacts to the surrounding environment.

Surface Water

Construction of the landfill requires the excavation and redistribution of soils. During these operations the potential for increased surface erosion from exposed areas could result in increased sediment loading to the on-Site ditches or the Simpson Drain. To prevent this, erosion and sediment control measures will be implemented before landfill construction begins.

The main activities for which erosion and sediment control measures must be implemented are:

- Excavation within the landfill area and earthmoving;
- Construction of the on-Site roads and drainage ditches; and/or,
- Construction of berms.

Erosion and sediment control measures that will be incorporated include:

- Minimize the extent of disturbed areas and duration soils are exposed;
- Seed completed areas and ditches, protect with mulches and geotextiles to reduce erosion until vegetation takes hold;
- Install silt fences around disturbed areas; and,
- Provide straw bale check dams in existing drainage courses immediately downstream of construction activities.

Dust and Mud Control

Best practices typically required for construction activities will be followed. Specific measures could include:

- Watering or application of other approved chemical agents (e.g., winter use) on haulage roads to control dust, if required; and,
- If required, temporary truck washing station (before permanent station is built).

All necessary measures will be taken to ensure that visible mud and dust emissions do not carry beyond the property line.

4.3 Routine Operational Components

Routine operations of the landfill component of the CRRRC will be consistent with and as described in the overall facility D&O report. Reference should be made to the overall facility D&O report specifically for information on staffing, waste acceptance procedures, handling of suspect wastes, handling of other wastes, complaint procedures, record keeping, fencing, signage, dust control, noise control, litter and vectors/vermin control. Other routine operational information that is more specific to the landfill is described below.

4.3.1 Operating Hours

It is proposed that the overall CRRRC will be open for waste receiving between 6:00 a.m. and 6:00 p.m. Monday through Saturday. Landfill operations are proposed to be 6:00 a.m. to 7:00 p.m. Monday through Saturday. The Site is expected to operate between 300 and 312 days per year.

4.3.2 Equipment

Site equipment may be modified from time to time as necessary. Equipment as described below (or similar models) that is planned to be designated to the landfill component of the CRRRC includes:

- Ford F-150 pickup truck (4x4) – 1 (shared with organics processing facility);
- Triaxle 400 horse power dump truck – 1;
- Caterpillar 966 loader – 1 (shared with the PHC contaminated soil treatment area and surplus soil stockpiling facility);
- Caterpillar 336 excavator – 1;
- Caterpillar 430 backhoe – 1;
- Caterpillar 12 grader – 1 (shared with surplus soil stockpiling facility);
- Caterpillar D8 dozer – 1;
- Caterpillar D6 dozer – 1 (shared with surplus soil stockpiling facility);
- Caterpillar 836 compactor – 1; and,
- Water truck – 1.

4.3.3 Fire Control

The method of preventing surface fires will be to monitor all loads being received at the Site and check loads for any hot materials. Detection and determination of the size of a subsurface fire, while somewhat unlikely, can be more difficult. Subsurface fires will typically be indicated by:

- Unusual or rapid landfill settlement;
- Venting of smoke;
- Carbon monoxide in LFG; and,
- Elevated LFG temperatures.

The location and extent of a subsurface fire could be determined by the following methods:

- Excavation or borings to allow visual examination of refuse; and,
- Installation of test wells to allow monitoring of subsurface temperature gradients.

In the event of a landfill fire, the Ottawa Fire Department and the Ministry of the Environment and Climate Change (MOECC) District Office would be contacted and advised of the situation. Depending on the size of the fire, staff may attempt to contain the fire with on-Site fire extinguishers until the fire department arrives. Although the fire ponds are intended for extinguishing fires at the diversion facilities, it may be possible to also use this water for a landfill fire.

Additional considerations with regards to subsurface landfill fires caused by the operation of the active LFG management system are described in Section 6.1 of this report.

4.3.4 Burning of Waste

Burning of waste will be prohibited at the CRRRC. In addition, no burning of brush, trees or clean wood piles will be conducted at the Site.

4.3.5 Winter Operations

A variety of snow removal equipment will be available on-Site, including loaders, backhoes and pickup trucks (which may be equipped with snow plows, if required).

Stockpiles of sandy material will be available on-Site for use as cover material during cold winter weather, if required. A dozer or excavator equipped with a ripper will be used to remove frozen surficial material on the sand stockpiles and expose underlying material suitable for use as daily cover. Equipment will be available to transport sandy cover material to the active landfill face, if required.

4.4 Waste Placement

Waste placement will proceed in Phases 1 through 8 as described in Section 4.1.2 of this report. No waste will be placed outside the limits of landfilling or within the buffer zones around the perimeter of the Site. Waste haul vehicles will access the active face via on-Site roads and via well-maintained granular surface access roads within the landfill area. Upon arriving at the active face, a ground worker will screen the load and direct the driver to back into the active face. The active face length will be confined to as small an area as possible while having enough space for trucks to safely unload.

The first waste lift in a given area shall be placed in a thick layer in order to avoid damage to the drainage features due to equipment travel. A minimum 1.5-metre depth of waste shall be placed in the first layer. The waste will be placed initially near the perimeter of the fill area and pushed out over the prepared landfill base. The landfilled waste will act as a travelling surface for equipment and waste trucks, with appropriate additional granular material added for temporary roads, as required.

After placement of the initial lift, the waste will generally be placed in lifts of thicknesses between 0.45 and 0.6 metres. By placing material in thin lifts and compacting the waste, the waste density will be increased, thus reducing the rate of landfill space consumption.

The length of the operating face will be kept to a minimum (i.e., maximum length of approximately 30 metres) to help control insects, rodents, scavenging by birds, blowing litter, fires, odours and to maintain an aesthetically pleasing site appearance.

Asbestos waste will be landfilled in accordance with Section 17 of O. Reg. 347 (MOE, 1990). Asbestos handling procedures will include but not necessarily be limited to the following:

- Staff involved in the disposal of asbestos will be trained to recognize the related hazards;
- Asbestos will only be accepted in containers/bags and not in a loose form. Care will be taken to ensure that staff or equipment do not come into contact with the asbestos;
- Asbestos will only be accepted with 24-hour pre-notification;
- Appropriate personal protective equipment including disposable coveralls, head covers and respirators will be available for the handling of special wastes;
- Prior to the arrival of asbestos on-Site, a trench will be excavated to receive the material;
- Other operations in the immediate vicinity of the trench will be temporarily suspended while the containers are placed in the trench; and,
- The trench will be covered over immediately with at least 1.25 metres of waste or cover soil.

No waste will be accepted, deposited or removed from the Site unless the Site supervisor or a trained designate is present.

4.5 Daily and Intermediate Cover

Exposed waste will be covered by approximately 0.15 metres of suitable cover material on a daily basis. Areas not visited for more than 6 months will be covered with a minimum of 0.3 metres of cover material. In addition to general clean fill (uncontaminated soil), fines from on-Site diversion operations, wood chips and appropriately treated impacted soil may be used as daily or intermediate cover material. In addition, alternative daily cover systems or materials such as tarpaulin systems and/or spray foams may be used. Daily or intermediate cover will be removed, as much as practical, prior to resuming placement of waste in an area.

4.6 Effects of Settlement on Final Contours

The clay beneath the landfill will consolidate under the weight of the waste. As a result the elevation to which waste is placed will decline as the clay below it consolidates, some of which will occur during the period that filling is ongoing. Because the stability of the landfill is dependent on the thickness of waste, the thickness will be monitored. Waste thickness monitoring will occur primarily at the manhole locations since the base of the manholes will be founded on the landfill base and expected to settle with the overall subgrade settlement.

Although the overall final shape of the landfill will be similar to the design, it is expected that the landfill will not actually reach the maximum ridge/peak elevation presented in the design. In this regard, it is expected that the final contours for Phases 5 and 8 (the two periods of filling the upper part of the landfill above previously filled areas) may be somewhat lower than, but within the approved landfill landform contours. As the clay consolidates over time its shear strength will increase; this increase in shear strength will be considered in determining the total achievable waste thickness and the final contours for Phases 5 and 8. The final shape will also provide positive drainage of runoff.

Some settlement within the waste is also expected over time as any organics and biodegradable components of the waste degrade. Waste settlement as a percent of the overall settlement will be calculated based on settlement monitoring at each of the manhole locations.

Based on the anticipated Site development/landfilling schedule (see Section 4.1.2 of this report), it is expected that Phase 1 will have settled to a greater degree than Phases 2, 3 and 4 when landfilling commences in Phase 5. Regular inspections of the interim waste surface in these Phases will occur and minor modifications will be made to the waste surface and/or intermediate cover to ensure positive drainage from the interim waste surface and to prevent ponding of stormwater on the landfill surface. Surface grade adjustments may also be required when landfilling commences in Phase 5 due to differential settlement that will likely occur between the newer and older completed Phases.

5.0 SITE INSPECTION AND MAINTENANCE

A routine program of inspection and maintenance of all systems within the landfill component of the CRRRC will be carried out to ensure that the systems remain in good repair. Any deficiencies or deviations noted from the approved design operations plan will be addressed promptly. Operations maintenance observations will be made daily in the course of routine operations.

5.1 Landfill

Specific daily landfill observations will include but not necessarily be limited to confirming:

- No evidence of any unacceptable wastes or illegal dumping;
- Adequacy of the daily cover;
- Adequacy of dust control on working areas or access roads;
- Prevention and control of litter on or off-Site;
- No unacceptable odour levels; and,
- No evidence of leachate breakout or seeps.

In addition, specific weekly landfill inspection items will include but not necessarily be limited to:

- Condition of access roads (e.g., potholes, snow removal, etc.);
- General intermediate cover condition (e.g., signs of erosion, etc.);
- Inspection of litter control practices; and,
- Condition of drainage ditches and berms.

Operating staff will maintain a logbook with appropriate checklists and maintenance will be carried out on an as-required basis.

As discussed in Section 4.6 of this report, regular inspection of intermediate waste surfaces will be carried out to ensure positive drainage from the landfill surface.

5.2 Leachate Collection System

It is proposed that all leachate collection and header piping that has been installed in active landfilling areas or areas that have previously received waste will be inspected via camera equipment and flushed on an annual basis during the operating lifespan of the landfill. The frequency of the camera inspections may be decreased, particularly in closed areas of the landfill, should prior inspections indicate no operational challenges or concerns. The camera and flushing equipment will access the leachate collection and header piping via the cleanouts.

The purpose of these inspections will be to look for any blockage due to clogging/fouling or pipe breakage/ deformation. In addition, drainage directions will be noted (i.e., by observing the direction of flow from the flushing operations in each pipe), if possible. Should positive flow in a pipe not be maintained or should areas of settlement result in pipe depressions without positive drainage, leachate levels will be calculated based on the recorded length from the pipe entrance to where the camera becomes submerged and based on pipe elevation estimates. The pipe elevation estimates (and therefore the leachate levels) will only be approximate due to the expected settlement of the subgrade and leachate collection system.

5.2.1 Service Life of Engineered Components

The design for the leachate collection system in the landfill component of the CRRRC meets the requirements of 'Schedule 1' provided in O. Reg. 232/98 (MOE, 1998a) and the Landfill Standards (MOE, 1998b). Based on this regulation, the service life of a primary leachate collection system that meets the requirements in 'Schedule 1' can be taken as 100 years starting from year 10 or the mid-point of the landfilling period, whichever is less.

5.3 Leachate Detection and Secondary Containment System

The LDSCS will be pumped out from the manholes with mobile pumping; the frequency of pumping will depend on the quantity of water in the system as determined through monitoring. The perforated pipes will be flushed if and when necessary.

5.4 Landfill Gas and Odour Management System

Routine inspection and preventative maintenance of the LFG collection system will be conducted by the Owner in accordance with Section 22 of CSA B149.6-11 (CSA, 2011) Code for Digester Gas and Landfill Gas Installations. Records of inspection and maintenance will be maintained and stored on-Site. An operation and maintenance manual will be prepared for the LFG collection system and will include the inspection and maintenance activities described below. Maintenance activities will be coordinated where possible to minimize down-time of the extraction plant and flare.

LFG Horizontal Monitoring Ports

The LFG horizontal collector monitoring ports will be visually inspected during each LFG monitoring session. If the flexible hose, fittings or flow control valve are damaged, they will be repaired or replaced as necessary. Ongoing maintenance of the horizontal collector monitoring ports should be expected, including periodic replacement of fittings and flexible hose.

LFG Header Piping

In accordance with Section 22.2 of CSA B149.6-11 (CSA, 2011), the LFG header pipe will be inspected externally for corrosion on a periodic basis. In addition, the insulation and protective cladding on above-ground portions of the header pipe will be inspected. Any damage or corrosion to the LFG header pipe should be promptly documented, reported, and repairs arranged as required. If damage or significant corrosion is observed, the LFG collection system should be immediately shut down until repairs are completed.

LFG Condensate Trap

Condensate trap(s) will be inspected for the accumulation of sludge/debris and the pneumatic pump removed, checked and cleaned on an annual basis prior to winter.

LFG Extraction Plant

Typical routine inspection and maintenance activities associated with the LFG extraction plant include the following:

- Test the operation of all safety shut-off valves and other shut-downs in the extraction plant;
- Inspect the blower and motor for any unusual noises, vibration, excessive heat, build-up of dirt or debris, and signs of damage or deterioration, as per Section 22.5 of CSA B149.6-11 (CSA, 2011). Visually check that the blower is level and properly aligned;
- Lubricate the blower motor bearings;
- Test all functions of the alarm autodialler;
- Clean the flow meter probe;
- Inspect and clean the air compressor coalescing filter, air dryer and dust particulate filter. Inspect the air compressor oil level and verify that condensate is draining adequately;
- Check the condensate knockout liquid level and drain if necessary;
- Verify the extraction plant ventilation system air flow as per Section 22.9 of CSA B149.6-11 (CSA, 2011);
- Inspect, calibrate and maintain the LFG sampling system and analyzer;
- Inspect, calibrate and maintain the extraction plant ambient gas analyzer as per Section 22.9 of CSA B149.6-11 (CSA, 2011). Replace the gas analyzer sensor when calibration can no longer be achieved; and,
- Inspect manual valves to test for proper operation as per Section 22.6 of CSA B149.6-11 (CSA, 2011), and maintain as necessary. Lubricate valves in accordance with manufacturer's recommendations.

Enclosed Flare

Typical routine inspection and maintenance activities associated with the enclosed flare include the following:

- Inspect all components of flare pilot fuel and ignition assembly for signs of damage. Clean the pilot fuel line flame check when necessary to keep free from deposits and accumulation of foreign matter;
- Inspect burner tips of the flare for deterioration;
- Inspect integrity of flare refractory ceramic fibre blanket;
- Clean the flare flame scanner lens and ensure no cobwebs or obstruction obscuring the scanner view path;
- Clean the spark plug in flare pilot igniter and check for proper gap;
- Lubricate the flare purge fan motor and bearings if necessary;
- Lubricate the flare dampers;
- Inspect the enclosed flare for general signs of damage;

- Monitor for leaks immediately adjacent to all above-ground header piping and fittings, propane pilot fuel train assembly, propane tanks, flare and associated equipment, as per Section 22.4 of CSA B149.6-11 (CSA, 2011);
- Inspect the flame arrestor element for dirt, corrosion and bent, warped or otherwise damaged sheets. Clean if necessary; and,
- If a flash-back or burn-back has occurred within the system or severe heat has been applied external to the thermal valve, inspect the thermal valve internal components.

6.0 MONITORING PROGRAMS

Environmental monitoring related to the landfill component of the CRRRC will be carried out concurrently with and as part of the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to groundwater, leachate, surface water, sediment, lateral LFG migration, dust, noise, odour and biology.

Regular monitoring that will be required related to the operation of the LFG collection and flaring system is discussed below as well as actions that could be carried out based on this operational LFG monitoring.

6.1 Operational Landfill Gas Monitoring

Ongoing, regular monitoring of and adjustments to the LFG collection and flaring system are required for the following reasons:

- To ensure LFG safety;
- To achieve proper operations and maintenance of the LFG system, and to optimize LFG recovery for flaring or utilization purposes;
- To comply with the Province of Ontario's LFG regulations;
- To achieve and maintain effective surface and subsurface gas migration control, protect structures near the landfill, and reduce LFG-related odours; and,
- To avoid overpulling in the horizontal collectors by application of excess vacuum, maintain a healthy anaerobic state within the landfill, and reduce the possibility of subsurface fires caused by drawing oxygen in from the atmosphere.

The following LFG monitoring activities should be conducted, with detailed records of monitoring activities maintained and stored on-Site.

LFG Horizontal Collector Monitoring

LFG horizontal monitoring port monitoring and adjustment (balancing the wellfield) are required to achieve a stable rate and quality of extracted LFG. The frequency of monitoring depends on the number and magnitude of recent changes to the landfill (in the area of the LFG collection system) and to the LFG extraction plant settings. If a large number and large magnitude (e.g., if several additional LFG horizontal collectors are added to the collection system) of changes have been introduced to the LFG collection system, then initial twice weekly to weekly monitoring of the LFG collection system is recommended. If only minor adjustments to a limited number of locations have been made, and LFG quality has been steady for the previous two months, the horizontal collector monitoring can occur monthly. However, as a minimum, it is recommended that not more than 31 calendar days elapse between rounds of horizontal collector monitoring.

Typically, the LFG pressure, quality and flow rate should be recorded at each horizontal monitoring port using calibrated monitoring equipment.

Landfill Cover Monitoring

Observation of the landfill cover should occur during each horizontal collector monitoring session. The location of any excessive settlement, cracking, seeps or evidence of a potential landfill fire should be noted during the observation of the cover, and subsequently reported and repaired by the appropriate parties. Horizontal collectors in the vicinity of large cracks or fissures should be isolated from the remainder of the LFG collection system to limit the opportunity for air intrusion until remedial action is taken to repair the landfill cover.

Extraction Plant Monitoring

During each horizontal collector monitoring session, the following LFG extraction plant monitoring is recommended:

- Record the LFG flow rate, vacuum, and methane and oxygen concentrations in the LFG reported on the human-machine interface (HMI) screen;
- Download the extraction plant (blower and other instrumentation) and flare data from the datalogger; and,
- Use a portable LFG analyzer to manually record methane, carbon dioxide and oxygen concentrations in LFG stream.

The LFG flow rate at the extraction plant and the flow control valves at the horizontal collector monitoring ports should be adjusted based on the results of the monitoring.

6.1.1 Landfill Gas and Flaring System Operational Contingencies

The following contingency options are provided for the LFG collection and flaring system:

LFG Odours or Insufficient Quantity of Collected LFG

If required, vertical LFG extraction wells could be installed following the completion of individual landfill phases to control odours or to augment the quantity of collected LFG recovered. Vertical LFG extraction wells could be located in individual phases already completed to final contours, specifically in areas of thicker waste and where horizontal collectors may have become blocked due to settlement. Vertical LFG extraction wells should be equipped with a wellhead to allow for the monitoring of LFG quality and pressure, measurement of LFG flow rates, and a valve to facilitate the regulation and balancing of LFG flow. Each vertical LFG extraction well would be connected to the LFG header pipe via lateral piping.

Unexpected LFG System Component Failure

In the event of the failure of a component that is connected to the PLC (e.g., LFG analyzer), the LFG system will automatically shut down and send an alarm via the autodialler.

A supply of typical spare parts will be maintained on-Site to allow for the timely replacement of failed components and to minimize down-time of the LFG collection system.

Landfill Fire

Site LFG personnel would be familiar with preventative measures and immediate action required in the event of a subsurface landfill fire due to the operation of the active LFG management system. Typical immediate steps that could be taken could include the following:

- Shut down the LFG blower and shut off each LFG horizontal collector;
- Contact a LFG professional;
- If safe, cover the area with 300 mm thickness of fine-grained soil to smother the fire;
- Record the methane, carbon dioxide, oxygen, balance gas, pressure and temperature of LFG in the horizontal collectors within the affected area; and,
- Maintain a record and photographs of all fires.

7.0 LANDFILL CLOSURE

Prior to approved waste capacity being exhausted, formal Site closure procedures will be developed. A closure report will be prepared and submitted to the MOECC for approval at least one year before the landfill component of the CRRRC is expected to close and stop receiving waste. The Closure Plan will outline the post-closure monitoring and maintenance program.

7.1 Final Cover

Based on the analysis of landfill performance in terms of compliance with the groundwater protection requirements of O.Reg. 232/98 (MOE, 1998a), it is currently proposed that a permeable soil final cover be used on the landfill consisting of a 0.6-metre thick general soil cover layer overlain by a 0.15-metre thick layer of topsoil or other material able to sustain plant growth, in accordance with O. Reg. 232/98. This will be confirmed in consultation with the MOECC during development and approval of the Closure Plan. The general earth material for the final cover can be permeable since there is a leachate collection system in place (MOE, 1998a). It is currently anticipated that the general earth material will consist of a soil layer that meets the following geotechnical requirements:

- A soil moisture content that enables the material to be handled, spread and compacted;
- Adequate internal strength to be stable on the proposed grades and sideslope angles;
- Adequate thickness to resist cracking due to the effects of differential settlement of the underlying waste;
- Material gradation ranging from gravel, through sand, to silty clay;
- Achieve at least 90% of the standard Proctor maximum dry density; and,
- Together with the topsoil and vegetative cover, be sufficiently erosion resistant.

For the landfill final cover, consideration may however be given to including measures to achieve increased runoff off the cover and thereby reduce infiltration and the corresponding volume of leachate requiring treatment. The approach would be to more quickly remove the water from the covered landfill area by reducing the surface runoff distance using such measures as a network of shallow surface ditching and/or piping on/within the soil cover to intercept surface runoff and convey it to the toe of the landfill and the stormwater management system. This will be confirmed in consultation with the MOECC during development of the final Closure Plan.

Final cover construction will take place after filling in a part of the landfill is complete. Completed portions of the final cover will be hydroseeded or otherwise vegetated in order to quickly establish a vegetative cover for aesthetics and erosion control purposes.

8.0 CLOSURE

We trust this report meets your current needs. If you have any questions regarding this report, please contact the undersigned.

GOLDER ASSOCIATES LTD.

P. Andrew S. Benson, M.Eng., P.Eng.
Senior Environmental Engineer, Associate

PASB/PAS/sg

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Ministry of the Environment (MOE). (2011). *Ontario Water Resources Act (OWRA).* Last Updated: 2011.

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PLOT DATE: November 10, 2014
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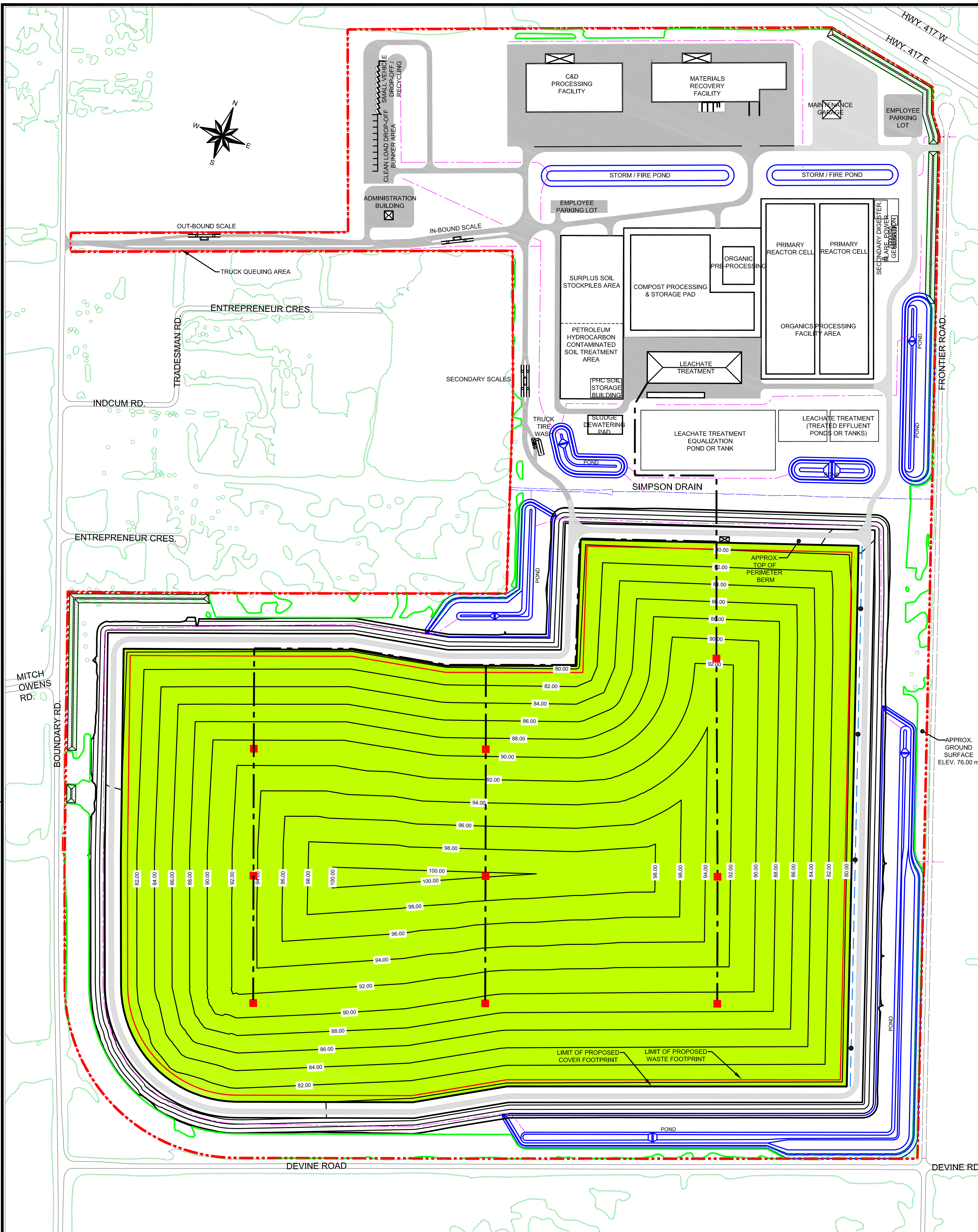


LEGEND

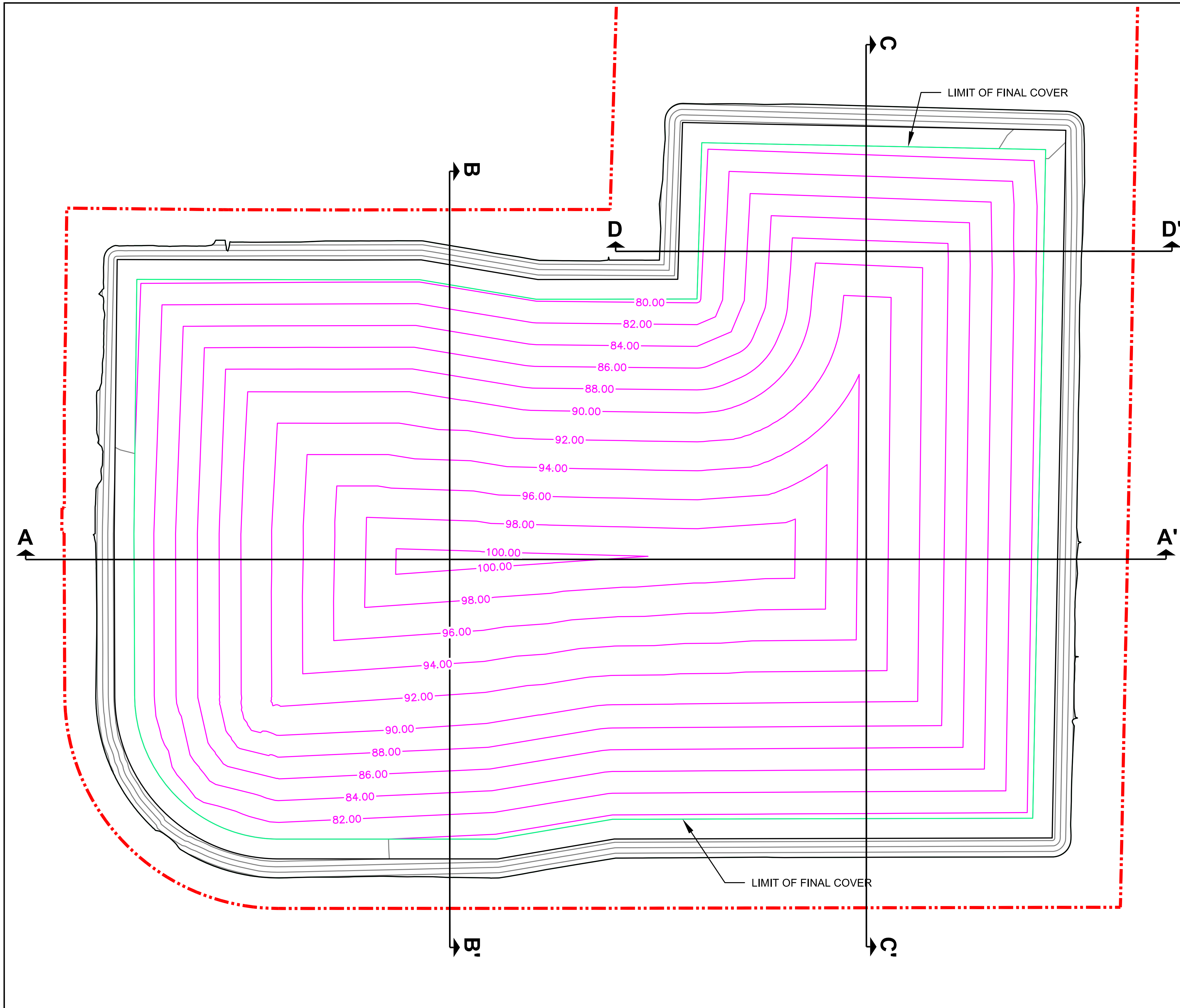
- LANDFILL COMPONENT
- PAVED ROAD (ASPHALT)
- GRAVEL ROAD
- PROPERTY BOUNDARY
- EXISTING VEGETATION
- CONSTRUCTED SCREENING FEATURE
- PERIMETER BERM CONTOURS (interval 1 m)
- STORMWATER MANAGEMENT PONDS
- LANDFILL FINAL CONTOURS (interval 2 m)
- LEACHATE MANHOLE
- LEACHATE FORCEMAIN
- LEACHATE PUMP CONTROL STATION
- LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM MANHOLE
- LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM

120 0 120 240

SCALE 1:6,000 METRES

Golder Associates
Ottawa, Ontario, Canada

SCALE	AS SHOWN	TITLE	SITE DEVELOPMENT PLAN
DATE	7 Nov. 2013		
DESIGN	M.L.F.		
CAD	M.L.F.		
FILE No. 1211250045-1500-4000-01.dwg	CHECK P.L.E.	CAPITAL REGION RESOURCE RECOVERY CENTRE	FIGURE 1
PROJECT No. 12-1125-0045 REV.	REVIEW P.A.S.		



LEGEND:

PROPERTY BOUNDARY

PERIMETER BERM CONTOURS (interval 1.0 m)

LANDFILL FINAL CONTOURS (interval 2.0 m)

A A' SECTION LINE (REFER TO FIGURES 4a & 4b)

REFERENCES:

1. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

PLAN VIEW OF LANDFILL

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-1500-4000-2-6.dwg	
DESIGN	M.K.F.	15 Oct. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	P.L.E.	Aug. 2014	**Figure 2**	
REVIEW	P.A.S.	Aug. 2014		

PLOT DATE: September 4, 2014
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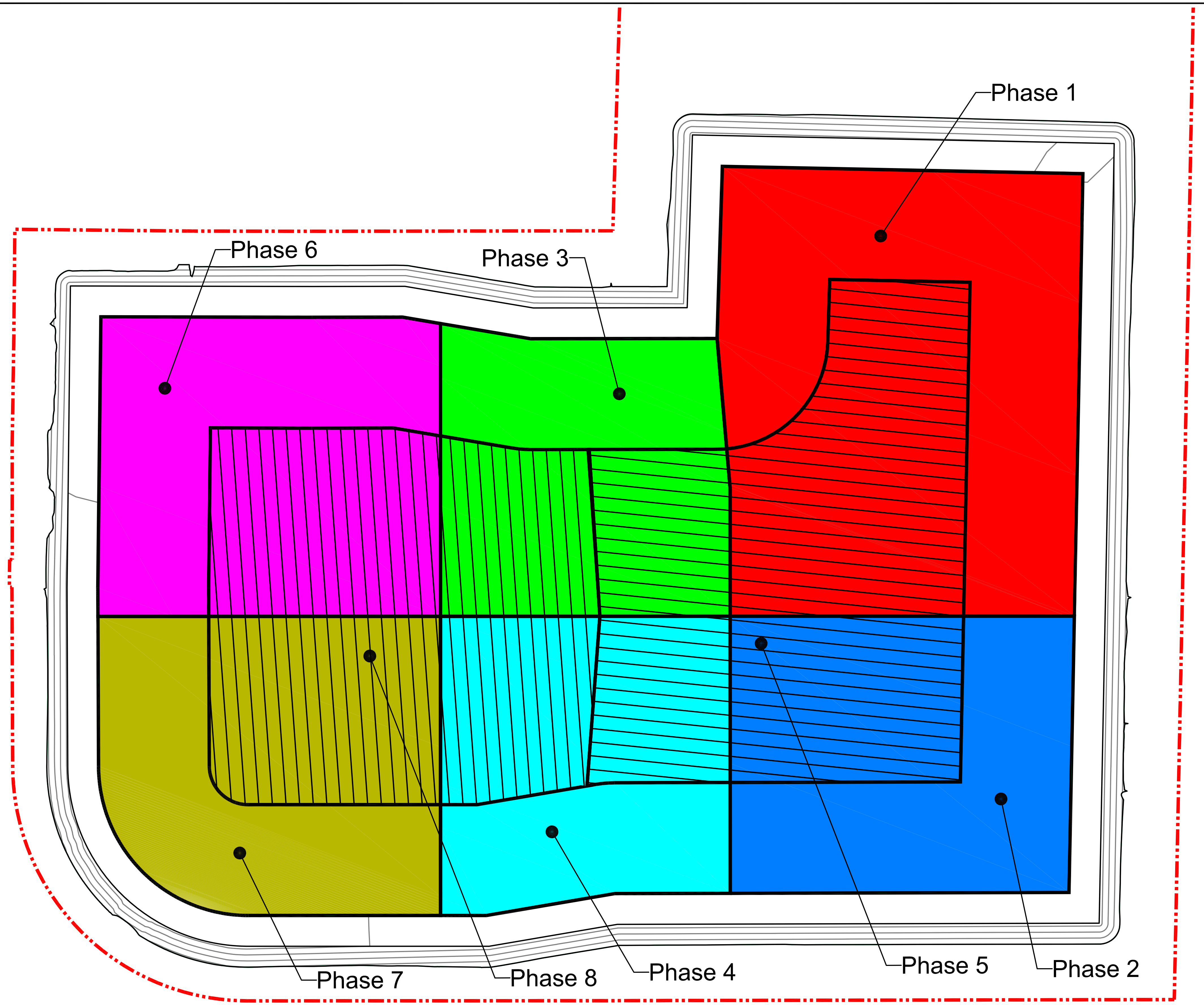

LEGEND:

- PROPERTY BOUMDARY
- PERIMETER BERM CONTOURS (interval 1.0 m)

REFERENCES:

1. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
   COORDINATE SYSTEM: UTM ZONE 18

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LANDFILL PHASING PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-1500-4000-2-6.dwg	
DESIGN	M.K.F.	15 Oct. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	P.L.E.	Aug. 2014	**Figure 3**	
REVIEW	P.A.S.	Aug. 2014		

PLOT DATE: September 4, 2014
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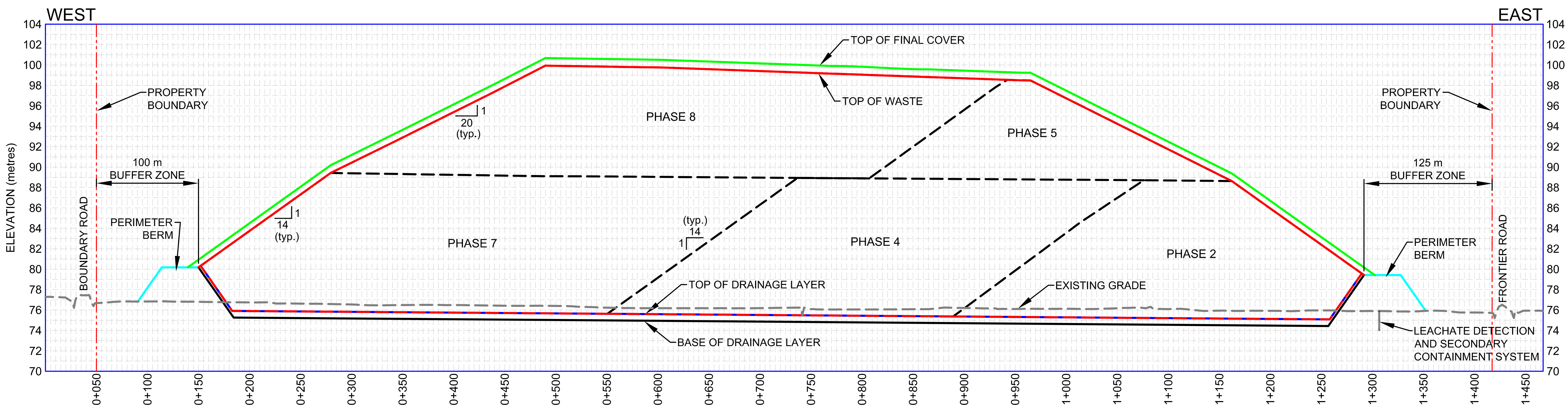
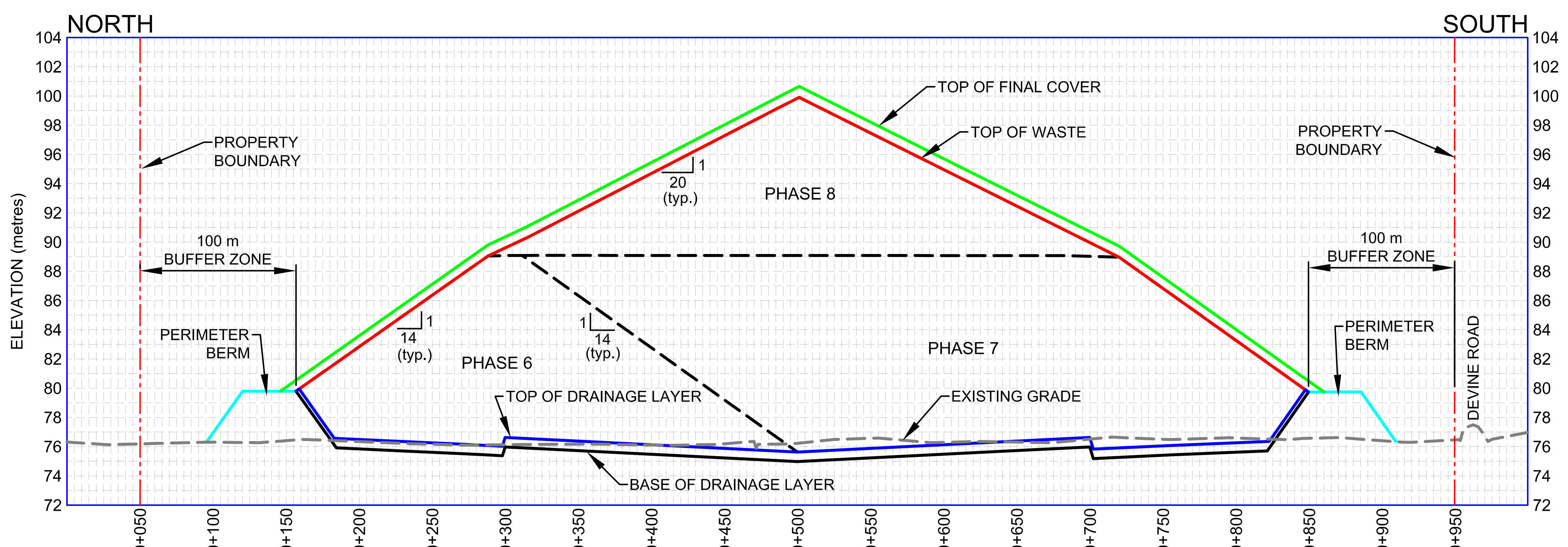


SECTION A-A'



SECTION B-B'

NOTES:

1. LEACHATE COLLECTION PIPING AND SUMPS ARE NOT SHOWN.

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
SECTIONS A-A' and B-B'

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REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-1500-4000-2-6.dwg
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DRAWING No.
Figure 4a

PLOT DATE: November 4, 2014
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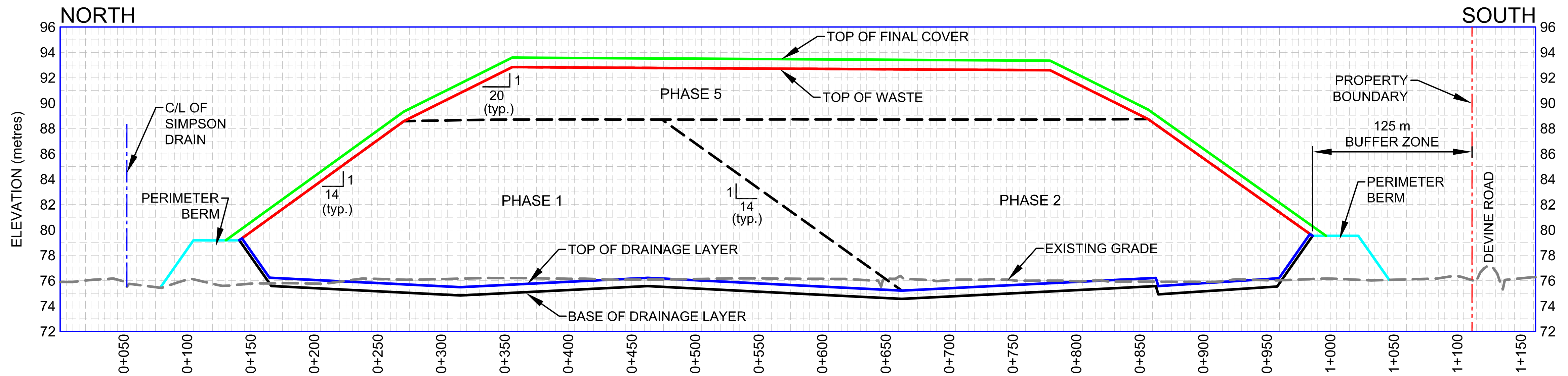
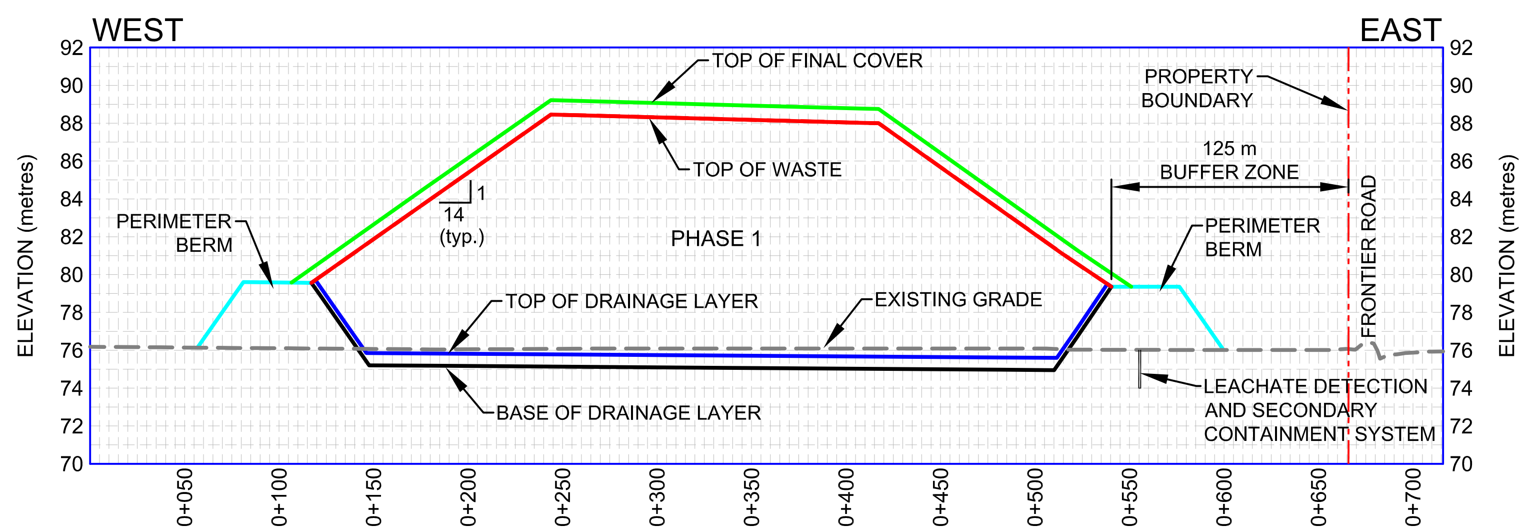


SECTION C-C'



SECTION D-D'

NOTES:

1. LEACHATE COLLECTION PIPING AND SUMPS ARE NOT SHOWN.

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
SECTIONS C-C' and D-D'

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PROJECT No.	12-1125-0045	
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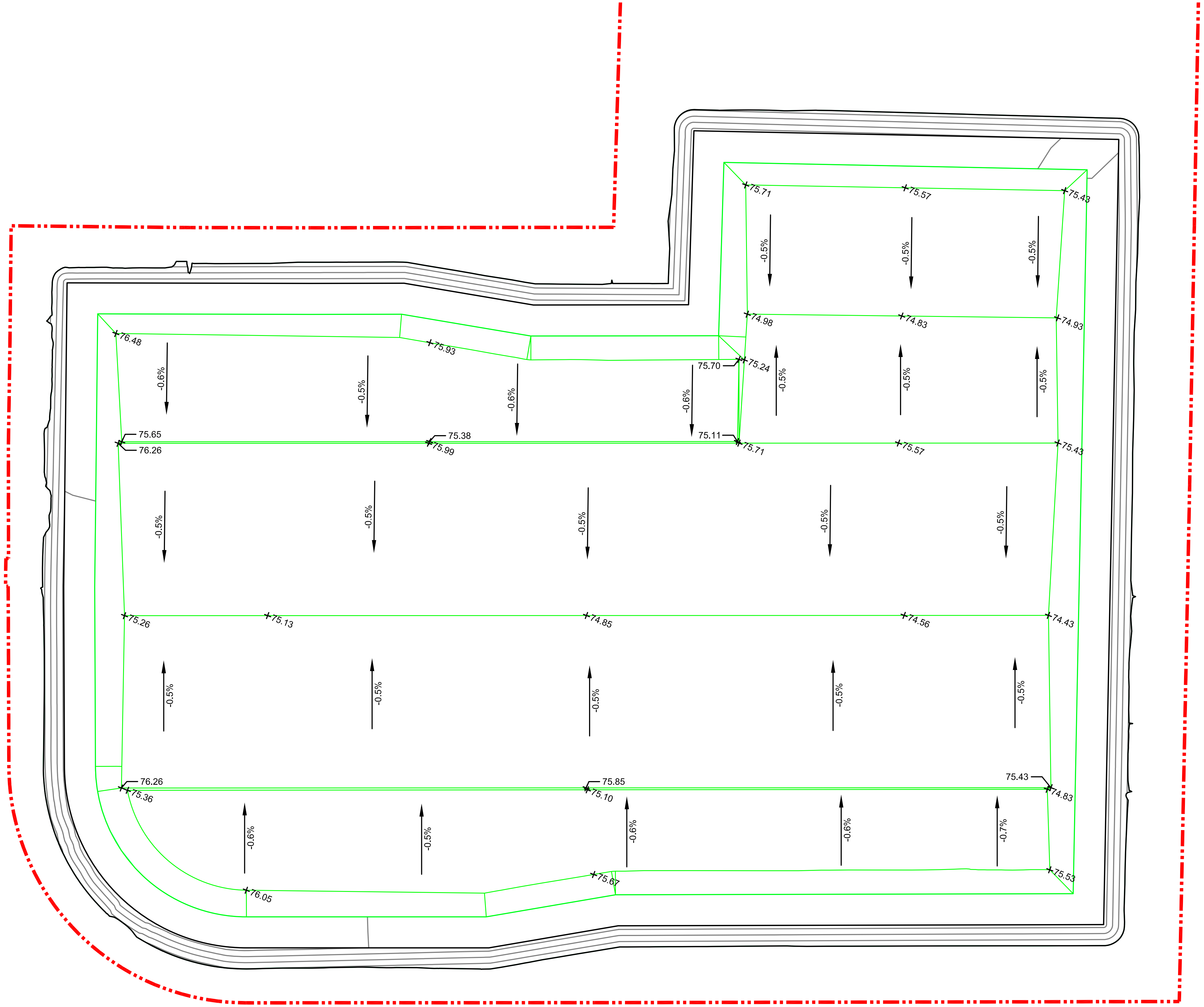
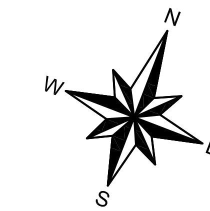
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-1500-4000-2-6.dwg
SCALE AS SHOWN REV. 0
DRAWING No.
Figure 4b

PLOT DATE: November 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Design\1211250045-1500-4000-2-6.dwg





LEGEND:

PROPERTY BOUNDARY

74.85 SUBBASE ELEVATION

-0.5% SUBBASE SLOPES

MAIN SUBGRADE SLOPE BREAK POINTS

REFERENCES:

1. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
   COORDINATE SYSTEM: UTM ZONE 18

NOT FOR CONSTRUCTION

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LANDFILL BASE GRADES

Golder Associates
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DRAWING No.

Figure 5

PLOT DATE: September 4, 2014
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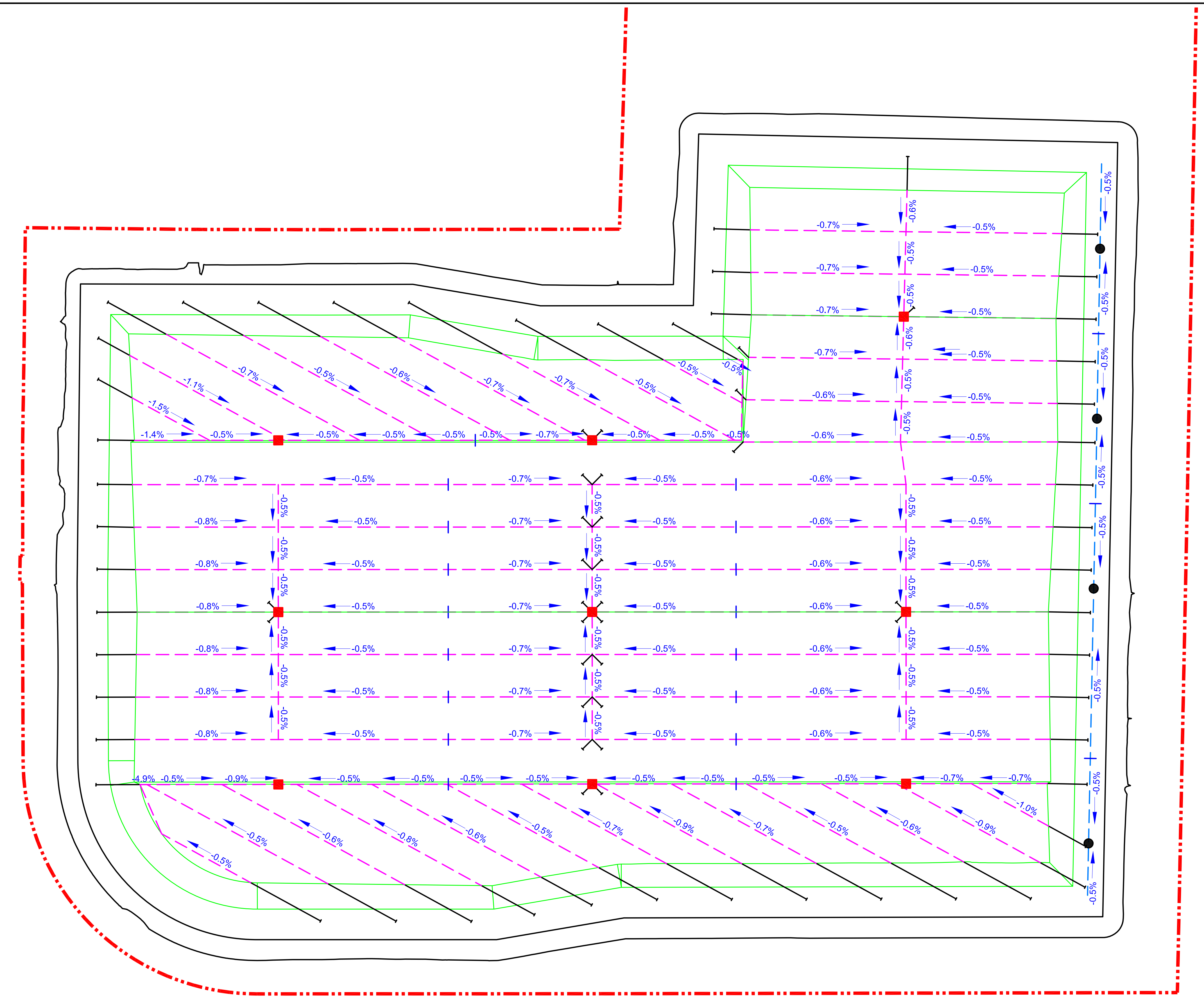

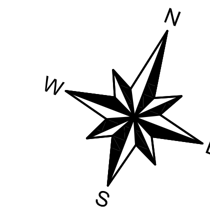

LEGEND:

- PROPERTY BOUNDARY
- -0.5% LEACHATE COLLECTION PIPE SLOPE (initial)
- LEACHATE MANHOLE (nts)
- CLEAN OUT LOCATION (nts)
- PIPE GRADE BREAK POINT
- LEACHATE COLLECTION PIPE
- MAIN SUBGRADE SLOPE BREAK POINTS
- PERIMETER BERM SLOPE BREAK POINTS
- LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM MANHOLE (nts)
- LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM COLLECTION PIPE

REFERENCES:

1. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

NOT FOR CONSTRUCTION

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LEACHATE COLLECTION AND LDSCS PIPING LAYOUT PLAN

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PROJECT No.		12-1125-0045	FILE No. 1211250045-1500-4000-2-6.dwg
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REVIEW	P.A.S.	Aug. 2014	

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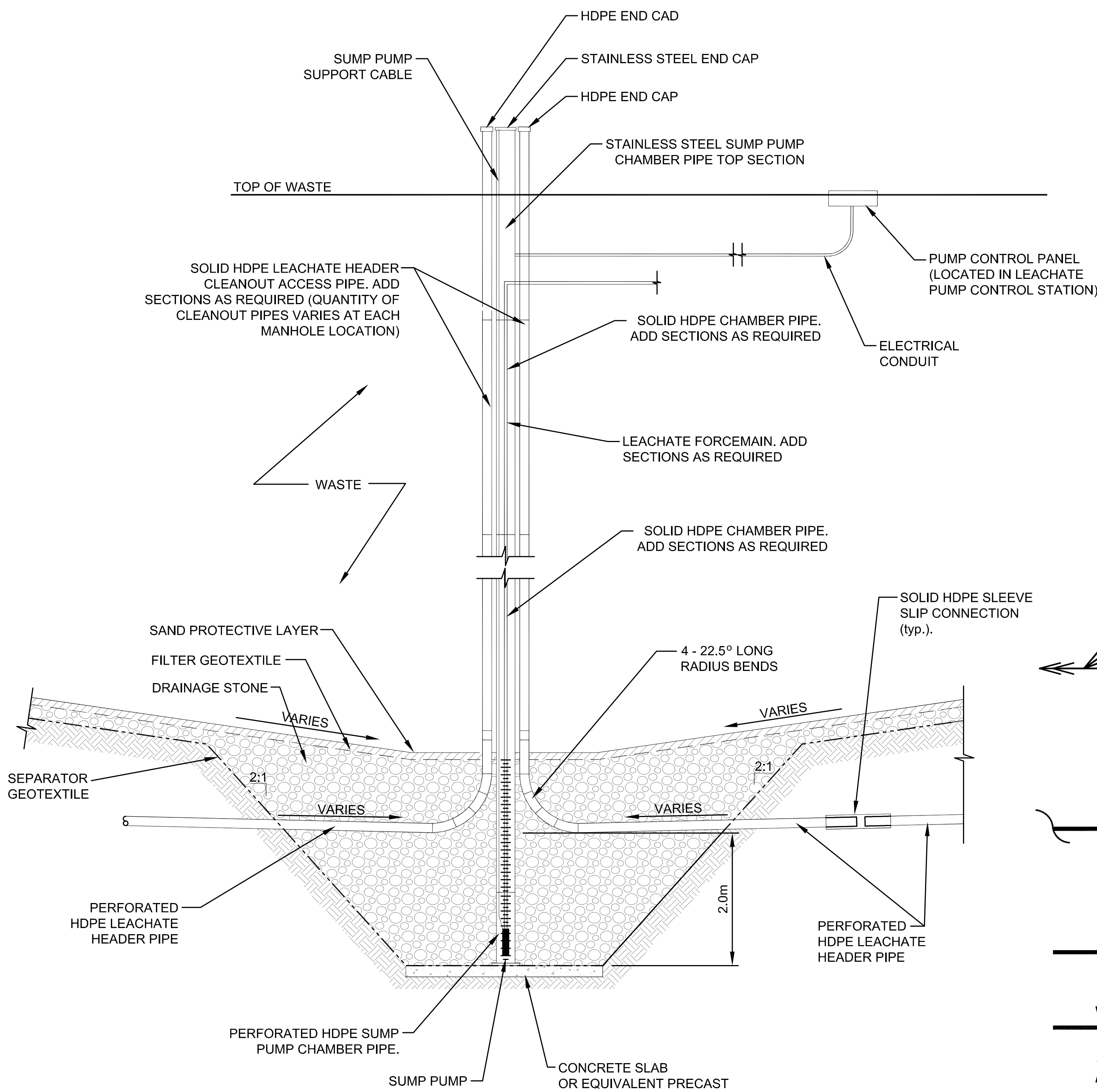
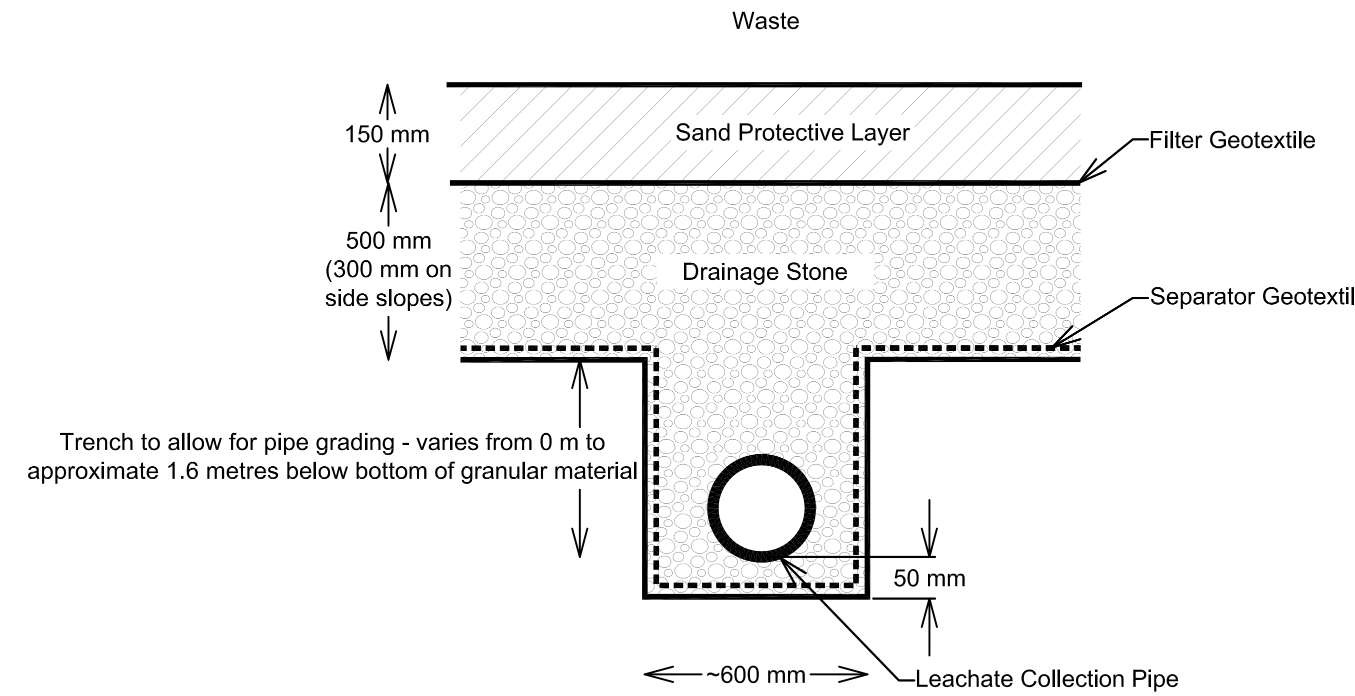


LEACHATE MANHOLE DETAIL

SCALE: N.T.S.



TYPICAL LEACHATE COLLECTION SYSTEM SECTION

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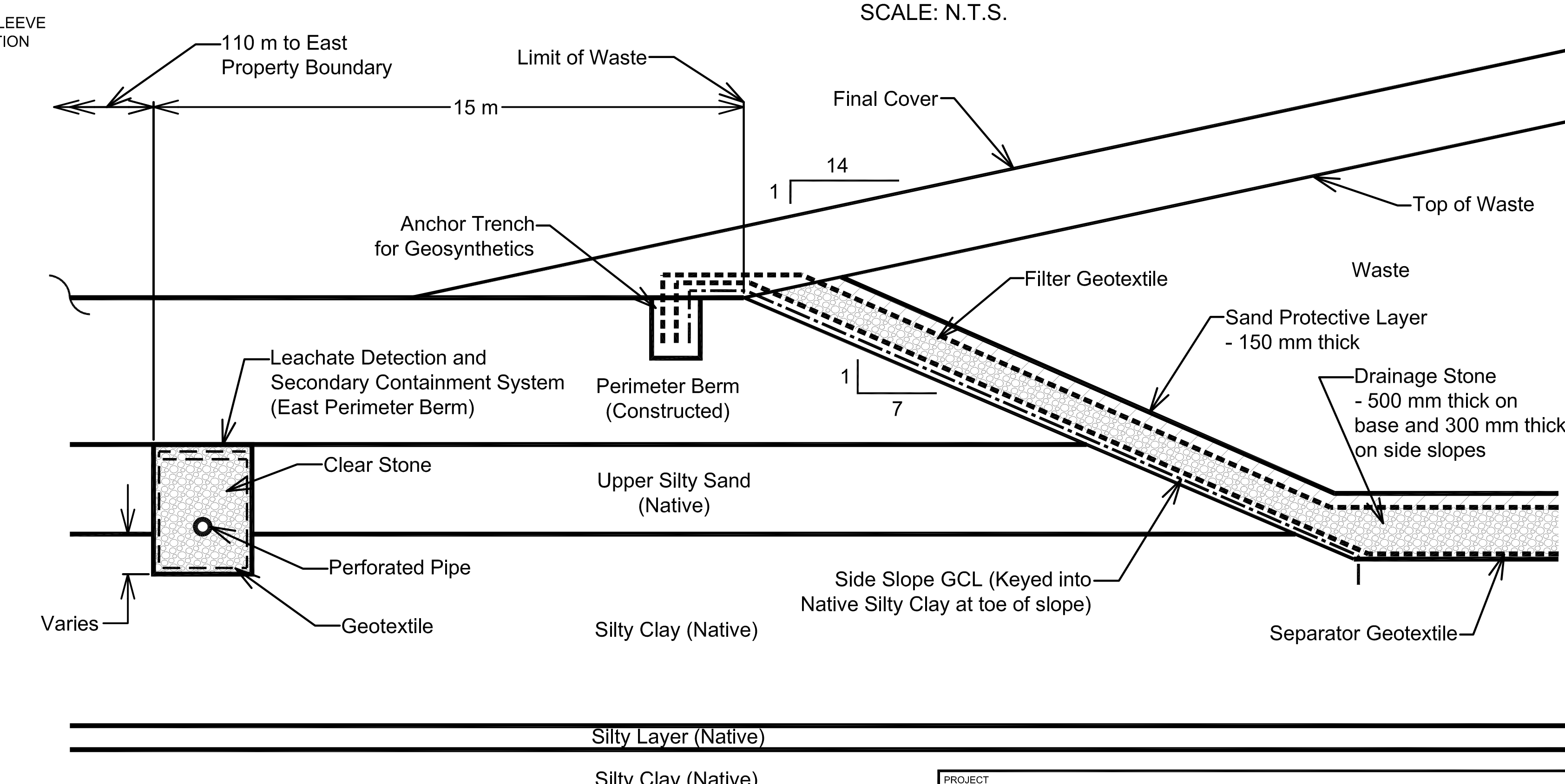

TYPICAL PERIMETER LEACHATE CONTAINMENT CROSS-SECTION

SCALE: N.T.S.

NOT FOR CONSTRUCTION

PROJECT	CAPITAL REGION RESOURCE RECOVERY CENTRE
TITLE	LEACHATE COLLECTION CONCEPTUAL DETAILS

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PROJECT No.		12-1125-0045	FILE No. 1211250045-1500-4000-07.dwg
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REVIEW	P.A.S.	Aug. 2014	

PLOT DATE: November 5, 2014
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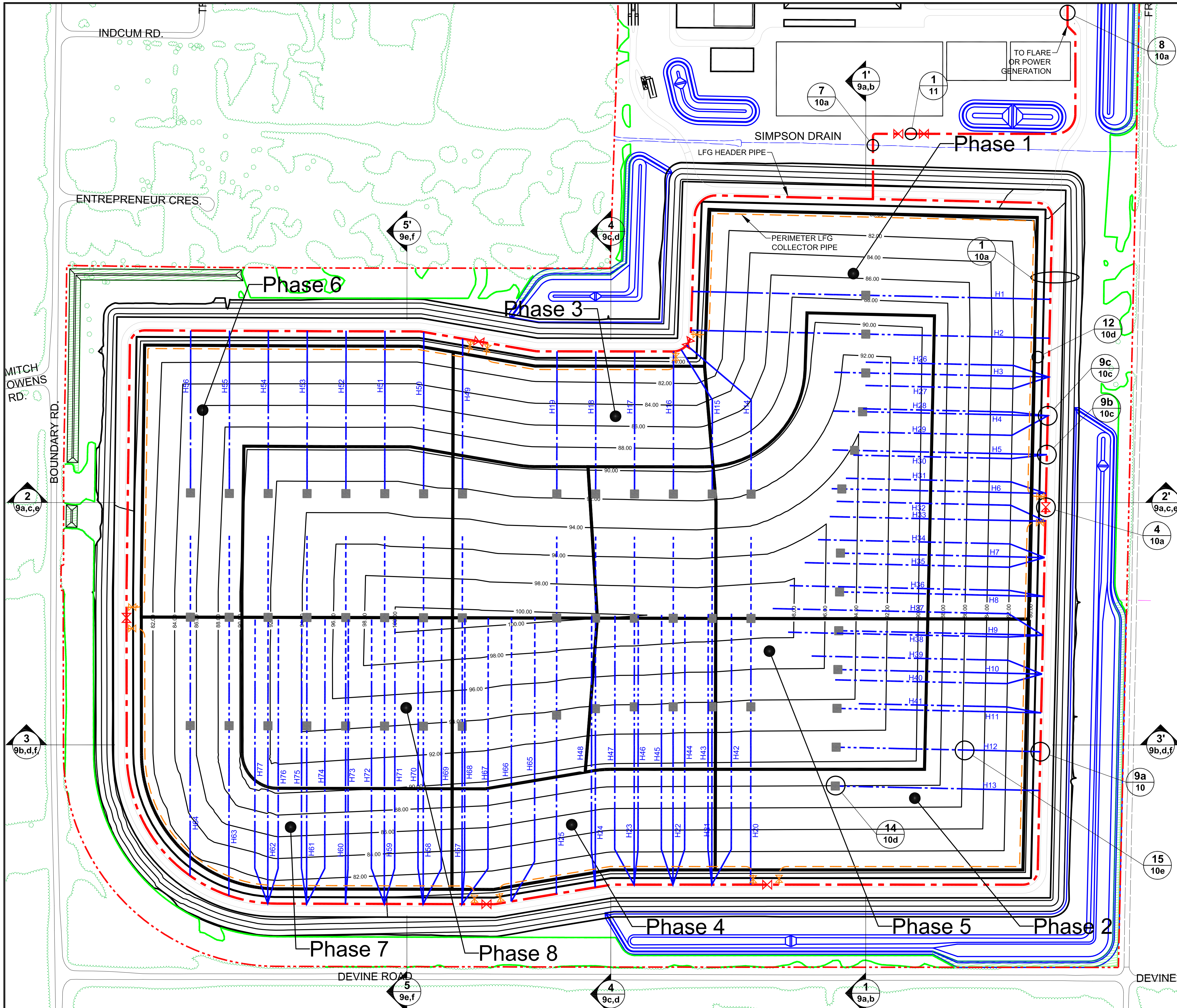


LEGEND:

- HDPE LFG HEADER PIPE
- HDPE LFG PERIMETER COLLECTOR PIPE
- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)
- HORIZONTAL COLLECTOR DRAIN
- VALVE
- CONDENSATE TRAP
- SECTION LINES
- REFERENCE DETAIL OR SECTION / REFERENCE DRAWING SHEET

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.
2. WELLHEAD / VALVE AT DOWNSTREAM END OF HORIZONTAL COLLECTOR IS NOT SHOWN.

NOT FOR CONSTRUCTION

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LANDFILL GAS COLLECTION SYSTEM LAYOUT

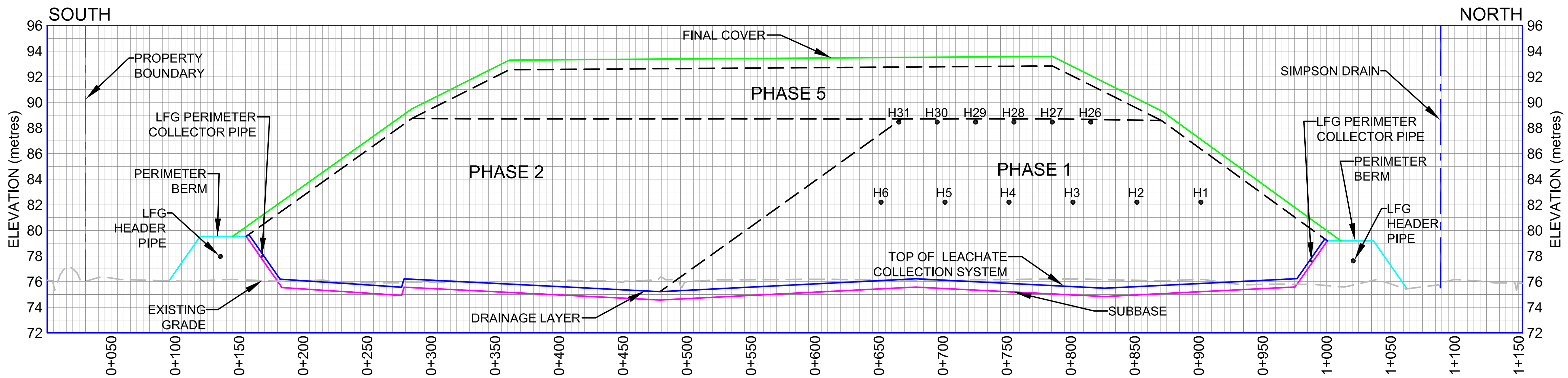
Golder Associates
Ottawa, Ontario, Canada

PROJECT No.	12-1125-0045	
DESIGN	A.M.H.	29 Nov. 2013
CAD	M.L.F.	03 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

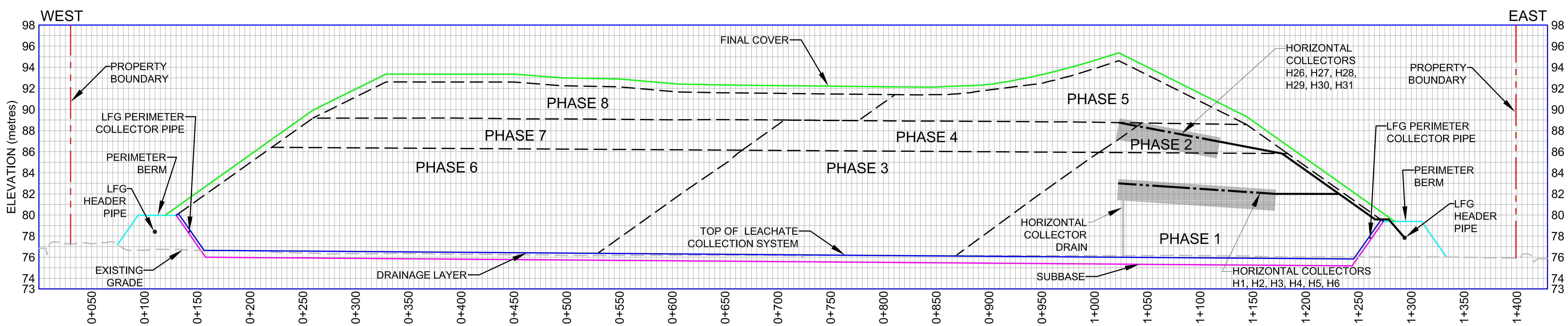
FILE No. 1211250045-4000-LGW-08.dwg
SCALE AS SHOWN REV. 0
DRAWING No.

Figure 8

PLOT DATE: October 9, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-08.dwg



PROFILE 1-1'



PROFILE 2-2'

LEGEND:

- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

TYPICAL HORIZONTAL COLLECTORS FOR PHASE 1

NOTE: CROSS-SECTION OF TYPICAL HORIZONTAL COLLECTORS. ELEVATION AND LENGTHS OF INDIVIDUAL HORIZONTAL COLLECTORS VARY

NOT FOR CONSTRUCTION

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

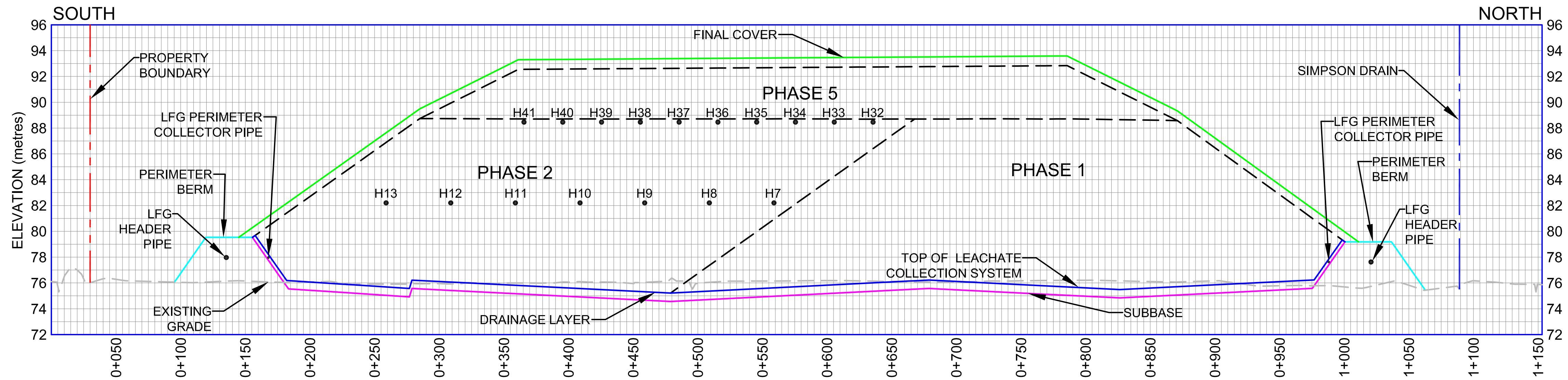
PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
TYPICAL LANDFILL GAS HORIZONTAL COLLECTOR CROSS-SECTION

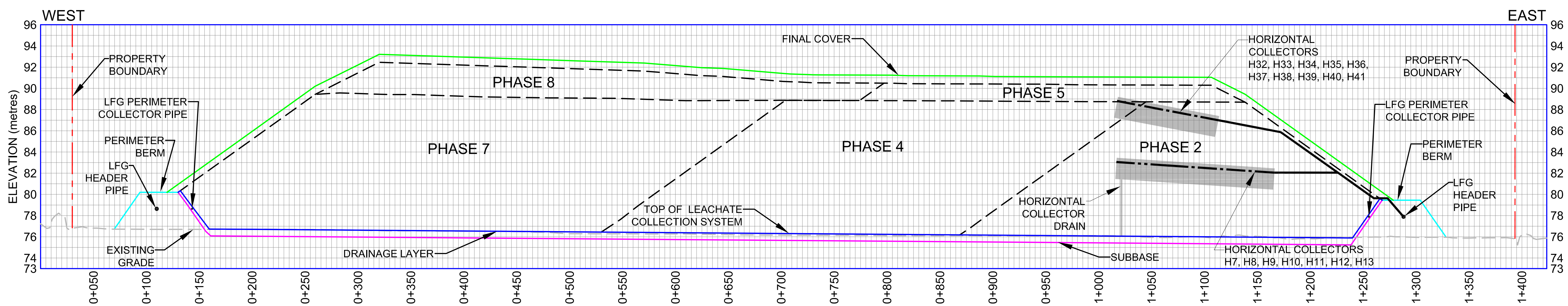
Golder Associates
Ottawa, Ontario, Canada

PROJECT No.	12-1125-0045	FILE No. 1211250045-4000-LGW-09.dwg
DESIGN	A.M.H. 29 Nov. 2013	SCALE AS SHOWN REV. 0
CAD	M.L.F. 02 Dec. 2013	DRAWING No.
CHECK	P.L.E. Aug. 2014	**Figure 9a**
REVIEW	P.A.S. Aug. 2014	

PLOT DATE: July 7, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-09.dwg



PROFILE 1-1'



PROFILE 3-3'

LEGEND:

- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

TYPICAL HORIZONTAL COLLECTORS FOR PHASE 2

NOTE: CROSS-SECTION OF TYPICAL HORIZONTAL COLLECTORS. ELEVATION AND LENGTHS OF INDIVIDUAL HORIZONTAL COLLECTORS VARY

NOT FOR CONSTRUCTION

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

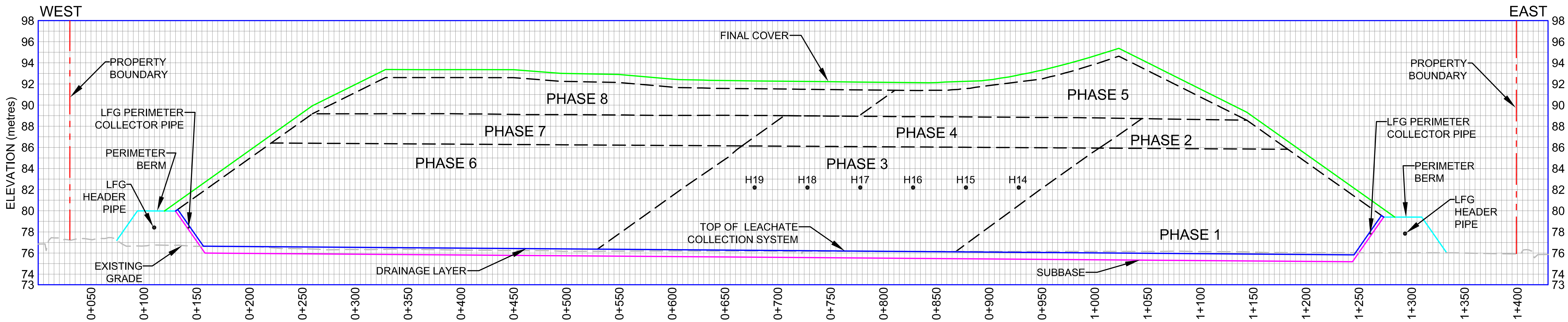
PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
TYPICAL LANDFILL GAS HORIZONTAL COLLECTOR CROSS-SECTION

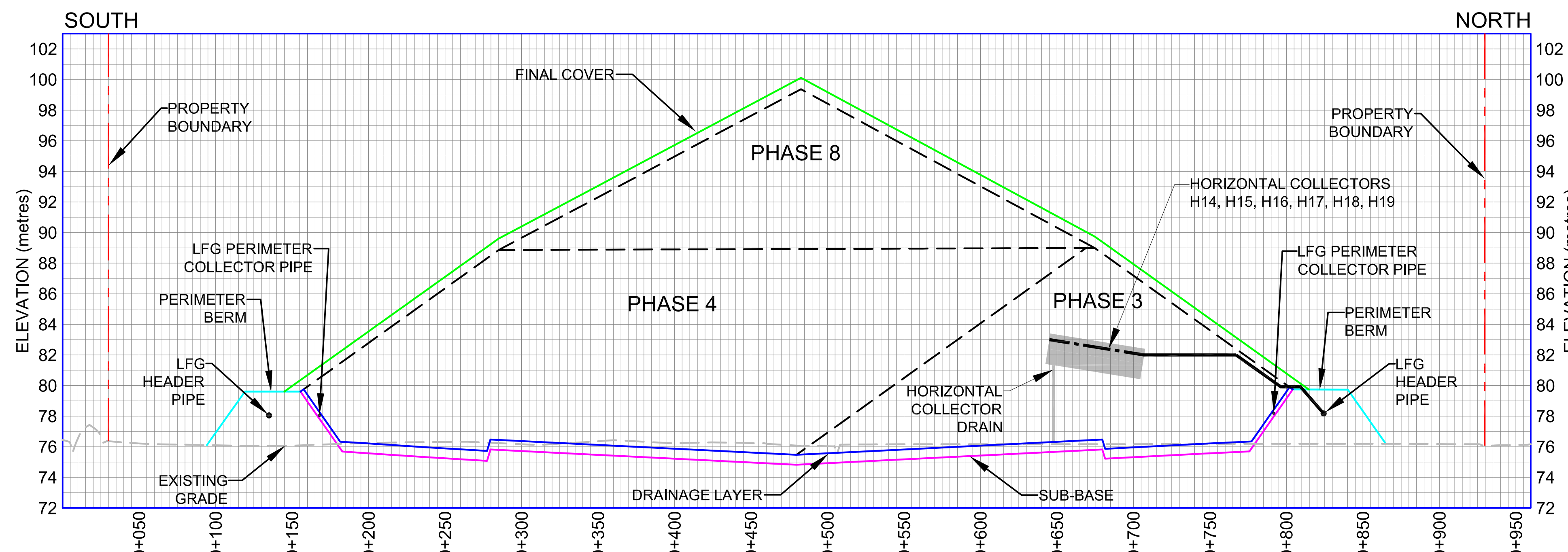
Golder Associates
Ottawa, Ontario, Canada

PROJECT No.	12-1125-0045	FILE No.	1211250045-4000-LGW-09.dwg
DESIGN	A.M.H.	29 Nov. 2013	SCALE AS SHOWN REV. 0
CAD	M.L.F.	02 Dec. 2013	DRAWING No.
CHECK	P.L.E.	Aug. 2014	**Figure 9b**
REVIEW	P.A.S.	Aug. 2014	

PLOT DATE: July 7, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-09.dwg



PROFILE 2-2'



PROFILE 4-4'

LEGEND:

- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

TYPICAL HORIZONTAL COLLECTORS FOR PHASE 3

NOTE: CROSS-SECTION OF TYPICAL HORIZONTAL COLLECTORS. ELEVATION AND LENGTHS OF INDIVIDUAL HORIZONTAL COLLECTORS VARY

NOT FOR CONSTRUCTION

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
TYPICAL LANDFILL GAS HORIZONTAL COLLECTOR CROSS-SECTION

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.	12-1125-0045		FILE No.	1211250045-4000-LGW-09.dwg
DESIGN	A.M.H.	29 Nov. 2013	SCALE	AS SHOWN REV. 0
CAD	M.L.F.	02 Dec. 2013	DRAWING No.	
CHECK	P.L.E.	Aug. 2014		Figure 9c
REVIEW	P.A.S.	Aug. 2014		

PLOT DATE: July 7, 2014
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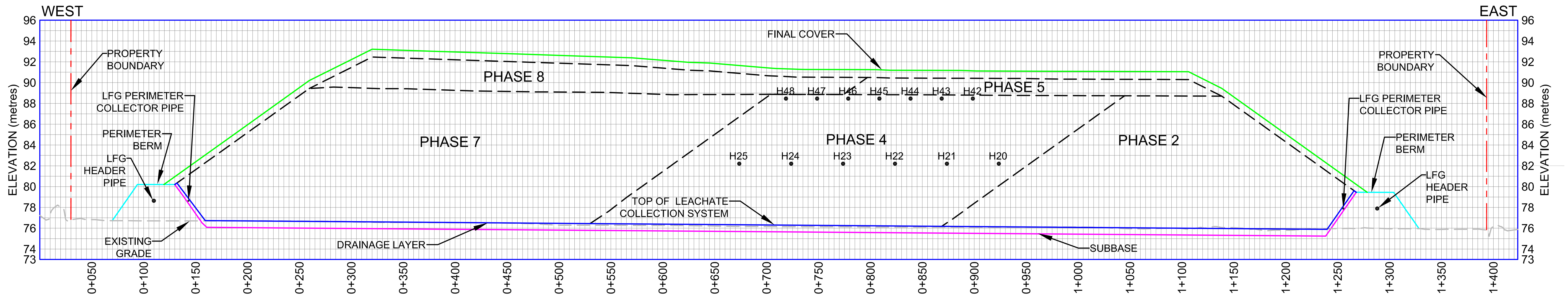
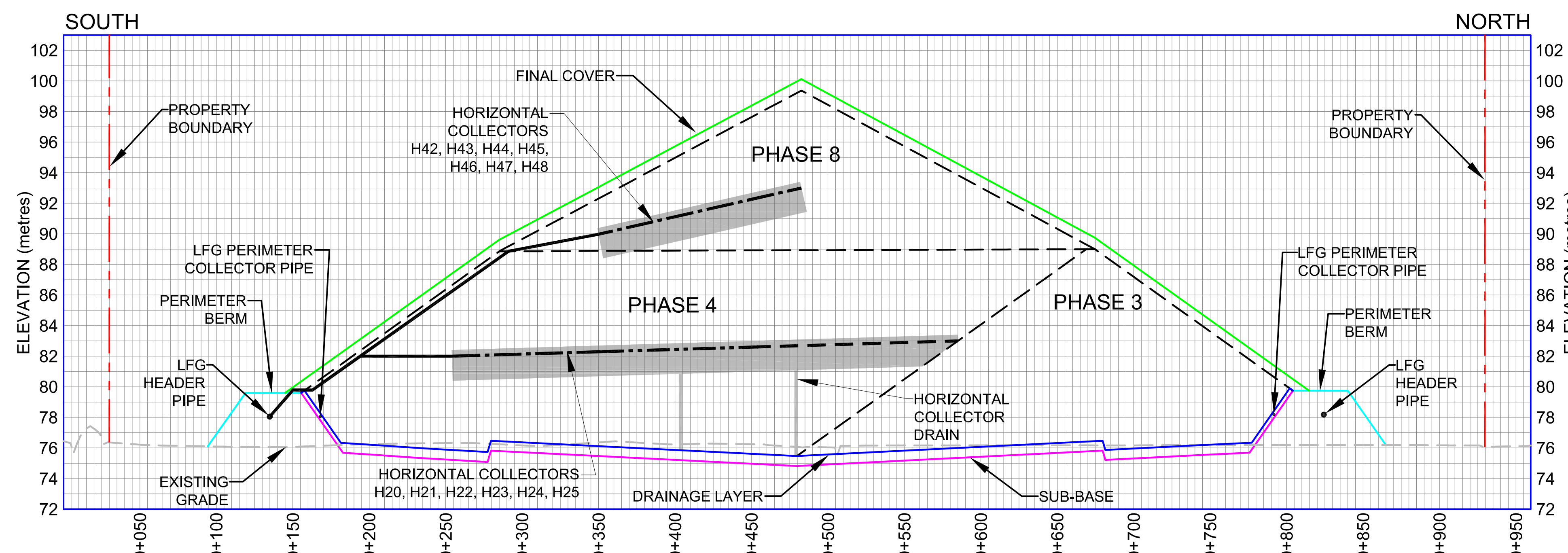


PROFILE 3-3'



PROFILE 4-4'

LEGEND:

- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

TYPICAL HORIZONTAL COLLECTORS FOR PHASE 4

NOTE: CROSS-SECTION OF TYPICAL HORIZONTAL COLLECTORS. ELEVATION AND LENGTHS OF INDIVIDUAL HORIZONTAL COLLECTORS VARY

NOT FOR CONSTRUCTION

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

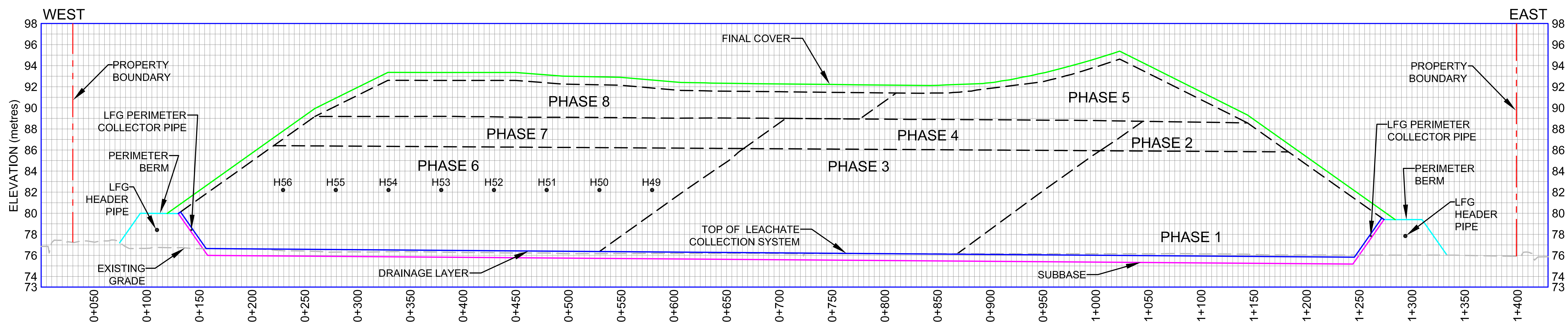
TITLE
TYPICAL LANDFILL GAS HORIZONTAL COLLECTOR CROSS-SECTION

Golder Associates
Ottawa, Ontario, Canada

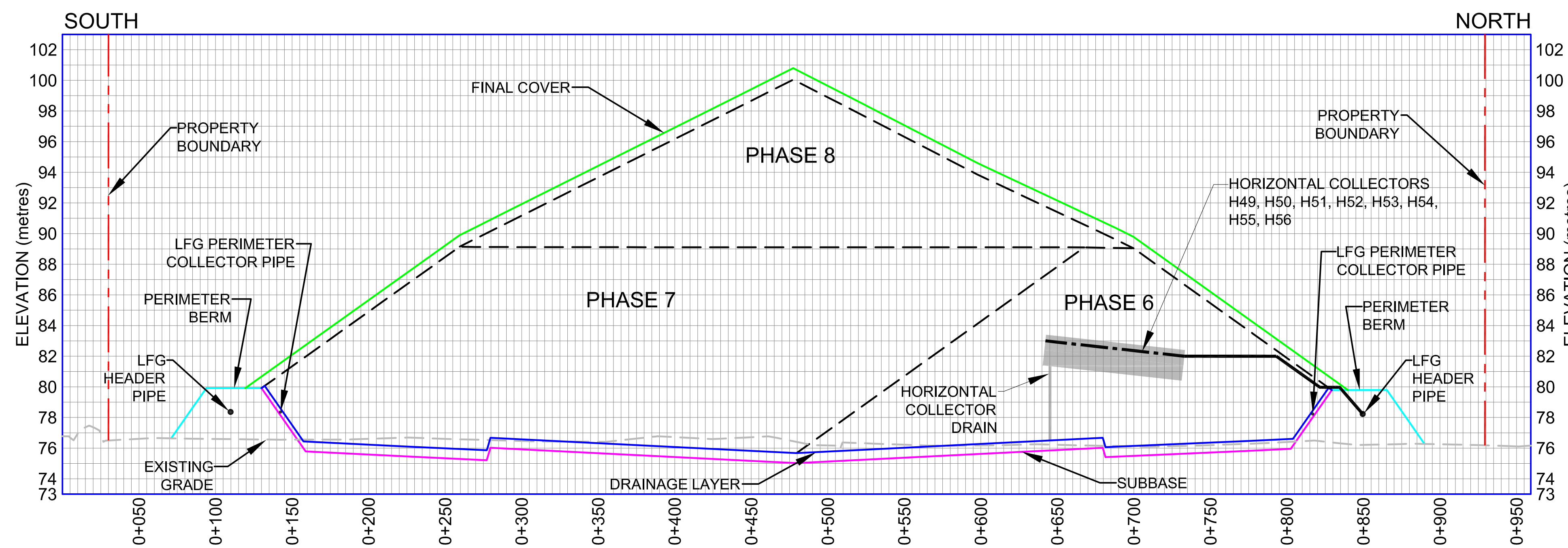
PROJECT No.		12-1125-0045
DESIGN	A.M.H.	29 Nov. 2013
CAD	M.L.F.	02 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-4000-LGW-09.dwg
SCALE AS SHOWN REV. 0
DRAWING No.
Figure 9d

PLOT DATE: July 7, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-09.dwg



PROFILE 2-2'



PROFILE 5-5'

LEGEND:

HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE

HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)

HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)

HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

TYPICAL HORIZONTAL COLLECTORS FOR PHASE 6

NOTE: CROSS-SECTION OF TYPICAL HORIZONTAL COLLECTORS. ELEVATION AND LENGTHS OF INDIVIDUAL HORIZONTAL COLLECTORS VARY

NOT FOR CONSTRUCTION

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
TYPICAL LANDFILL GAS HORIZONTAL COLLECTOR CROSS-SECTION

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	A.M.H.	29 Nov. 2013
CAD	M.L.F.	02 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-4000-LGW-09.dwg
SCALE AS SHOWN REV. 0
DRAWING No.
Figure 9e

PLOT DATE: July 7, 2014
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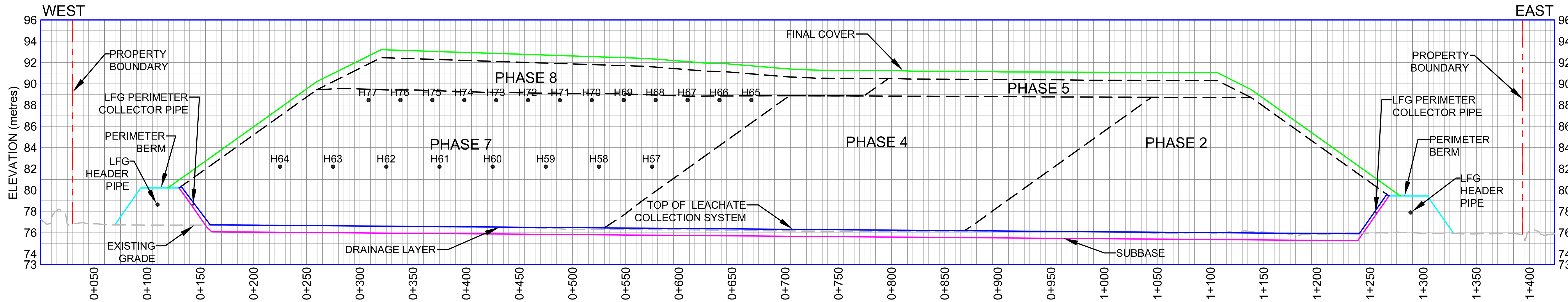
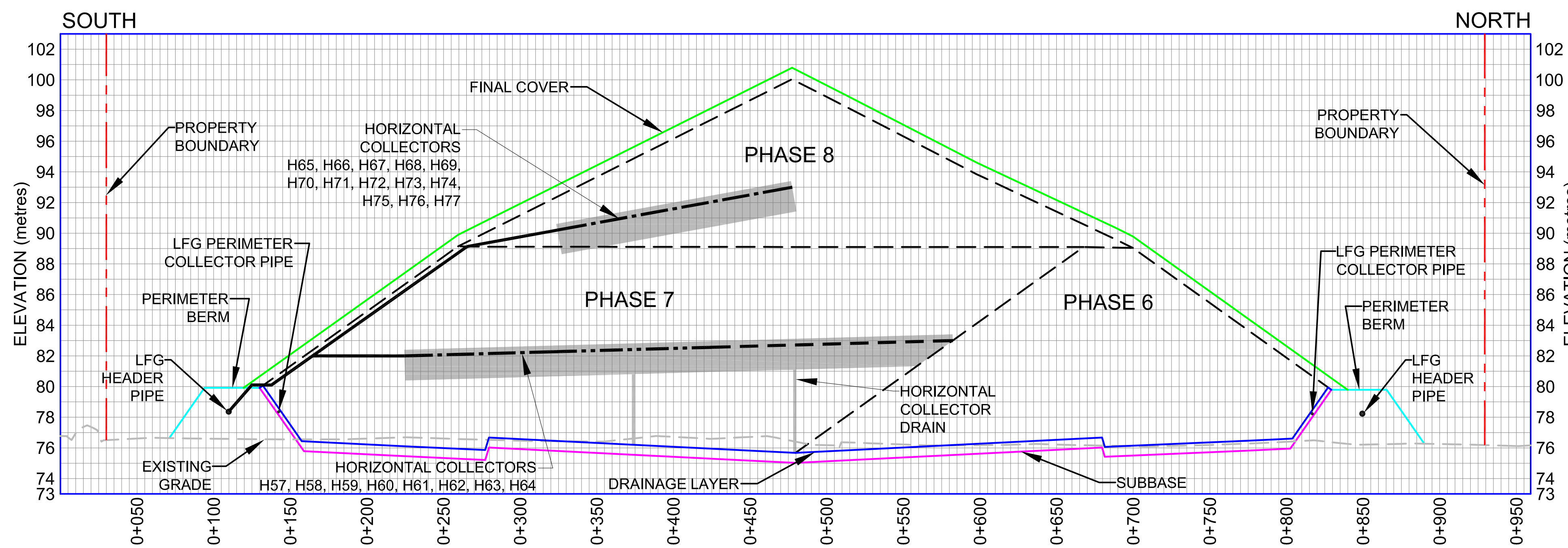


PROFILE 3-3'



PROFILE 5-5'

TYPICAL HORIZONTAL COLLECTORS FOR PHASE 7

NOTE: CROSS-SECTION OF TYPICAL HORIZONTAL COLLECTORS. ELEVATION AND LENGTHS OF INDIVIDUAL HORIZONTAL COLLECTORS VARY

LEGEND:

- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

NOT FOR CONSTRUCTION

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
TYPICAL LANDFILL GAS HORIZONTAL COLLECTOR CROSS-SECTION

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	A.M.H.	29 Nov. 2013
CAD	M.L.F.	02 Dec. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-4000-LGW-09.dwg
SCALE AS SHOWN REV. 0
DRAWING No.
Figure 9f

PLOT DATE: July 7, 2014
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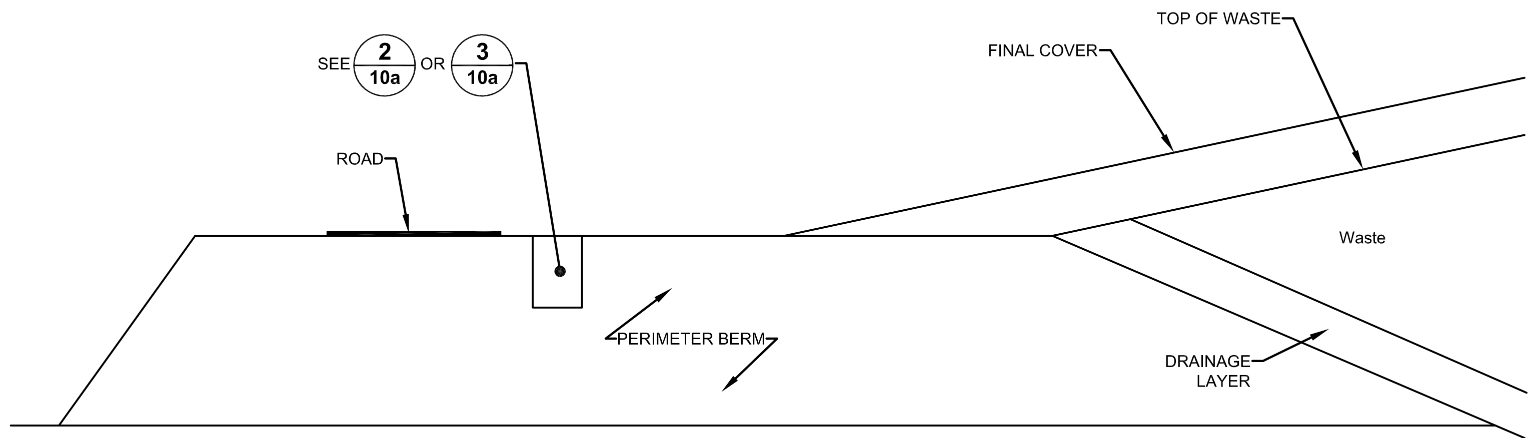
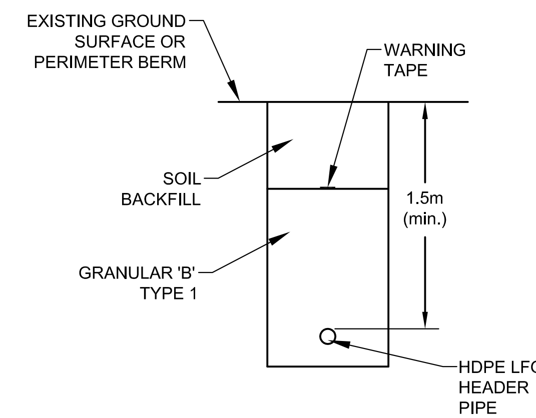


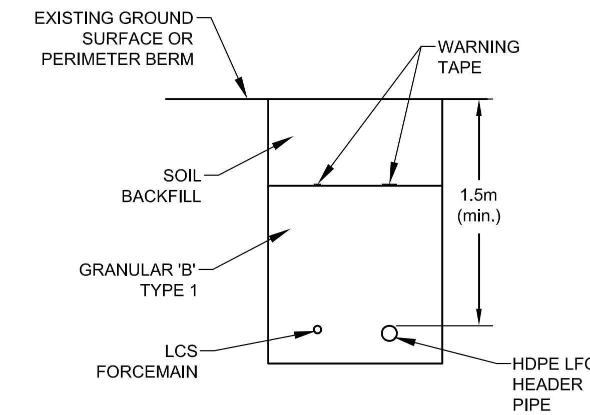
TYPICAL LFG HEADER PIPE AND PERIMETER BERM CROSS-SECTION 1/10a

SCALE N.T.S.



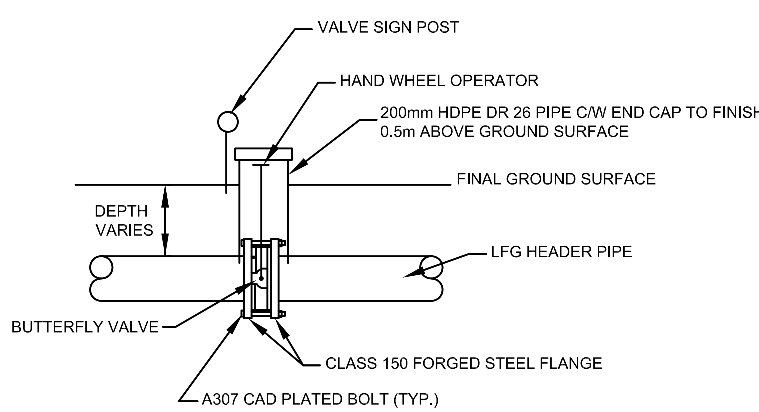
TYPICAL LFG HEADER PIPE TRENCH CROSS-SECTION (WHERE ALONE) 2/10a

SCALE N.T.S.



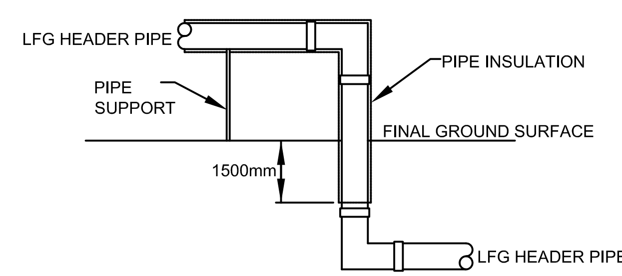
TYPICAL LFG HEADER AND LCS FORCEMAIN TRENCH CROSS-SECTION 3/10a

SCALE N.T.S.



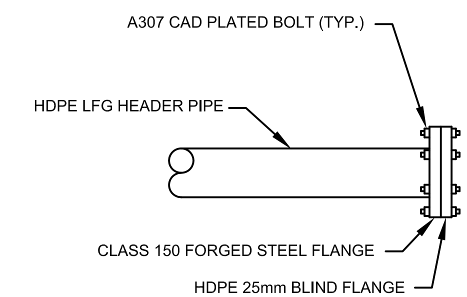
TYPICAL LFG HEADER VALVE 4/10a

SCALE N.T.S.



HEADER PIPE ENTRY ABOVE GROUND 5/10a

SCALE N.T.S.

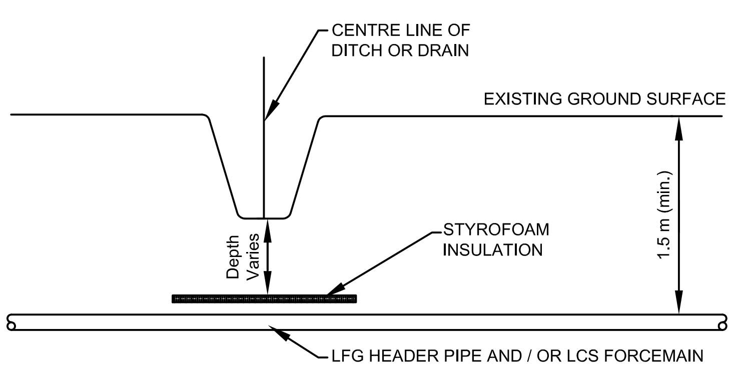


TEMPORARY LFG HEADER TERMINATION 6/10a

SCALE N.T.S.

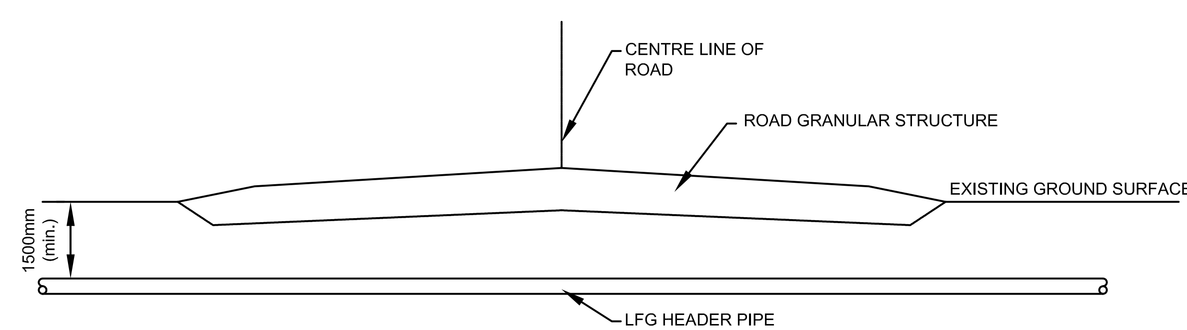
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. ALL SOIL COMPACTION TO MINIMUM 90% OF STANDARD PROCTOR MAXIMUM DRY DENSITY. GRANULAR B, TYPE I SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.



TYPICAL DITCH OR DRAIN CROSSING 7/10a

SCALE N.T.S.



TYPICAL ROAD CROSSING 8/10a

SCALE N.T.S.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

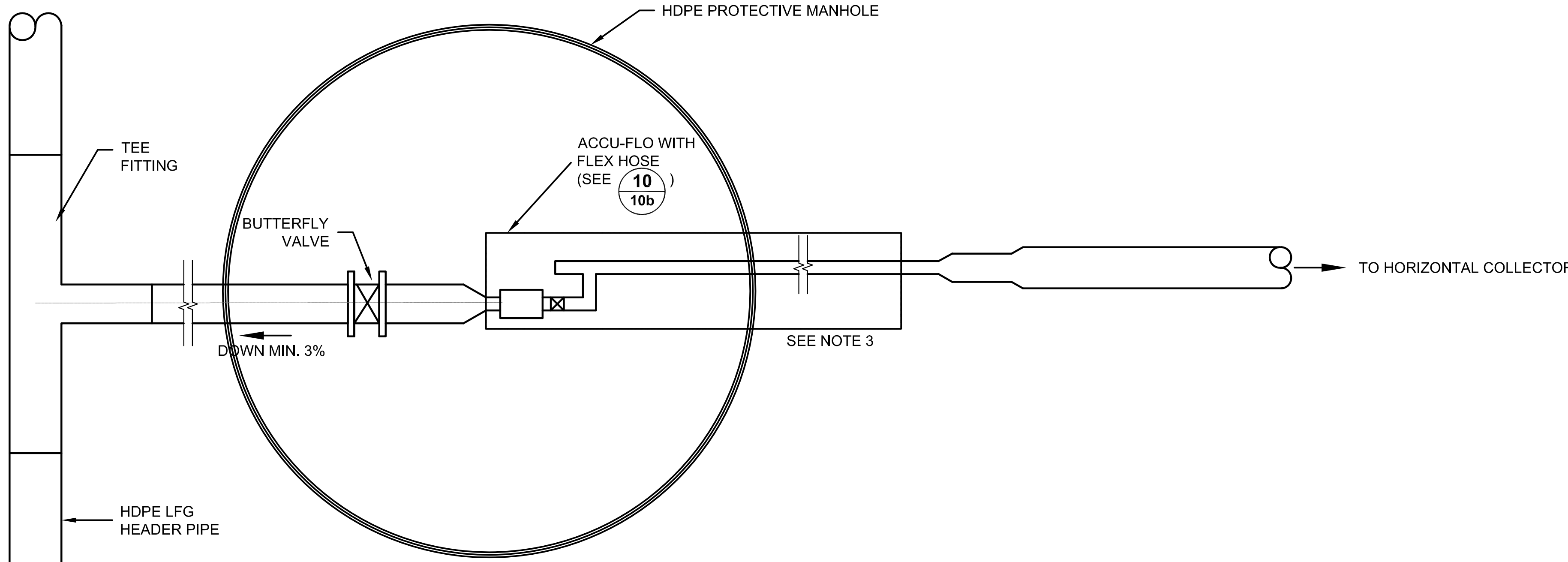
TITLE

LANDFILL GAS COLLECTION SYSTEM DETAILS

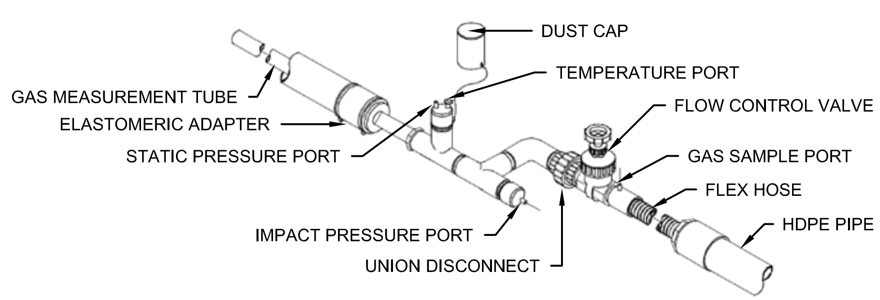
Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-4000-LGW-10.dwg	
DESIGN	M.K.F.	15 Oct. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	M.K.F.	Aug. 2014	**Figure 10a**	
REVIEW	P.A.S.B.	Aug. 2014		

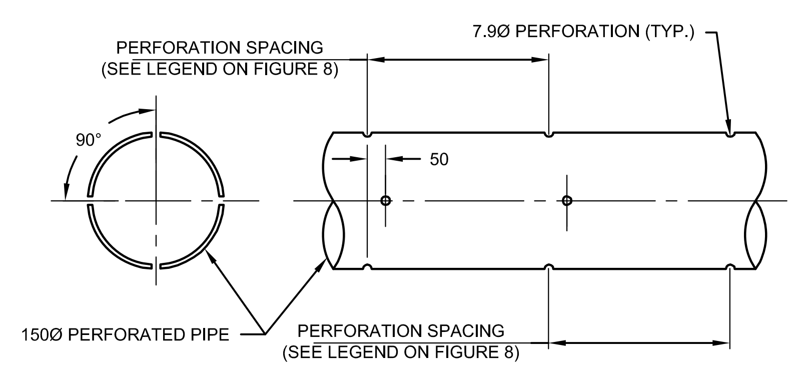
PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-10.dwg



TYPICAL JUNCTION AND MONITORING STATION (PLAN) 9a / 10b
SCALE N.T.S.



TYPICAL FLOW CONTROL AND MONITORING PORT (LANDTEC HORIZONTAL ACCU-FLO LATERAL) 10 / 10b
SCALE N.T.S.



TYPICAL PERFORATIONS ON HORIZONTAL COLLECTORS 11 / 10b
SCALE N.T.S.

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. ALL SOIL COMPACTION TO MINIMUM 90% OF STANDARD PROCTOR MAXIMUM DRY DENSITY. GRANULAR B, TYPE I SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. PIPE, VALVES AND MONITORING PORTS SHALL BE SUPPORTED ON NOMINALLY COMPACTED GRAVEL IF NEEDED.
4. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

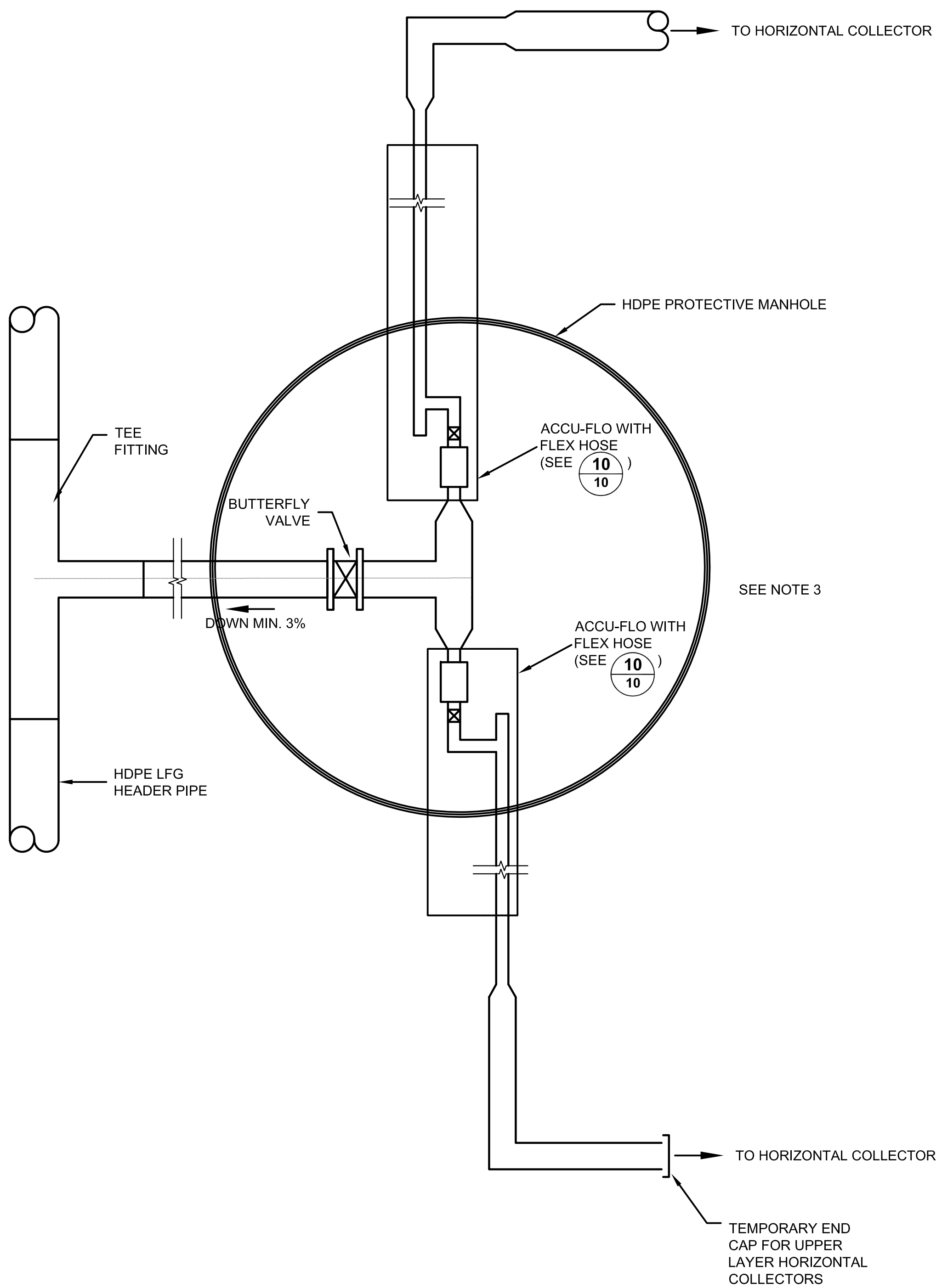
TITLE

LANDFILL GAS COLLECTION SYSTEM DETAILS

Golder Associates
Ottawa, Ontario, Canada

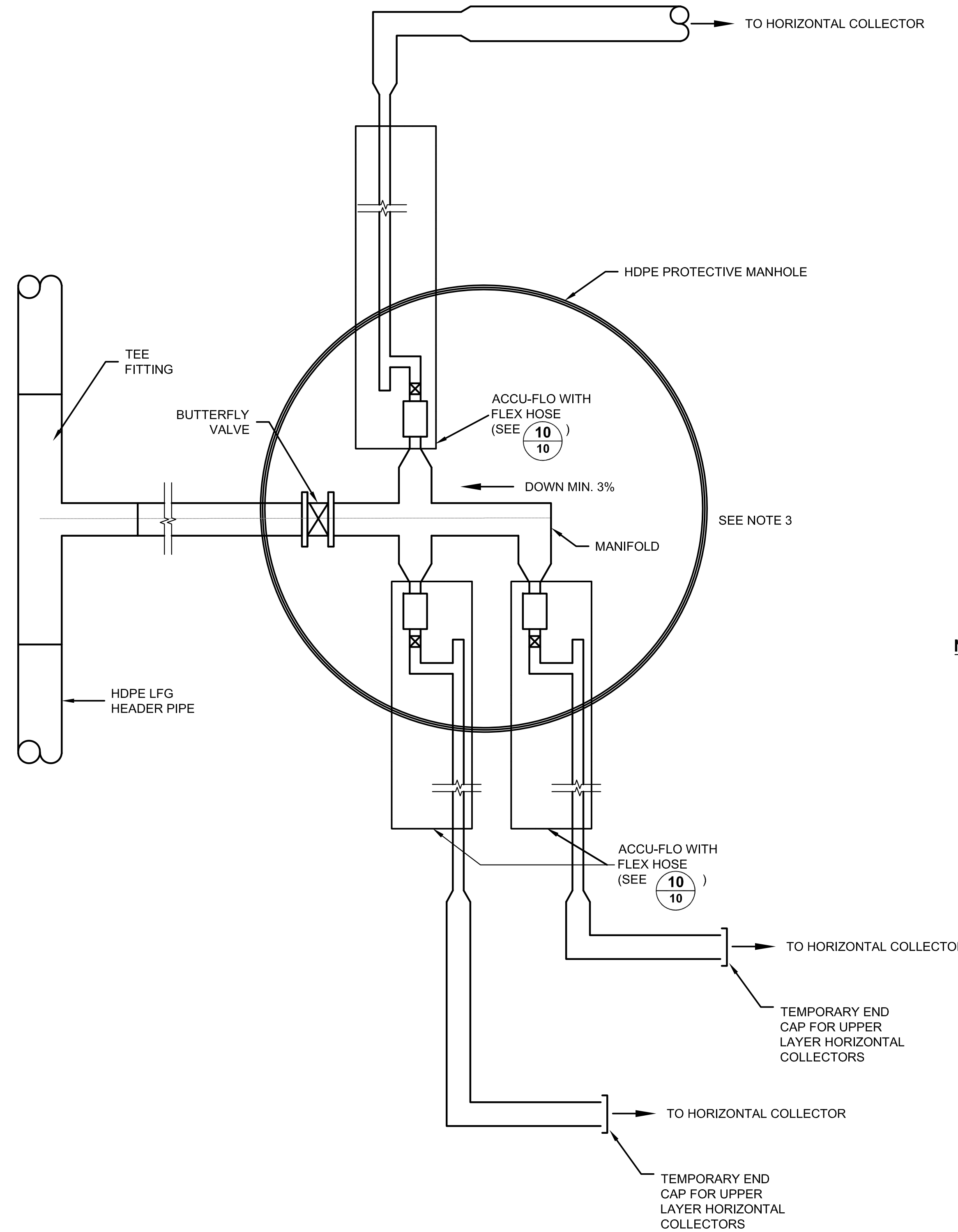
PROJECT No.		12-1125-0045	FILE No. 1211250045-4000-LGW-10.dwg	
DESIGN	M.K.F.	15 Oct. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	M.K.F.	Aug. 2014	**Figure 10b**	
REVIEW	P.A.S.B.	Aug. 2014		

PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-10.dwg



TYPICAL JUNCTION AND MONITORING STATION (PLAN) 9b/10c

SCALE N.T.S.



TYPICAL JUNCTION AND MONITORING STATION (PLAN) 9c/10c

SCALE N.T.S.

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. ALL SOIL COMPACTION TO MINIMUM 90% OF STANDARD PROCTOR MAXIMUM DRY DENSITY. GRANULAR B, TYPE I SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. PIPE, VALVES AND MONITORING PORTS SHALL BE SUPPORTED ON NOMINALLY COMPACTED GRAVEL IF NEEDED.
4. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

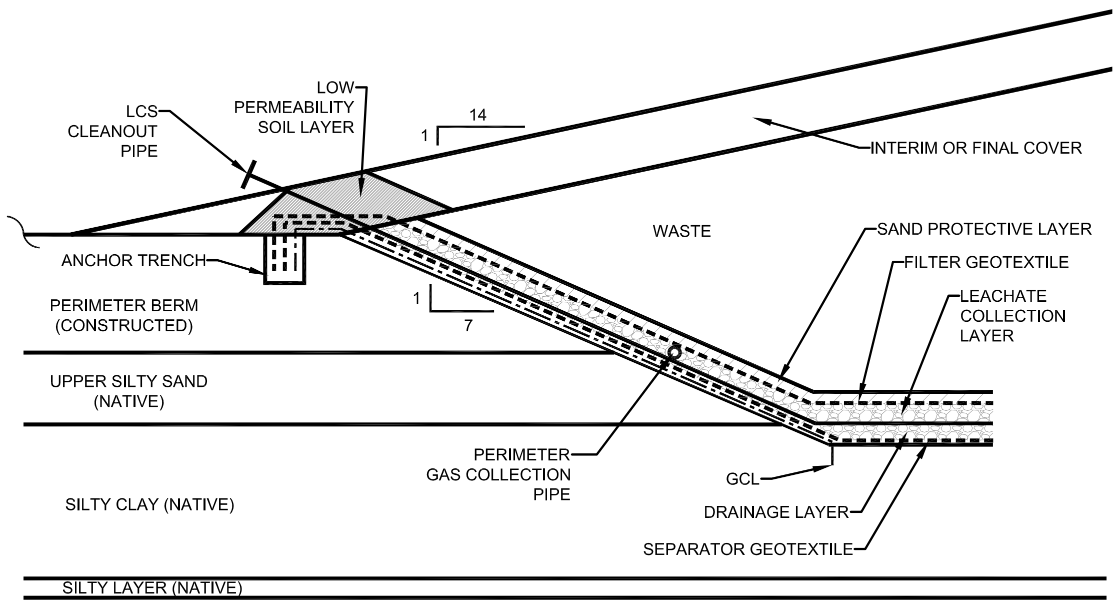
LANDFILL GAS COLLECTION SYSTEM DETAILS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	M.K.F.	15 Oct. 2013
CAD	M.L.F.	15 Oct. 2013
CHECK	M.K.F.	Aug. 2014
REVIEW	P.A.S.B.	Aug. 2014

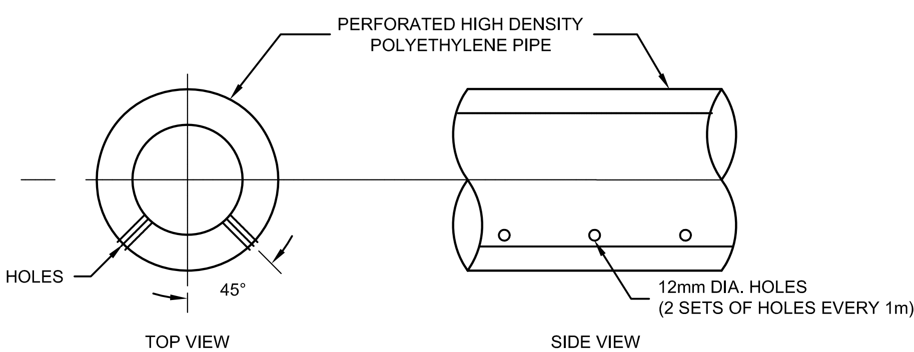
FILE No. 1211250045-4000-LGW-10.dwg
SCALE AS SHOWN REV. 0
DRAWING No.
Figure 10c

PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-10.dwg



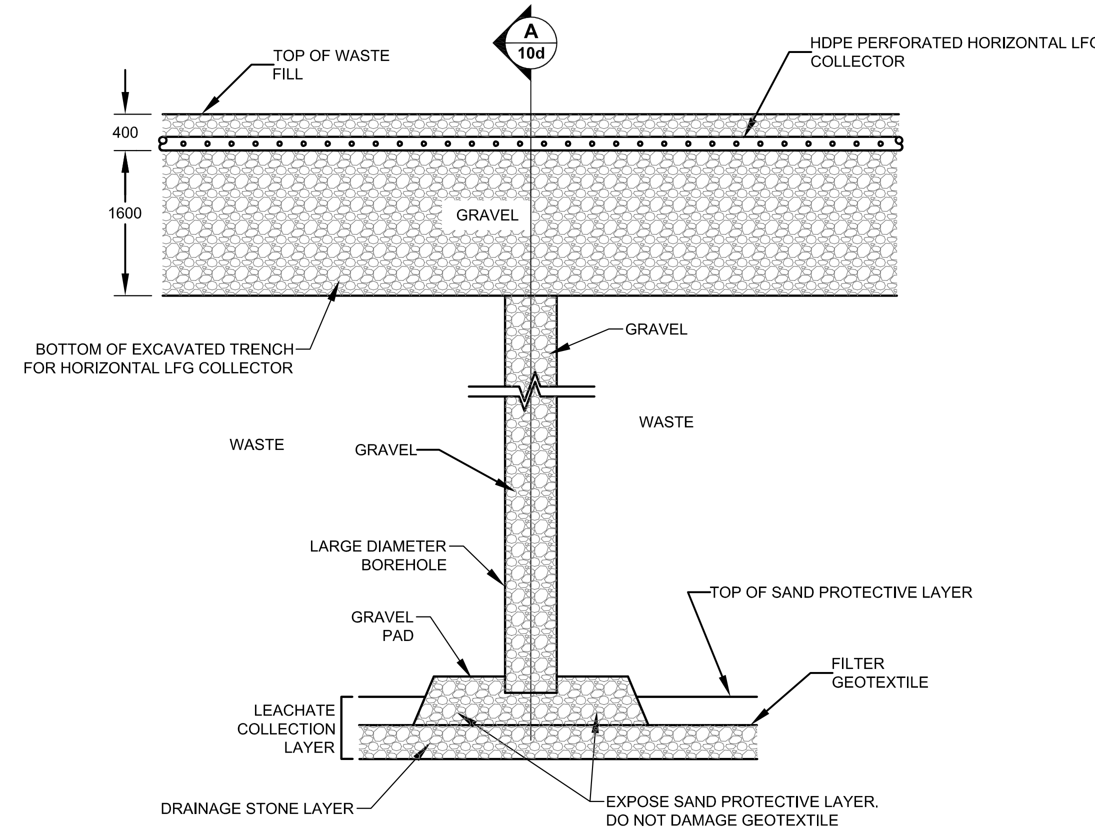
TYPICAL PERIMETER GAS COLLECTOR PIPE AT TOE OF WASTE 12 / 10d

SCALE N.T.S.

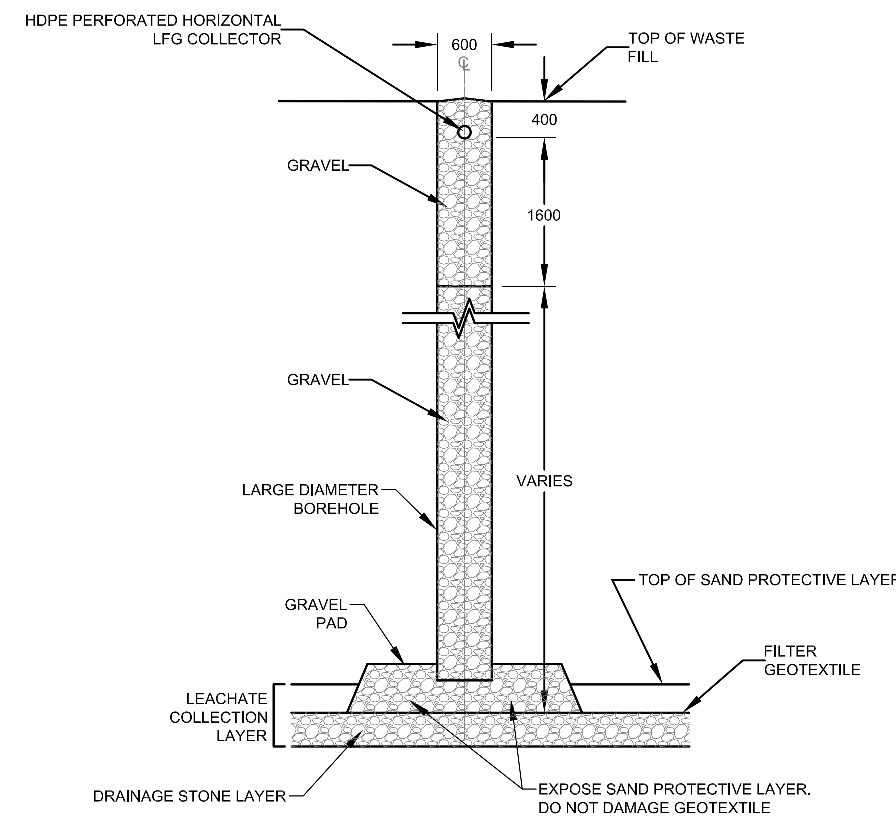


PERIMETER LANDFILL GAS COLLECTOR PIPE SPACING DETAIL 13 / 10d

SCALE N.T.S.



PROFILE VIEW



SECTION A

TYPICAL HORIZONTAL COLLECTOR DRAIN DETAIL 14 / 10d

SCALE N.T.S.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES, EXCEPT ARE AS NOTED.
2. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LANDFILL GAS COLLECTION SYSTEM DETAILS

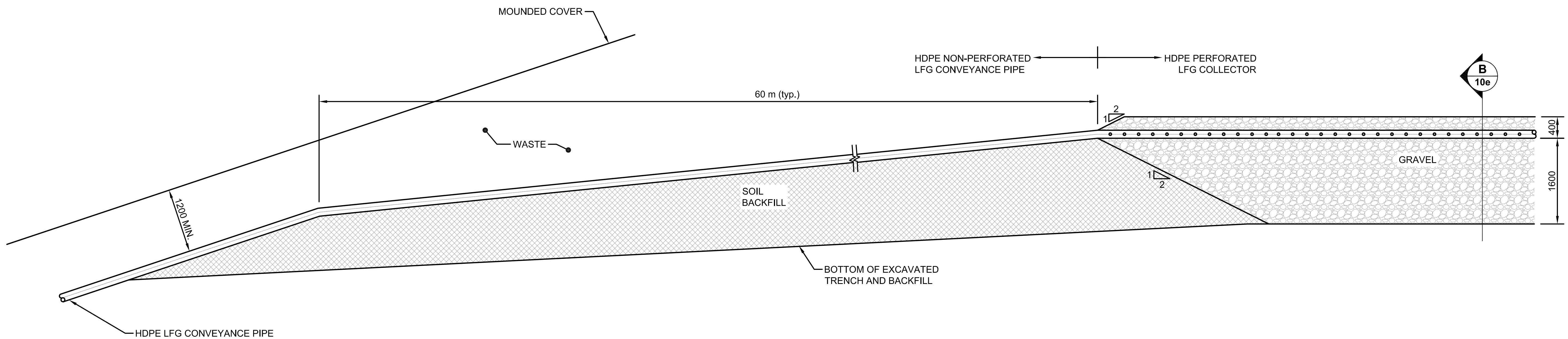
Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	M.K.F.	15 Oct. 2013
CAD	M.L.F.	15 Oct. 2013
CHECK	M.K.F.	Aug. 2014
REVIEW	P.A.S.B.	Aug. 2014

FILE No. 1211250045-4000-LGW-10.dwg
SCALE AS SHOWN REV. 0
DRAWING No.

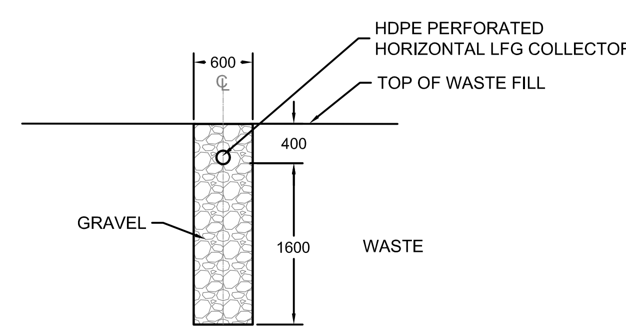
Figure 10d

PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-10.dwg



TYPICAL TRANSITION BETWEEN NON-PERFORATED AND PERFORATED HORIZONTAL COLLECTOR PIPES 15 / 10e

SCALE N.T.S.



SECTION B
TYPICAL HORIZONTAL COLLECTOR
TRENCH CROSS-SECTION 16 / 10e

SCALE N.T.S.

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

NOT FOR CONSTRUCTION

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

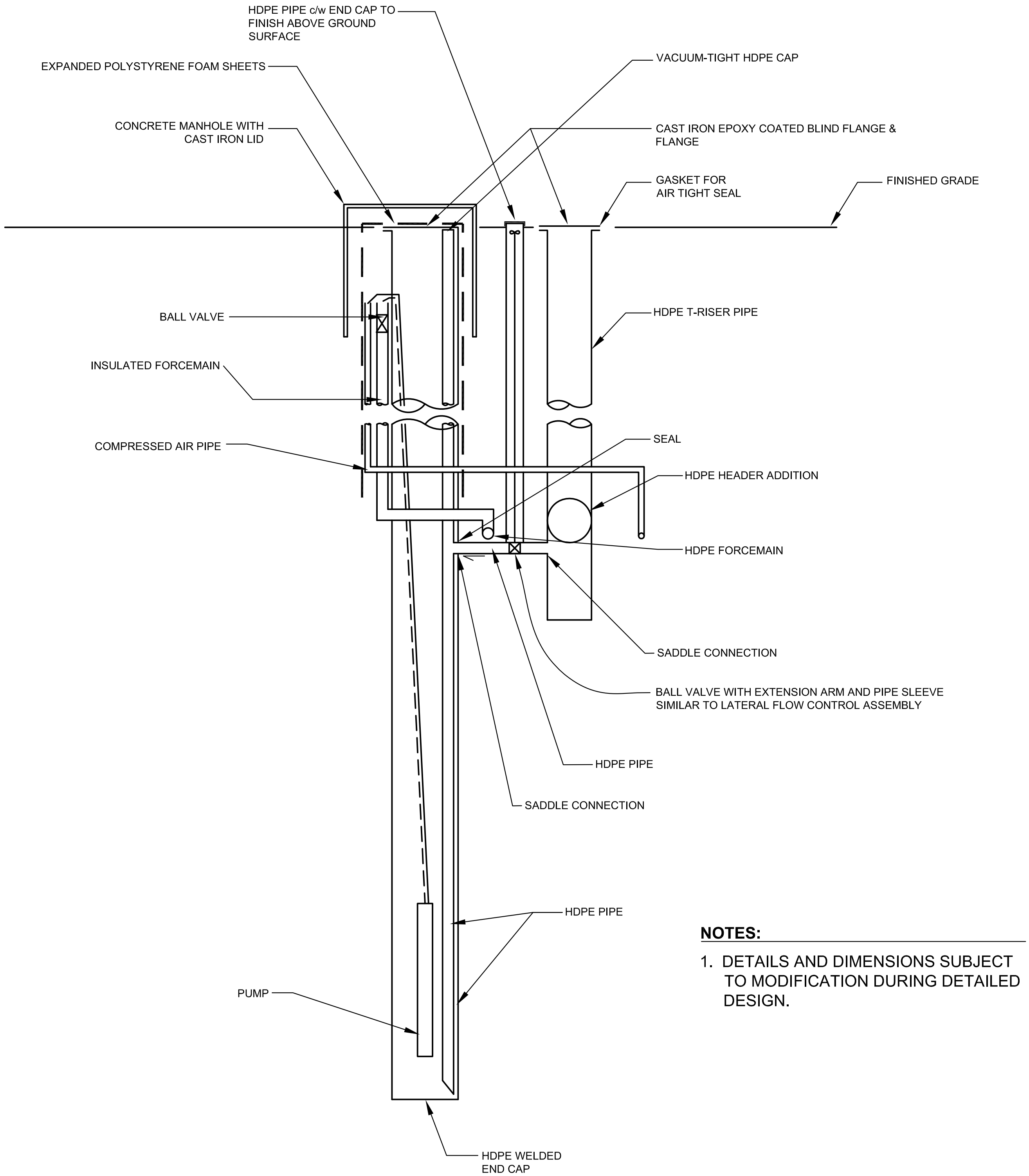
TITLE

LANDFILL GAS COLLECTION SYSTEM DETAILS

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-4000-LGW-10.dwg	
DESIGN	M.K.F.	15 Oct. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	M.K.F.	Aug. 2014	**Figure 10e**	
REVIEW	P.A.S.B.	Aug. 2014		

PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-10.dwg



NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.

TYPICAL CONDENSATE TRAP SECTION VIEW 1/11

NOT FOR CONSTRUCTION

Golder Associates
Ottawa, Ontario, Canada

SCALE	N.T.S.	TITLE	CONDENSATE MANAGEMENT DETAILS
DATE	30 Nov. 2013		
DESIGN	A.M.H.		
CAD	M.L.F.		
FILE No. 1211250045-4000-LGW-11.dwg	CHECK P.L.E.	CAPITAL REGION RESOURCE RECOVERY CENTRE	FIGURE 11
PROJECT No. 12-1125-0045 REV.	REVIEW P.A.S.		

PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 4 (Report Figures)\Landfill Gas\1211250045-4000-LGW-11.dwg

ATTACHMENT A

Landfill Gas Generation Estimates

TECHNICAL MEMORANDUM

DATE November 2013 **PROJECT No.** 12-1125-0045/2000/0110

ESTIMATE OF LANDFILL GAS GENERATION
CAPITAL REGION RESOURCE RECOVERY CENTRE (CRRRC)

Introduction

Estimates of landfill gas (LFG) generation were prepared for the landfill associated with the proposed Taggart Miller Capital Region Resource Recovery Centre (CRRRC) as described in this technical memorandum. The estimated LFG generation rates from the landfill footprint will be used in the estimation of air emissions from the CRRRC. The estimated LFG generation rates herein are not intended for use in sizing/specifying LFG equipment or associated collection system.

This memorandum concerns only LFG generated from landfilled materials. Biogas generated from other on-site facilities, such as the Organics Processing Facility, is not considered in this memorandum.

Methodology

At the request of Mr. Rudolf Wan (Ministry of the Environment (MOE) - Toronto) during a conference call on October 9, 2013, LFG generation rates from landfilled materials at the proposed CRRRC were estimated using the LandGEM model (1991) developed by the United States Environmental Protection Agency (US EPA). The LandGEM model is based on a first-order decay model of landfill gas generation. It should be noted that the LandGEM model was developed to estimate LFG generation rates for landfills accepting municipal solid waste (MSW) (US EPA, 2005). The projected waste materials anticipated to be landfilled at the CRRRC consist primarily of industrial, commercial and institutional (IC&I) and construction and demolition (C&D) materials, and may differ from a typical municipal solid waste (MSW) composition. As a result, it is expected that LFG generation rate results generated by the LandGEM model may not be representative of the actual LFG generation rates for the CRRRC landfill.

The key input parameters for the model are the projected annual tonnages of waste disposed of in the landfill footprint, the landfill gas production potential (L_o) and the landfill gas generation rate factor (k). L_o is a measure of the ultimate methane yield in cubic metres of methane per tonne of waste (m^3/tonne), and k is the methane generation rate constant in year^{-1}. Both L_o and k are highly influenced by moisture content, as well as waste composition, temperature, pH, particle size and availability of nutrients.

The LandGEM model was used to estimate LFG generation rates for the CRRRC based on the maximum projected waste tonnages to be landfilled at the CRRRC provided by Taggart Miller, assuming an operational lifespan of 30 years. Tonnages of soils were removed from the projected waste tonnages as it was assumed that rates of LFG produced by soil would be negligible. Tonnages of C&D, IC&I, leaf and yard, clean source-separated organics and mixed organics waste were included.

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The following default values for L_o and k for Ontario used in the LFG generation estimates as described in the MOE *Interim Guide to Estimate and Assess Landfill Air Impacts* (MOE, 1992):

$$L_o = 125\ m^3/tonne$$

$$k = 0.04\ year^{-1}$$

For the model, LFG generated at the landfill site was assumed to be comprised of 50% methane (CH_4) by volume.

LFG Generation Estimates

The resulting theoretical LFG generation rate estimates obtained from the LandGEM model are presented in Attachment A and illustrated in Figure 1. Table 1 presents a summary of LFG and methane generation rates.

Table 1: Estimated LFG and Methane Generation Rates using the Projected Maximum Waste Tonnage Landfilled

Year	Total LFG		Total Methane*	
	m^3/hour	scfm	m^3/hour	scfm
5	1,115	655	555	330
10	2,240	1,320	1,120	660
15	3,165	1,865	1,585	930
20	3,925	2,310	1,960	1,155
25	4,545	2,675	2,270	1,335
30 (Peak)	5,050	2,975	2,525	1,485
35	4,135	2,435	2,070	1,215
40	3,385	1,995	1,695	995
45	2,770	1,630	1,385	815
50	2,270	1,335	1,135	670

* Assumes LFG is comprised of 50% methane.
m^3 = cubic metres
scfm = standard cubic feet per minute

It should be noted that this memorandum provides an estimate of landfill gas generation, which is not the same as the landfill gas collection rate since any future LFG collection system would not be able to collect all of the LFG generated.

Limitations

It should be noted that landfill gas modelling without the benefit of actual measurement of LFG emissions, is a very inexact science. Model results can vary, perhaps substantially, from actual LFG generation rates. Caution should always be exercised when using LFG generation rates derived from first order decay modelling.

Closure

We trust this technical memorandum satisfies your current needs. If you have any questions regarding this memorandum, please contact the undersigned.

GOLDER ASSOCIATES LTD.

A.M. Harwood, M.Eng., P.Eng.
Environmental Engineer

Rachel Wyles, M.Eng., P.Eng. (BC)
Air Quality Specialist

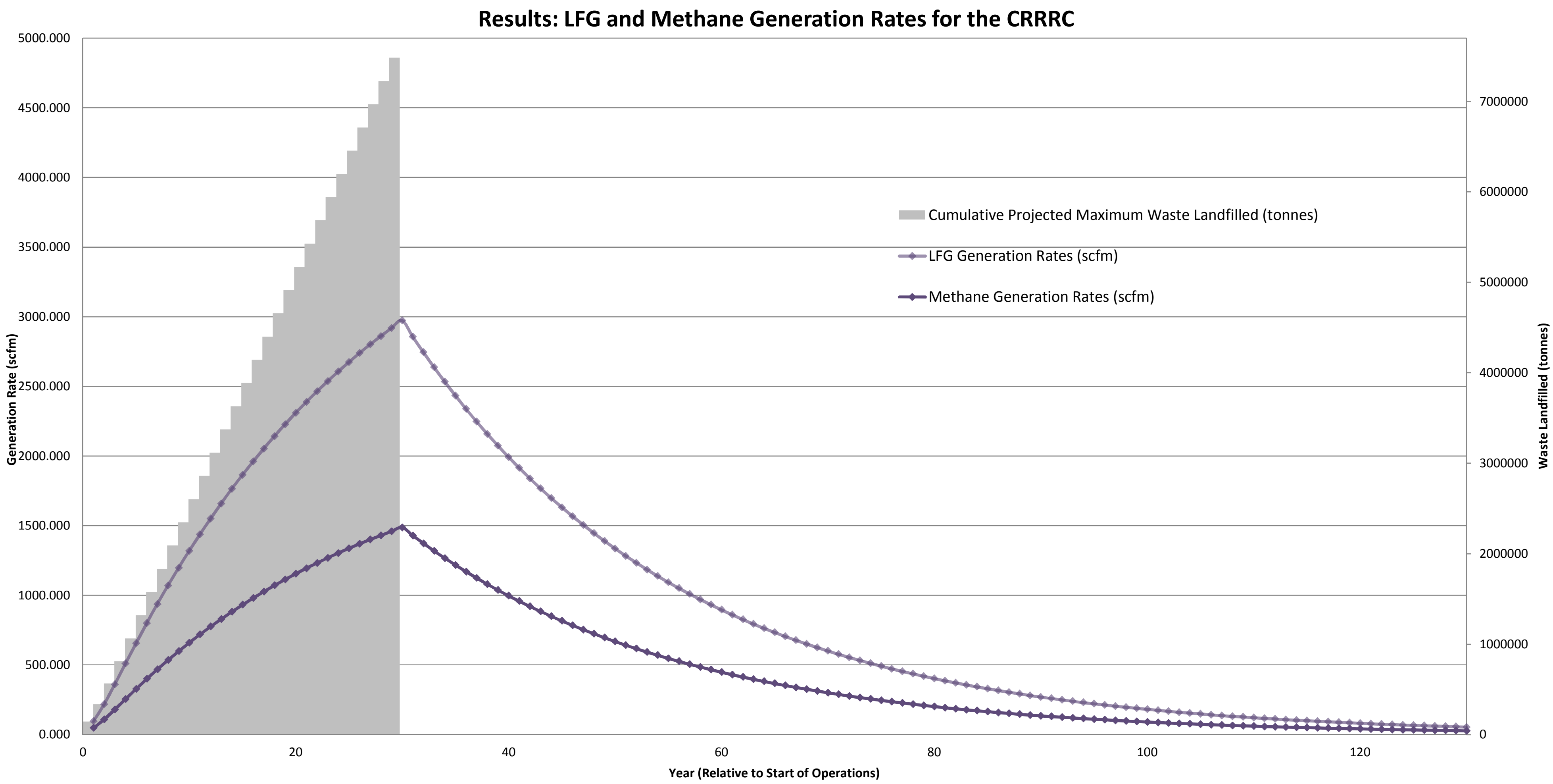
ALC/AMH/RW/sg
n:\active\2012\1125 - environmental and civil engineering\12-1125-0045 crrrc ea eastern on\phase 2000_assess_env_impacts\task 0110 air&noise\lfggen\landgem\tm crrrc\tm crrrc lfg gen moe inputs_nov2013.docx

Attachments: Figure 1
Attachment A

References

MOE, Air Resources Branch. *Interim Guide to Estimate and Assess Landfill Air Impacts.* October 1992.

United State Environmental Protection Agency. Landfill Gas Emissions Model (LandGEM) Version 3.02 User's Guide. May 2005.



Golder Associates	Date: November 2013 Drawn: ALC Project: 12-1125-0045 Review: AMH	**LFG and Methane Generation Rates for the CRRRC**	FIGURE 1

ATTACHMENT A

Summary Report

Landfill Name or Identifier: Maximum Tonnage- MOE Inputs

Date: Friday, November 08, 2013

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate (*year^{-1}*)
L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the i^{th} year (*Mg*)
t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1**	
Landfill Closure Year (with 80-year limit)	**30**	
Actual Closure Year (without limit)	***30***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**125**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1	144,900	159,390	0	0
2	190,500	209,550	144,900	159,390
3	229,680	252,648	335,400	368,940
4	246,000	270,600	565,080	621,588
5	251,786	276,964	811,080	892,188
6	256,800	282,480	1,062,866	1,169,152
7	256,800	282,480	1,319,666	1,451,632
8	256,800	282,480	1,576,466	1,734,112
9	256,800	282,480	1,833,266	2,016,592
10	256,800	282,480	2,090,066	2,299,072
11	256,800	282,480	2,346,866	2,581,552
12	256,800	282,480	2,603,666	2,864,032
13	256,800	282,480	2,860,466	3,146,512
14	256,800	282,480	3,117,266	3,428,992
15	256,800	282,480	3,374,066	3,711,472
16	256,800	282,480	3,630,866	3,993,952
17	256,800	282,480	3,887,666	4,276,432
18	256,800	282,480	4,144,466	4,558,912
19	256,800	282,480	4,401,266	4,841,392
20	256,800	282,480	4,658,066	5,123,872
21	256,800	282,480	4,914,866	5,406,352
22	256,800	282,480	5,171,666	5,688,832
23	256,800	282,480	5,428,466	5,971,312
24	256,800	282,480	5,685,266	6,253,792
25	256,800	282,480	5,942,066	6,536,272
26	256,800	282,480	6,198,866	6,818,752
27	256,800	282,480	6,455,666	7,101,232
28	256,800	282,480	6,712,466	7,383,712
29	256,800	282,480	6,969,266	7,666,192
30	256,800	282,480	7,226,066	7,948,672
31	0	0	7,482,866	8,231,152
32	0	0	7,482,866	8,231,152
33	0	0	7,482,866	8,231,152
34	0	0	7,482,866	8,231,152
35	0	0	7,482,866	8,231,152
36	0	0	7,482,866	8,231,152
37	0	0	7,482,866	8,231,152
38	0	0	7,482,866	8,231,152
39	0	0	7,482,866	8,231,152
40	0	0	7,482,866	8,231,152

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	***(short tons/year)***	***(Mg)***	***(short tons)***
41	0	0	7,482,866	8,231,152
42	0	0	7,482,866	8,231,152
43	0	0	7,482,866	8,231,152
44	0	0	7,482,866	8,231,152
45	0	0	7,482,866	8,231,152
46	0	0	7,482,866	8,231,152
47	0	0	7,482,866	8,231,152
48	0	0	7,482,866	8,231,152
49	0	0	7,482,866	8,231,152
50	0	0	7,482,866	8,231,152
51	0	0	7,482,866	8,231,152
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60	0	0	7,482,866	8,231,152
61	0	0	7,482,866	8,231,152
62	0	0	7,482,866	8,231,152
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68	0	0	7,482,866	8,231,152
69	0	0	7,482,866	8,231,152
70	0	0	7,482,866	8,231,152
71	0	0	7,482,866	8,231,152
72	0	0	7,482,866	8,231,152
73	0	0	7,482,866	8,231,152
74	0	0	7,482,866	8,231,152
75	0	0	7,482,866	8,231,152
76	0	0	7,482,866	8,231,152
77	0	0	7,482,866	8,231,152
78	0	0	7,482,866	8,231,152
79	0	0	7,482,866	8,231,152
80	0	0	7,482,866	8,231,152

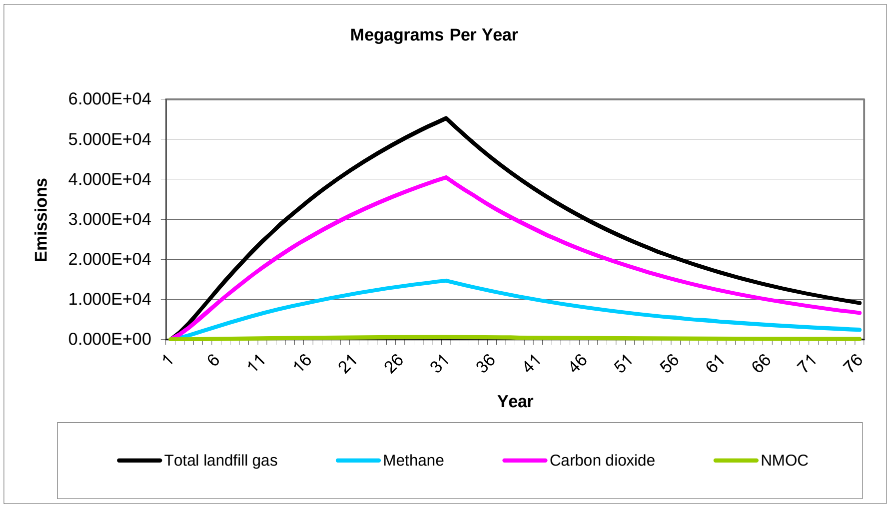
Pollutant Parameters

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

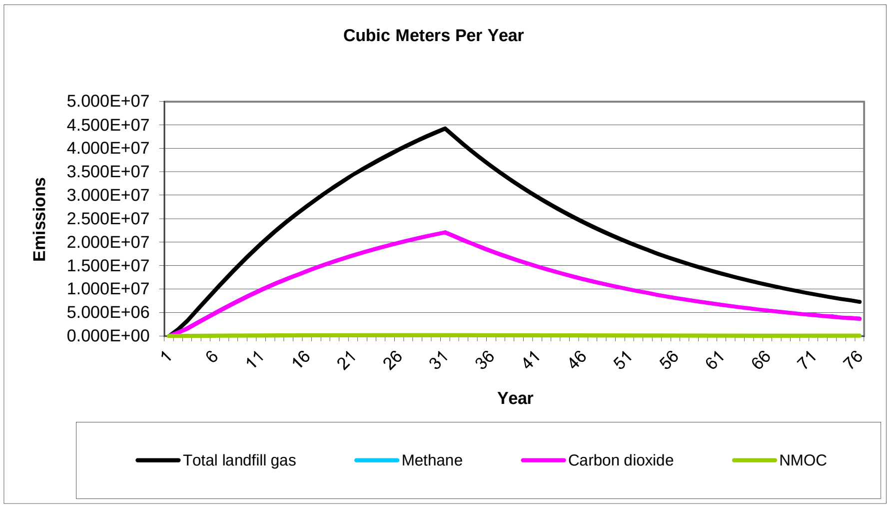
Pollutant Parameters (Continued)

	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

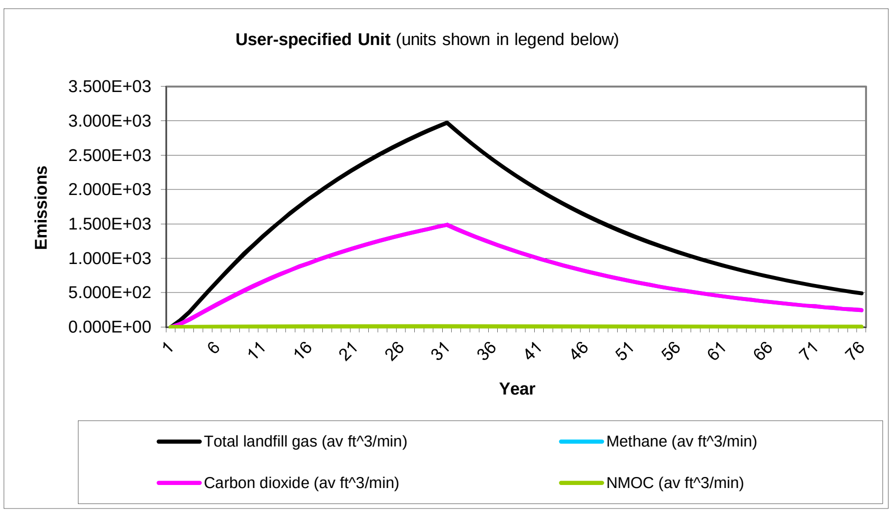
Graphs



Megagrams Per Year
6.000E+04
5.000E+04
4.000E+04
3.000E+04
2.000E+04
1.000E+04
0.000E+00
Emissions
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
Year
Total landfill gas
Methane
Carbon dioxide
NMOC



Cubic Meters Per Year
5.000E+07
4.500E+07
4.000E+07
3.500E+07
3.000E+07
2.500E+07
2.000E+07
1.500E+07
1.000E+07
5.000E+06
0.000E+00
Emissions
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
Year
Total landfill gas
Methane
Carbon dioxide
NMOC



User-specified Unit (units shown in legend below)
3.500E+03
3.000E+03
2.500E+03
2.000E+03
1.500E+03
1.000E+03
5.000E+02
0.000E+00
Emissions
1
6
11
16
21
26
31
36
41
46
51
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61
66
71
76
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1	0	0	0	0	0	0
2	1.777E+03	1.423E+06	9.563E+01	4.748E+02	7.116E+05	4.781E+01
3	4.044E+03	3.239E+06	2.176E+02	1.080E+03	1.619E+06	1.088E+02
4	6.703E+03	5.368E+06	3.606E+02	1.790E+03	2.684E+06	1.803E+02
5	9.458E+03	7.573E+06	5.089E+02	2.526E+03	3.787E+06	2.544E+02
6	1.218E+04	9.750E+06	6.551E+02	3.252E+03	4.875E+06	3.275E+02
7	1.485E+04	1.189E+07	7.989E+02	3.966E+03	5.945E+06	3.994E+02
8	1.742E+04	1.395E+07	9.370E+02	4.652E+03	6.973E+06	4.685E+02
9	1.988E+04	1.592E+07	1.070E+03	5.311E+03	7.961E+06	5.349E+02
10	2.225E+04	1.782E+07	1.197E+03	5.944E+03	8.910E+06	5.986E+02
11	2.453E+04	1.964E+07	1.320E+03	6.552E+03	9.822E+06	6.599E+02
12	2.672E+04	2.140E+07	1.438E+03	7.137E+03	1.070E+07	7.188E+02
13	2.882E+04	2.308E+07	1.551E+03	7.698E+03	1.154E+07	7.753E+02
14	3.084E+04	2.470E+07	1.659E+03	8.238E+03	1.235E+07	8.297E+02
15	3.278E+04	2.625E+07	1.764E+03	8.756E+03	1.313E+07	8.819E+02
16	3.465E+04	2.774E+07	1.864E+03	9.254E+03	1.387E+07	9.320E+02
17	3.644E+04	2.918E+07	1.960E+03	9.733E+03	1.459E+07	9.802E+02
18	3.816E+04	3.056E+07	2.053E+03	1.019E+04	1.528E+07	1.027E+03
19	3.981E+04	3.188E+07	2.142E+03	1.063E+04	1.594E+07	1.071E+03
20	4.140E+04	3.315E+07	2.228E+03	1.106E+04	1.658E+07	1.114E+03
21	4.293E+04	3.437E+07	2.310E+03	1.147E+04	1.719E+07	1.155E+03
22	4.439E+04	3.555E+07	2.389E+03	1.186E+04	1.777E+07	1.194E+03
23	4.580E+04	3.668E+07	2.464E+03	1.223E+04	1.834E+07	1.232E+03
24	4.716E+04	3.776E+07	2.537E+03	1.260E+04	1.888E+07	1.269E+03
25	4.846E+04	3.880E+07	2.607E+03	1.294E+04	1.940E+07	1.304E+03
26	4.971E+04	3.980E+07	2.674E+03	1.328E+04	1.990E+07	1.337E+03
27	5.091E+04	4.077E+07	2.739E+03	1.360E+04	2.038E+07	1.370E+03
28	5.206E+04	4.169E+07	2.801E+03	1.391E+04	2.085E+07	1.401E+03
29	5.317E+04	4.258E+07	2.861E+03	1.420E+04	2.129E+07	1.430E+03
30	5.424E+04	4.343E+07	2.918E+03	1.449E+04	2.172E+07	1.459E+03
31	5.526E+04	4.425E+07	2.973E+03	1.476E+04	2.213E+07	1.487E+03
32	5.309E+04	4.251E+07	2.857E+03	1.418E+04	2.126E+07	1.428E+03
33	5.101E+04	4.085E+07	2.745E+03	1.363E+04	2.042E+07	1.372E+03
34	4.901E+04	3.925E+07	2.637E+03	1.309E+04	1.962E+07	1.318E+03
35	4.709E+04	3.771E+07	2.534E+03	1.258E+04	1.885E+07	1.267E+03
36	4.524E+04	3.623E+07	2.434E+03	1.209E+04	1.811E+07	1.217E+03
37	4.347E+04	3.481E+07	2.339E+03	1.161E+04	1.740E+07	1.169E+03
38	4.176E+04	3.344E+07	2.247E+03	1.116E+04	1.672E+07	1.124E+03
39	4.013E+04	3.213E+07	2.159E+03	1.072E+04	1.607E+07	1.079E+03
40	3.855E+04	3.087E+07	2.074E+03	1.030E+04	1.544E+07	1.037E+03
41	3.704E+04	2.966E+07	1.993E+03	9.894E+03	1.483E+07	9.965E+02
42	3.559E+04	2.850E+07	1.915E+03	9.506E+03	1.425E+07	9.574E+02
43	3.419E+04	2.738E+07	1.840E+03	9.134E+03	1.369E+07	9.199E+02
44	3.285E+04	2.631E+07	1.768E+03	8.776E+03	1.315E+07	8.838E+02
45	3.157E+04	2.528E+07	1.698E+03	8.431E+03	1.264E+07	8.491E+02
46	3.033E+04	2.428E+07	1.632E+03	8.101E+03	1.214E+07	8.159E+02
47	2.914E+04	2.333E+07	1.568E+03	7.783E+03	1.167E+07	7.839E+02
48	2.800E+04	2.242E+07	1.506E+03	7.478E+03	1.121E+07	7.531E+02
49	2.690E+04	2.154E+07	1.447E+03	7.185E+03	1.077E+07	7.236E+02
50	2.584E+04	2.069E+07	1.390E+03	6.903E+03	1.035E+07	6.952E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
51	2.483E+04	1.988E+07	1.336E+03	6.632E+03	9.941E+06	6.680E+02
52	2.386E+04	1.910E+07	1.284E+03	6.372E+03	9.552E+06	6.418E+02
53	2.292E+04	1.835E+07	1.233E+03	6.122E+03	9.177E+06	6.166E+02
54	2.202E+04	1.763E+07	1.185E+03	5.882E+03	8.817E+06	5.924E+02
55	2.116E+04	1.694E+07	1.138E+03	5.652E+03	8.472E+06	5.692E+02
56	2.033E+04	1.628E+07	1.094E+03	5.430E+03	8.139E+06	5.469E+02
57	1.953E+04	1.564E+07	1.051E+03	5.217E+03	7.820E+06	5.254E+02
58	1.877E+04	1.503E+07	1.010E+03	5.013E+03	7.514E+06	5.048E+02
59	1.803E+04	1.444E+07	9.701E+02	4.816E+03	7.219E+06	4.850E+02
60	1.732E+04	1.387E+07	9.320E+02	4.627E+03	6.936E+06	4.660E+02
61	1.664E+04	1.333E+07	8.955E+02	4.446E+03	6.664E+06	4.477E+02
62	1.599E+04	1.281E+07	8.604E+02	4.272E+03	6.403E+06	4.302E+02
63	1.536E+04	1.230E+07	8.266E+02	4.104E+03	6.152E+06	4.133E+02
64	1.476E+04	1.182E+07	7.942E+02	3.943E+03	5.910E+06	3.971E+02
65	1.418E+04	1.136E+07	7.631E+02	3.788E+03	5.679E+06	3.815E+02
66	1.363E+04	1.091E+07	7.332E+02	3.640E+03	5.456E+06	3.666E+02
67	1.309E+04	1.048E+07	7.044E+02	3.497E+03	5.242E+06	3.522E+02
68	1.258E+04	1.007E+07	6.768E+02	3.360E+03	5.036E+06	3.384E+02
69	1.209E+04	9.678E+06	6.503E+02	3.228E+03	4.839E+06	3.251E+02
70	1.161E+04	9.299E+06	6.248E+02	3.102E+03	4.649E+06	3.124E+02
71	1.116E+04	8.934E+06	6.003E+02	2.980E+03	4.467E+06	3.001E+02
72	1.072E+04	8.584E+06	5.767E+02	2.863E+03	4.292E+06	2.884E+02
73	1.030E+04	8.247E+06	5.541E+02	2.751E+03	4.124E+06	2.771E+02
74	9.895E+03	7.924E+06	5.324E+02	2.643E+03	3.962E+06	2.662E+02
75	9.507E+03	7.613E+06	5.115E+02	2.539E+03	3.806E+06	2.558E+02
76	9.134E+03	7.314E+06	4.915E+02	2.440E+03	3.657E+06	2.457E+02
77	8.776E+03	7.028E+06	4.722E+02	2.344E+03	3.514E+06	2.361E+02
78	8.432E+03	6.752E+06	4.537E+02	2.252E+03	3.376E+06	2.268E+02
79	8.102E+03	6.487E+06	4.359E+02	2.164E+03	3.244E+06	2.179E+02
80	7.784E+03	6.233E+06	4.188E+02	2.079E+03	3.116E+06	2.094E+02
81	7.479E+03	5.989E+06	4.024E+02	1.998E+03	2.994E+06	2.012E+02
82	7.185E+03	5.754E+06	3.866E+02	1.919E+03	2.877E+06	1.933E+02
83	6.904E+03	5.528E+06	3.714E+02	1.844E+03	2.764E+06	1.857E+02
84	6.633E+03	5.311E+06	3.569E+02	1.772E+03	2.656E+06	1.784E+02
85	6.373E+03	5.103E+06	3.429E+02	1.702E+03	2.552E+06	1.714E+02
86	6.123E+03	4.903E+06	3.294E+02	1.636E+03	2.452E+06	1.647E+02
87	5.883E+03	4.711E+06	3.165E+02	1.571E+03	2.355E+06	1.583E+02
88	5.652E+03	4.526E+06	3.041E+02	1.510E+03	2.263E+06	1.521E+02
89	5.431E+03	4.349E+06	2.922E+02	1.451E+03	2.174E+06	1.461E+02
90	5.218E+03	4.178E+06	2.807E+02	1.394E+03	2.089E+06	1.404E+02
91	5.013E+03	4.014E+06	2.697E+02	1.339E+03	2.007E+06	1.349E+02
92	4.817E+03	3.857E+06	2.591E+02	1.287E+03	1.928E+06	1.296E+02
93	4.628E+03	3.706E+06	2.490E+02	1.236E+03	1.853E+06	1.245E+02
94	4.446E+03	3.560E+06	2.392E+02	1.188E+03	1.780E+06	1.196E+02
95	4.272E+03	3.421E+06	2.298E+02	1.141E+03	1.710E+06	1.149E+02
96	4.104E+03	3.287E+06	2.208E+02	1.096E+03	1.643E+06	1.104E+02
97	3.943E+03	3.158E+06	2.122E+02	1.053E+03	1.579E+06	1.061E+02
98	3.789E+03	3.034E+06	2.038E+02	1.012E+03	1.517E+06	1.019E+02
99	3.640E+03	2.915E+06	1.959E+02	9.724E+02	1.457E+06	9.793E+01
100	3.498E+03	2.801E+06	1.882E+02	9.342E+02	1.400E+06	9.409E+01
101	3.360E+03	2.691E+06	1.808E+02	8.976E+02	1.345E+06	9.040E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
102	3.229E+03	2.585E+06	1.737E+02	8.624E+02	1.293E+06	8.685E+01
103	3.102E+03	2.484E+06	1.669E+02	8.286E+02	1.242E+06	8.345E+01
104	2.980E+03	2.387E+06	1.604E+02	7.961E+02	1.193E+06	8.018E+01
105	2.864E+03	2.293E+06	1.541E+02	7.649E+02	1.146E+06	7.703E+01
106	2.751E+03	2.203E+06	1.480E+02	7.349E+02	1.102E+06	7.401E+01
107	2.643E+03	2.117E+06	1.422E+02	7.061E+02	1.058E+06	7.111E+01
108	2.540E+03	2.034E+06	1.366E+02	6.784E+02	1.017E+06	6.832E+01
109	2.440E+03	1.954E+06	1.313E+02	6.518E+02	9.770E+05	6.564E+01
110	2.344E+03	1.877E+06	1.261E+02	6.262E+02	9.387E+05	6.307E+01
111	2.253E+03	1.804E+06	1.212E+02	6.017E+02	9.019E+05	6.060E+01
112	2.164E+03	1.733E+06	1.164E+02	5.781E+02	8.665E+05	5.822E+01
113	2.079E+03	1.665E+06	1.119E+02	5.554E+02	8.325E+05	5.594E+01
114	1.998E+03	1.600E+06	1.075E+02	5.336E+02	7.999E+05	5.374E+01
115	1.919E+03	1.537E+06	1.033E+02	5.127E+02	7.685E+05	5.164E+01
116	1.844E+03	1.477E+06	9.922E+01	4.926E+02	7.384E+05	4.961E+01
117	1.772E+03	1.419E+06	9.533E+01	4.733E+02	7.094E+05	4.767E+01
118	1.702E+03	1.363E+06	9.160E+01	4.547E+02	6.816E+05	4.580E+01
119	1.636E+03	1.310E+06	8.800E+01	4.369E+02	6.549E+05	4.400E+01
120	1.572E+03	1.258E+06	8.455E+01	4.198E+02	6.292E+05	4.228E+01
121	1.510E+03	1.209E+06	8.124E+01	4.033E+02	6.045E+05	4.062E+01
122	1.451E+03	1.162E+06	7.805E+01	3.875E+02	5.808E+05	3.903E+01
123	1.394E+03	1.116E+06	7.499E+01	3.723E+02	5.581E+05	3.750E+01
124	1.339E+03	1.072E+06	7.205E+01	3.577E+02	5.362E+05	3.603E+01
125	1.287E+03	1.030E+06	6.923E+01	3.437E+02	5.152E+05	3.461E+01
126	1.236E+03	9.899E+05	6.651E+01	3.302E+02	4.950E+05	3.326E+01
127	1.188E+03	9.511E+05	6.390E+01	3.173E+02	4.755E+05	3.195E+01
128	1.141E+03	9.138E+05	6.140E+01	3.048E+02	4.569E+05	3.070E+01
129	1.096E+03	8.780E+05	5.899E+01	2.929E+02	4.390E+05	2.950E+01
130	1.053E+03	8.435E+05	5.668E+01	2.814E+02	4.218E+05	2.834E+01
131	1.012E+03	8.105E+05	5.446E+01	2.704E+02	4.052E+05	2.723E+01
132	9.724E+02	7.787E+05	5.232E+01	2.598E+02	3.893E+05	2.616E+01
133	9.343E+02	7.482E+05	5.027E+01	2.496E+02	3.741E+05	2.513E+01
134	8.977E+02	7.188E+05	4.830E+01	2.398E+02	3.594E+05	2.415E+01
135	8.625E+02	6.906E+05	4.640E+01	2.304E+02	3.453E+05	2.320E+01
136	8.287E+02	6.636E+05	4.458E+01	2.213E+02	3.318E+05	2.229E+01
137	7.962E+02	6.375E+05	4.284E+01	2.127E+02	3.188E+05	2.142E+01
138	7.650E+02	6.125E+05	4.116E+01	2.043E+02	3.063E+05	2.058E+01
139	7.350E+02	5.885E+05	3.954E+01	1.963E+02	2.943E+05	1.977E+01
140	7.061E+02	5.654E+05	3.799E+01	1.886E+02	2.827E+05	1.900E+01
141	6.785E+02	5.433E+05	3.650E+01	1.812E+02	2.716E+05	1.825E+01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m³/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m³/year)*	*(av ft^3/min)*
1	0	0	0	0	0	0
2	1.303E+03	7.116E+05	4.781E+01	2.041E+01	5.693E+03	3.825E-01
3	2.964E+03	1.619E+06	1.088E+02	4.643E+01	1.295E+04	8.704E-01
4	4.913E+03	2.684E+06	1.803E+02	7.696E+01	2.147E+04	1.443E+00
5	6.932E+03	3.787E+06	2.544E+02	1.086E+02	3.029E+04	2.035E+00
6	8.923E+03	4.875E+06	3.275E+02	1.398E+02	3.900E+04	2.620E+00
7	1.088E+04	5.945E+06	3.994E+02	1.705E+02	4.756E+04	3.195E+00
8	1.276E+04	6.973E+06	4.685E+02	2.000E+02	5.578E+04	3.748E+00
9	1.457E+04	7.961E+06	5.349E+02	2.283E+02	6.369E+04	4.279E+00
10	1.631E+04	8.910E+06	5.986E+02	2.555E+02	7.128E+04	4.789E+00
11	1.798E+04	9.822E+06	6.599E+02	2.816E+02	7.857E+04	5.279E+00
12	1.958E+04	1.070E+07	7.188E+02	3.068E+02	8.558E+04	5.750E+00
13	2.112E+04	1.154E+07	7.753E+02	3.309E+02	9.231E+04	6.203E+00
14	2.260E+04	1.235E+07	8.297E+02	3.541E+02	9.878E+04	6.637E+00
15	2.403E+04	1.313E+07	8.819E+02	3.764E+02	1.050E+05	7.055E+00
16	2.539E+04	1.387E+07	9.320E+02	3.978E+02	1.110E+05	7.456E+00
17	2.670E+04	1.459E+07	9.802E+02	4.183E+02	1.167E+05	7.842E+00
18	2.797E+04	1.528E+07	1.027E+03	4.381E+02	1.222E+05	8.212E+00
19	2.918E+04	1.594E+07	1.071E+03	4.571E+02	1.275E+05	8.568E+00
20	3.034E+04	1.658E+07	1.114E+03	4.753E+02	1.326E+05	8.910E+00
21	3.146E+04	1.719E+07	1.155E+03	4.929E+02	1.375E+05	9.239E+00
22	3.254E+04	1.777E+07	1.194E+03	5.097E+02	1.422E+05	9.554E+00
23	3.357E+04	1.834E+07	1.232E+03	5.259E+02	1.467E+05	9.858E+00
24	3.456E+04	1.888E+07	1.269E+03	5.414E+02	1.510E+05	1.015E+01
25	3.552E+04	1.940E+07	1.304E+03	5.564E+02	1.552E+05	1.043E+01
26	3.643E+04	1.990E+07	1.337E+03	5.707E+02	1.592E+05	1.070E+01
27	3.731E+04	2.038E+07	1.370E+03	5.845E+02	1.631E+05	1.096E+01
28	3.816E+04	2.085E+07	1.401E+03	5.977E+02	1.668E+05	1.120E+01
29	3.897E+04	2.129E+07	1.430E+03	6.105E+02	1.703E+05	1.144E+01
30	3.975E+04	2.172E+07	1.459E+03	6.227E+02	1.737E+05	1.167E+01
31	4.050E+04	2.213E+07	1.487E+03	6.345E+02	1.770E+05	1.189E+01
32	3.891E+04	2.126E+07	1.428E+03	6.096E+02	1.701E+05	1.143E+01
33	3.739E+04	2.042E+07	1.372E+03	5.857E+02	1.634E+05	1.098E+01
34	3.592E+04	1.962E+07	1.318E+03	5.627E+02	1.570E+05	1.055E+01
35	3.451E+04	1.885E+07	1.267E+03	5.406E+02	1.508E+05	1.013E+01
36	3.316E+04	1.811E+07	1.217E+03	5.194E+02	1.449E+05	9.737E+00
37	3.186E+04	1.740E+07	1.169E+03	4.991E+02	1.392E+05	9.355E+00
38	3.061E+04	1.672E+07	1.124E+03	4.795E+02	1.338E+05	8.988E+00
39	2.941E+04	1.607E+07	1.079E+03	4.607E+02	1.285E+05	8.636E+00
40	2.826E+04	1.544E+07	1.037E+03	4.426E+02	1.235E+05	8.297E+00
41	2.715E+04	1.483E+07	9.965E+02	4.253E+02	1.186E+05	7.972E+00
42	2.608E+04	1.425E+07	9.574E+02	4.086E+02	1.140E+05	7.659E+00
43	2.506E+04	1.369E+07	9.199E+02	3.926E+02	1.095E+05	7.359E+00
44	2.408E+04	1.315E+07	8.838E+02	3.772E+02	1.052E+05	7.070E+00
45	2.313E+04	1.264E+07	8.491E+02	3.624E+02	1.011E+05	6.793E+00
46	2.223E+04	1.214E+07	8.159E+02	3.482E+02	9.714E+04	6.527E+00
47	2.136E+04	1.167E+07	7.839E+02	3.345E+02	9.333E+04	6.271E+00
48	2.052E+04	1.121E+07	7.531E+02	3.214E+02	8.967E+04	6.025E+00
49	1.971E+04	1.077E+07	7.236E+02	3.088E+02	8.616E+04	5.789E+00
50	1.894E+04	1.035E+07	6.952E+02	2.967E+02	8.278E+04	5.562E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
51	1.820E+04	9.941E+06	6.680E+02	2.851E+02	7.953E+04	5.344E+00
52	1.748E+04	9.552E+06	6.418E+02	2.739E+02	7.641E+04	5.134E+00
53	1.680E+04	9.177E+06	6.166E+02	2.632E+02	7.342E+04	4.933E+00
54	1.614E+04	8.817E+06	5.924E+02	2.528E+02	7.054E+04	4.739E+00
55	1.551E+04	8.472E+06	5.692E+02	2.429E+02	6.777E+04	4.554E+00
56	1.490E+04	8.139E+06	5.469E+02	2.334E+02	6.511E+04	4.375E+00
57	1.431E+04	7.820E+06	5.254E+02	2.242E+02	6.256E+04	4.203E+00
58	1.375E+04	7.514E+06	5.048E+02	2.155E+02	6.011E+04	4.039E+00
59	1.321E+04	7.219E+06	4.850E+02	2.070E+02	5.775E+04	3.880E+00
60	1.270E+04	6.936E+06	4.660E+02	1.989E+02	5.549E+04	3.728E+00
61	1.220E+04	6.664E+06	4.477E+02	1.911E+02	5.331E+04	3.582E+00
62	1.172E+04	6.403E+06	4.302E+02	1.836E+02	5.122E+04	3.442E+00
63	1.126E+04	6.152E+06	4.133E+02	1.764E+02	4.921E+04	3.307E+00
64	1.082E+04	5.910E+06	3.971E+02	1.695E+02	4.728E+04	3.177E+00
65	1.039E+04	5.679E+06	3.815E+02	1.628E+02	4.543E+04	3.052E+00
66	9.987E+03	5.456E+06	3.666E+02	1.565E+02	4.365E+04	2.933E+00
67	9.596E+03	5.242E+06	3.522E+02	1.503E+02	4.194E+04	2.818E+00
68	9.219E+03	5.036E+06	3.384E+02	1.444E+02	4.029E+04	2.707E+00
69	8.858E+03	4.839E+06	3.251E+02	1.388E+02	3.871E+04	2.601E+00
70	8.510E+03	4.649E+06	3.124E+02	1.333E+02	3.719E+04	2.499E+00
71	8.177E+03	4.467E+06	3.001E+02	1.281E+02	3.574E+04	2.401E+00
72	7.856E+03	4.292E+06	2.884E+02	1.231E+02	3.433E+04	2.307E+00
73	7.548E+03	4.124E+06	2.771E+02	1.182E+02	3.299E+04	2.216E+00
74	7.252E+03	3.962E+06	2.662E+02	1.136E+02	3.169E+04	2.130E+00
75	6.968E+03	3.806E+06	2.558E+02	1.092E+02	3.045E+04	2.046E+00
76	6.695E+03	3.657E+06	2.457E+02	1.049E+02	2.926E+04	1.966E+00
77	6.432E+03	3.514E+06	2.361E+02	1.008E+02	2.811E+04	1.889E+00
78	6.180E+03	3.376E+06	2.268E+02	9.681E+01	2.701E+04	1.815E+00
79	5.938E+03	3.244E+06	2.179E+02	9.301E+01	2.595E+04	1.744E+00
80	5.705E+03	3.116E+06	2.094E+02	8.937E+01	2.493E+04	1.675E+00
81	5.481E+03	2.994E+06	2.012E+02	8.586E+01	2.395E+04	1.609E+00
82	5.266E+03	2.877E+06	1.933E+02	8.250E+01	2.302E+04	1.546E+00
83	5.060E+03	2.764E+06	1.857E+02	7.926E+01	2.211E+04	1.486E+00
84	4.861E+03	2.656E+06	1.784E+02	7.615E+01	2.125E+04	1.427E+00
85	4.671E+03	2.552E+06	1.714E+02	7.317E+01	2.041E+04	1.372E+00
86	4.488E+03	2.452E+06	1.647E+02	7.030E+01	1.961E+04	1.318E+00
87	4.312E+03	2.355E+06	1.583E+02	6.754E+01	1.884E+04	1.266E+00
88	4.142E+03	2.263E+06	1.521E+02	6.489E+01	1.810E+04	1.216E+00
89	3.980E+03	2.174E+06	1.461E+02	6.235E+01	1.739E+04	1.169E+00
90	3.824E+03	2.089E+06	1.404E+02	5.990E+01	1.671E+04	1.123E+00
91	3.674E+03	2.007E+06	1.349E+02	5.756E+01	1.606E+04	1.079E+00
92	3.530E+03	1.928E+06	1.296E+02	5.530E+01	1.543E+04	1.037E+00
93	3.392E+03	1.853E+06	1.245E+02	5.313E+01	1.482E+04	9.959E-01
94	3.259E+03	1.780E+06	1.196E+02	5.105E+01	1.424E+04	9.569E-01
95	3.131E+03	1.710E+06	1.149E+02	4.905E+01	1.368E+04	9.194E-01
96	3.008E+03	1.643E+06	1.104E+02	4.712E+01	1.315E+04	8.833E-01
97	2.890E+03	1.579E+06	1.061E+02	4.528E+01	1.263E+04	8.487E-01
98	2.777E+03	1.517E+06	1.019E+02	4.350E+01	1.214E+04	8.154E-01
99	2.668E+03	1.457E+06	9.793E+01	4.179E+01	1.166E+04	7.834E-01
100	2.563E+03	1.400E+06	9.409E+01	4.016E+01	1.120E+04	7.527E-01
101	2.463E+03	1.345E+06	9.040E+01	3.858E+01	1.076E+04	7.232E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
102	2.366E+03	1.293E+06	8.685E+01	3.707E+01	1.034E+04	6.948E-01
103	2.273E+03	1.242E+06	8.345E+01	3.561E+01	9.936E+03	6.676E-01
104	2.184E+03	1.193E+06	8.018E+01	3.422E+01	9.546E+03	6.414E-01
105	2.099E+03	1.146E+06	7.703E+01	3.288E+01	9.172E+03	6.163E-01
106	2.016E+03	1.102E+06	7.401E+01	3.159E+01	8.812E+03	5.921E-01
107	1.937E+03	1.058E+06	7.111E+01	3.035E+01	8.467E+03	5.689E-01
108	1.861E+03	1.017E+06	6.832E+01	2.916E+01	8.135E+03	5.466E-01
109	1.788E+03	9.770E+05	6.564E+01	2.802E+01	7.816E+03	5.251E-01
110	1.718E+03	9.387E+05	6.307E+01	2.692E+01	7.509E+03	5.046E-01
111	1.651E+03	9.019E+05	6.060E+01	2.586E+01	7.215E+03	4.848E-01
112	1.586E+03	8.665E+05	5.822E+01	2.485E+01	6.932E+03	4.658E-01
113	1.524E+03	8.325E+05	5.594E+01	2.387E+01	6.660E+03	4.475E-01
114	1.464E+03	7.999E+05	5.374E+01	2.294E+01	6.399E+03	4.300E-01
115	1.407E+03	7.685E+05	5.164E+01	2.204E+01	6.148E+03	4.131E-01
116	1.352E+03	7.384E+05	4.961E+01	2.117E+01	5.907E+03	3.969E-01
117	1.299E+03	7.094E+05	4.767E+01	2.034E+01	5.675E+03	3.813E-01
118	1.248E+03	6.816E+05	4.580E+01	1.955E+01	5.453E+03	3.664E-01
119	1.199E+03	6.549E+05	4.400E+01	1.878E+01	5.239E+03	3.520E-01
120	1.152E+03	6.292E+05	4.228E+01	1.804E+01	5.034E+03	3.382E-01
121	1.107E+03	6.045E+05	4.062E+01	1.734E+01	4.836E+03	3.250E-01
122	1.063E+03	5.808E+05	3.903E+01	1.666E+01	4.647E+03	3.122E-01
123	1.022E+03	5.581E+05	3.750E+01	1.600E+01	4.464E+03	3.000E-01
124	9.815E+02	5.362E+05	3.603E+01	1.538E+01	4.289E+03	2.882E-01
125	9.430E+02	5.152E+05	3.461E+01	1.477E+01	4.121E+03	2.769E-01
126	9.060E+02	4.950E+05	3.326E+01	1.419E+01	3.960E+03	2.660E-01
127	8.705E+02	4.755E+05	3.195E+01	1.364E+01	3.804E+03	2.556E-01
128	8.364E+02	4.569E+05	3.070E+01	1.310E+01	3.655E+03	2.456E-01
129	8.036E+02	4.390E+05	2.950E+01	1.259E+01	3.512E+03	2.360E-01
130	7.721E+02	4.218E+05	2.834E+01	1.209E+01	3.374E+03	2.267E-01
131	7.418E+02	4.052E+05	2.723E+01	1.162E+01	3.242E+03	2.178E-01
132	7.127E+02	3.893E+05	2.616E+01	1.116E+01	3.115E+03	2.093E-01
133	6.847E+02	3.741E+05	2.513E+01	1.073E+01	2.993E+03	2.011E-01
134	6.579E+02	3.594E+05	2.415E+01	1.031E+01	2.875E+03	1.932E-01
135	6.321E+02	3.453E+05	2.320E+01	9.902E+00	2.763E+03	1.856E-01
136	6.073E+02	3.318E+05	2.229E+01	9.514E+00	2.654E+03	1.783E-01
137	5.835E+02	3.188E+05	2.142E+01	9.141E+00	2.550E+03	1.713E-01
138	5.606E+02	3.063E+05	2.058E+01	8.782E+00	2.450E+03	1.646E-01
139	5.386E+02	2.943E+05	1.977E+01	8.438E+00	2.354E+03	1.582E-01
140	5.175E+02	2.827E+05	1.900E+01	8.107E+00	2.262E+03	1.520E-01
141	4.972E+02	2.716E+05	1.825E+01	7.789E+00	2.173E+03	1.460E-01

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APPENDIX J

On-Site Leachate Pre-treatment Design Report

December 2014

APPENDIX J

On-Site Leachate Pre-Treatment Design Report
Volume IV Design and Operations Report
Capital Region Resource Recovery Centre

REPORT

Report Number: 12-1125-0045/4500/vol IV

Table of Contents

TABLES

FIGURES

1.0 INTRODUCTION

1.1 Objectives

The objectives of this leachate pre-treatment design report are to:

- Identify the background, design basis, and scope of the proposed on-Site leachate pre-treatment system prior to assumed final treatment at the City of Ottawa Municipal Wastewater Treatment Plant (ROPEC);
- Present the proposed design concept;
- Outline proposed environmental protection provisions, monitoring programs and reporting requirements; and,
- Provide supporting documentation for submission of an Environmental Compliance Approval (ECA) application.

2.0 WASTEWATER QUANTITY

The leachate quantity is estimated to be approximately 20,000 m^3/year during the initial years, which will increase to 88,000 m^3/year by year 10 and continue to increase until the landfill is in its final phase to an estimated 230,000 m^3/year. Once the landfill is closed using the proposed permeable final cover approach, it is estimated that approximately 228,000 m^3 of leachate will require treatment per year.

Additionally, liquor from the organics processing will require treatment. The amount of organics to be processed at the Site is estimated to be approximately 50,000 tonnes per year and the liquor produced from this process is estimated to be 30,000 m^3 to 35,000 m^3 per year. During the initial years the Biopower demonstration project will likely produce a limited amount of liquor that would be re-used in the process, if possible. Hence, during this time no liquor has been accounted for requiring treatment. Table 1 shows the total estimated quantity of wastewater requiring treatment:

Table 1: Estimated Wastewater Quantity

Year	Landfill Leachate (m^3)	Organics Processing Liquor (m^3)	Total (m^3)
Initial years	20,000	-	20,000
By year 5	40,000	20,000	60,000
By year 10	88,000	30,000 – 35,000	118,000 – 123,000
Maximum	230,000	35,000	265,000
After landfill is closed	228,000	-	228,000

2.1.1 Surface Water Diversion

In order to reduce the quantity of water requiring on-Site pre-treatment, the non-impacted runoff generated from the covered sideslopes of the landfill will be captured by a separate stormwater runoff system. This is addressed in a separate part of the Design and Operations (D&O) Report.

3.0 WASTEWATER QUALITY

Leachate age, precipitation, waste type and composition are the main factors that affect leachate quality. The leachate quality from the CRRRC landfill component is expected to be less in strength than typical landfills accepting municipal waste; however, similar to the leachate quality observed at Otter Lake Waste Processing and Disposal Facility in Nova Scotia (Otter Lake) which has a front end processor, waste stabilization facility and residual disposal facility somewhat similar to the proposed Capital Region Resource Recovery Centre (CRRRC) facility. The following table provides a comparison of typical leachate parameters from a municipal waste landfill to Otter Lake Landfill leachate data. The typical values are based on analytical results from municipal waste containing landfill sites within Ontario, literature and values used in the Ontario Landfill Standards (MOE, 1998). Actual values will not be known until the landfill is in operation and the leachate quality is monitored.

Table 2: Estimated Leachate Quality

Parameters	Typical Peak Concentration for Municipal Landfill Leachate (mg/L)	Otter Lake		
		Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
BOD	8,000	14	5,600	761
NO2+NO3		0.05	270	35
NO3	5	<0.1	87	22
NO2		<0.1	190	15
Ammonia	800	4.2	620	260
Phenols	4			
P	50	0.10	16	2.5
SO4		2	530	215
TSS	1,500	14	8,700	290
Al	2	0.1	157	5.3
As		0.01	1.4	0.16
B	9	0.3	17	7
Cd	0.05			
Cr		0.02	2.8	0.3
Co	0.05	0.01	0.38	0.04
Cu	0.4	0.02	4.2	0.5
Pb		0	0.2	0.03
Mn		0.09	11	2
Ni	0. 4	0.06	2.3	0.25
Ag	0.003			
Ti		0.01	3.7	0.2
V	0.5	0.01	1	0.10
Zn	2	0.06	2.5	0.5
pH	5.2 – 8.0	6.2	8.6	7.8
Fe	50	0.3	229	14

The organics processing liquor quality was similarly estimated based on information found in the literature. Based on data obtained from a full scale treatment plant designed to treat the source separated organic fraction of municipal solid waste (OFMSW) in Spain, the effluent liquor has average ammonia, phosphorous and total organic carbon concentrations of 1,360, 30 and 14,400 mg/L, respectively (Pognani, et al., 2012). Similarly the average ammonia concentrations in a bench scale reactors anaerobically treating mechanically recovered OFMSW was reported as 1,470 mg/L (Zhang et al., 2012). The metal concentrations were reported by Pognani et al. (2012) as the following: Cd 0.16 mg/L, Cr 10.9 mg/L, Cu 19.2 mg/L, Ni 9.1 mg/L, Pb 17.4 mg/L and Zn 55.2/L. During the first five years, the CRRRC wastewater will have a higher proportion of liquor to leachate, which, when combined, will initially affect overall quality. However, after year 10 the effect of liquor quality on the overall mixed influent to the pre-treatment system is expected to be less. Table 3 summarizes the estimated digested organics processing liquor quality. Similar to leachate quality estimates, the actual values will not be known until the organics processing is in operation and the quality is monitored.

Table 3: Estimated Digested Organics Processing Liquor Quality

Parameters	Estimated Liquor concentrations (mg/L)
Ammonia	1,700
BOD	2,000
TP	50
All metals	Same or less than maximum concentrations in leachate

4.0 PROPOSED ON-SITE PRE-TREATMENT SYSTEM DESIGN

4.1 General Design Considerations

The overall design philosophy of the CRRRC on-Site pre-treatment facility utilizes proven and cost-effective components. After analyzing the available options, pre-treating the wastewater on-Site and hauling it to ROPEC was chosen as the preferred wastewater treatment system to both minimize potential environmental effects and minimize the complexity, infrastructure and operational costs of the on-Site pre-treatment. A Sequencing Batch Reactor system was chosen for its high treatment efficiency and scalability. All design components are sized based on the estimated maximum averaged flow rate. The pre-treatment system development will be phased based on the actual leachate and liquor incoming flow rates from the landfill and organics processing facility operations. Some components may not be required based on actual quality and quantity of wastewater.

4.2 Effluent Discharge Criteria

For the effluent to be accepted by ROPEC, it is required to meet the City of Ottawa Sewer Use By-Law (City of Ottawa, 2003). An agreement with the City of Ottawa will be required. Table 4 shows parameters anticipated to require treatment based on the conservative quality estimates for these parameters compared with the Sewer Use By-law limits.

Table 4: Estimated CRRRC Wastewater Parameters Compared to the City of Ottawa Sewer Use By-law (City of Ottawa, 2003)

Parameters	City of Ottawa Sewer Use By-law Limits (mg/L)	Estimated Maximum Leachate Concentrations (mg/L)	Estimated Liquor Concentrations (mg/L)
BOD	300	8,000	2,000
TKN	100	>800	>1,700
Ammonia	--	800	1,700
TP	10	50	50
TSS	350	8,700	Same or less than maximum concentrations in the leachate
Al	50	157	
Cd	0.02	0.05	
Cu	3	4.2	

To be conservative, the highest values for each parameter from municipal leachate quality and Otter Lake Landfill leachate data (Table 2) were considered as design criteria.

4.3 Pre-treatment System Description

4.3.1 Collection

The leachate collection system consists of a series of sloped perforated pipes within a granular drainage blanket underneath the landfill. The piping is separated into nine different drainage areas with each area sloping into a manhole. Leachate pumps in each of the nine manholes will pump the raw leachate to the equalization tank in the leachate pre-treatment building. The pumps will be controlled by level switches such that as the leachate level in the manholes rises, the pumps turn on and remove the leachate. The design of the leachate collection system is discussed in the landfill design section of the D&O report.

4.3.2 Equalization and Storage

The collection system will pump the leachate into a 1,520 m^3 equalization tank located within the main pre-treatment building. Excess leachate will overflow from the equalization tank into the leachate storage pond where it will be kept until treatment capacity is available. The liquor from the organics processing facility will be pumped into the liquor storage tank, also located in the main pre-treatment building. The liquor from the organics facility will be combined with the landfill leachate at a ratio determined by the operator before entering heat exchangers prior to the sequencing batch reactors.

4.3.2.1 Leachate Storage Pond/Tank(s)

The leachate storage pond/tank(s) will have approximately 44,000 m^3 storage capacity. If a pond is used, it will have a maximum liquid depth of 3 metres. Total excavation depth will be 3.6 metres providing a 0.6 metre freeboard at maximum liquid capacity. The pond will be constructed with minimum 4H:1V sideslopes and will be lined using a geomembrane liner having properties suitable for chemical compatibility/resistance to leachate impacted waters and long term performance in an exposed liner application. If a tank(s) is to be used, the volume noted above will be provided within the tank(s). The leachate storage volume available will be approximately two months of storage based on the maximum yearly flow rate estimate. This volume will be used to store excess leachate from the landfill during periods when the supply of leachate is greater than the design flow of the pre-treatment system. The storage is projected to be utilized primarily during the spring runoff season and periods of high precipitation. An aeration system will be implemented in the storage pond for the reduction of odours.

Once leachate generation slows and there is capacity in the pre-treatment system, liquid from the leachate storage pond will be pumped back into the equalization tank. A pumping chamber will be provided at the discharge of the storage pond to house the transfer pump to pump the liquid back into the equalization tank.

Consideration may be given to the use of a floating cover for the leachate storage pond. The floating cover may be considered as a means of odour control, if required.

4.3.3 Wastewater Treatment

In order to optimize the biological processes, particularly for ammonia reduction, the influent should be at a temperature of around 15^{o}C. The operator will be able to adjust temperatures to optimize performance.

4.3.3.1 Boilers and Heat Exchangers

It will be necessary to use a system of boilers and heat exchangers to pre-heat the wastewater before it enters the biological treatment system at certain times of the year. During the winter months, liquid stored in the leachate storage pond may need to be heated from < 4^{o}C to about 15^{o}C, while in the summer months the heating requirements will decline. The boilers and heat exchangers will also be needed to heat the facility building. It is anticipated that the boilers and heat exchangers will use heat recovered from the flare/generator, biogas from the organics processing facility and/or landfill and/or fuel oil.

4.3.3.2 Sludge Digestion Tank

Pre-heated raw influent from the heat exchangers initially flows into the sludge digestion tank (1,520 m^3). The sludge digestion tank is kept full of liquid and overflows into one of up to three liquor holding tanks (1,520 m^3 each). In the sludge digestion tank, anaerobic conditions facilitate the breakdown of sludge that accumulates at the bottom of the tank using carbon in the incoming raw influent stream.

As sludge builds up in the bottom of the sludge digestion tank, it is pumped to the sludge management system as described in Section 4.3.5.

4.3.3.3 Air Scrubbing Equipment

Since there is a potential for anaerobic bacterial activity, the vents from the sludge digestion tank, equalization tank, and liquor storage tank will be combined before being directed to a discharge stack on the roof of the building. Once the plant is operational, if the air discharge from the stack has parameters exceeding the applicable Ministry of the Environment and Climate Change's (MOECC) regulations regarding air emission, a scrubber will be installed on the stack to limit the release of parameters such as methane and hydrogen sulphide.

4.3.3.4 Mixed Liquor Holding Tanks

As the liquid overflows the sludge digestion tank, it flows equally to each of the mixed liquor holding tanks (1,520 m^3 each). Two mixed liquor holding tanks are anticipated based on the estimated maximum average daily flow. One mixed liquor holding tank will be provided for redundancy. All mixed liquor tanks will be operated continuously at lower rates than design capacity; this could change based on actual flows. When the mixed liquor holding tanks are full, the wastewater is transferred to one of the leachate digestion tanks in a batch process with a portion of the transferred liquid cycled back to the sludge digestion tank where the biological solids settle. Once the leachate digestion tank is full, the pumps continue to run and nitrified mixed liquor overflows from the leachate digestion tank back into the mixed liquor holding tank. This recycled flow mixes with carbon-rich raw influent allowing denitrifying bacteria to convert nitrates into nitrogen gas in the mixed liquor holding tank.

The mixed liquor holding tanks fill the leachate digestion tanks with liquid in a batch process. Once one digestion tank is full, the system fills the next digestion tank in the cycle.

4.3.3.5 Leachate Digestion Tanks

The leachate digestion tanks (1,520 m^3 each) receive liquid from the mixed liquor holding tanks in a batch process. As the tank is being filled, a blower system aerates the liquid encouraging aerobic bacteria to break down organic compounds and nitrify ammonia in the wastewater. Four leachate digestion tanks are anticipated based on the estimated maximum average daily flow; this could change based on actual flows. Similar to mixed liquor holding tanks, two additional reactors are included for redundancy purposes. All reactors will be operated to maintain biological health in each reactor.

Once the solids have settled to the bottom of the tank, a timer initiates the decanting phase where clarified effluent is drawn off the top of the tank and directed to the chemical clarification step. Once the clarified effluent is drawn off the top, the tank is filled again from the mixed liquor holding tank and the cycle repeats.

4.3.3.6 Chemical Clarification

The liquid effluent from the leachate digestion tanks is directed to a mixing tank (25 m^3) where alum and/or other chemicals for metal precipitation are added to the liquid in order to facilitate coagulation. A mechanical agitator promotes mixing. After the mixing tank, a clarifier allows the coagulated particles to settle out of suspension. If required, the pH of the clarified liquid effluent will be adjusted back to the range required by the City of Ottawa Sewer Use By-law (City of Ottawa, 2003) and described in the discharge agreement before it is directed to the treated effluent pond. The settled sludge will be directed to the sludge management system. The combination of chemical addition and clarification is designed to increase the removal of metals not already removed in the leachate digestion tanks. Additionally, if the metals concentration in the raw leachate is found to be toxic to the biological treatment, there will be a provision to divert the raw leachate to the mixing tank and clarifier prior to the sludge digestion tank to eliminate/minimize the toxicity in the influent.

4.3.4 Treated Effluent Ponds/Tanks

The treated effluent from the chemical clarification step is pumped to the effluent ponds/tanks, which will have approximately 11,000 m^3 storage capacity. If the ponds are used, it will have a liquid depth of approximately3 metres. Total excavation depth will be approximately 3.6 metres providing a 0.6 metre freeboard at maximum liquid capacity. The ponds will be constructed with minimum 4H:1V side slope and will be lined with a geomembrane liner having properties suitable for chemical compatibility/resistance and long term performance in an exposed liner application. If tanks are selected, the volume noted above will be provided within the tanks. The liquid storage volume is divided into two compartments each with approximately one week of storage based on the design flow rate of the leachate pre-treatment system. Pumps will mix/circulate/aerate water in each compartment and transfer water from the first compartment to the second compartment.

The tanker trucks will be filled by pump from the second compartment. . The tanker trucks will transport the pre-treated effluent to ROPEC where it will be further treated in the wastewater plant prior to discharge. If in future a forcemain is used for conveying the pre-treated effluent for final off-Site treatment at ROPEC, an appropriate system to pump from the effluent ponds/tanks via forcemain to the discharge location would be provided.

4.3.5 Sludge Management

The sludge management system will receive sludge from both the clarifier and the sludge digestion tank. Sludge will be pumped to a sludge holding tank (38 m^3) where it will be mixed by a mechanical agitator in order to provide a homogeneous mixture. A liquid polymer will be added to the sludge holding tank to facilitate efficient dewatering.

From the sludge holding tank, the sludge will be dewatered using seven Geotube™ (Geotube) units. Each Geotube is a porous tube made of specifically engineered dewatering textile supported on a concrete pad. As sludge is pumped into the tube, water filters out through the fabric and is collected by the trenches on the concrete pad while the solids are trapped inside the tube. Once the tube is full, the solids will be disposed to the landfill.

The liquid passing through the Geotube textile captured by the trenches on the concrete pad would be directed to the leachate storage pond where it re-enters the treatment process.

In the summer period, four Geotubes will be located on an outdoor concrete pad. During the winter months, three additional Geotubes will be housed within a greenhouse.

4.3.6 Building Facilities

The leachate pre-treatment system will be housed in two buildings. The first, primary building will house all major process units including the equalization tank, boilers, heat exchangers, sludge holding tank, mixed liquor tanks, leachate digestion tanks, sludge storage tank, mixing tank, clarifier, pH adjustment system, and all associated pumps and control equipment. This building will be approximately 50 metres by 150 metres and have an inside height of approximately 12 metres. The building will be insulated and heated using boilers/exchangers described in Section 4.3.3, or via a fuel oil heating system.

4.3.7 Tanker Truck Filling Station

Treated effluent will be hauled to ROPEC for further treatment. At the maximum design flow rate of about 800 m^3/day, about twenty trips by 40m^3 tanker trucks will be required each day to transport the treated wastewater. In order to facilitate the filling of multiple tanker trucks simultaneously, multiple pump hose connections will be installed at the tanker truck filling station to pump effluent from the treated effluent pond into the trucks.

4.4 Equipment List

The following is a list of the major process components of the pre-treatment system. The pre-treatment system layout and process schematics are provided on Figure 1 and 2, respectively. Transfer pump sizes and locations may change based on the final hydraulic profile of the plant:

Total Design Capacity: 800,000 L/day

1) Equalization Tank

One (1) equalization tank, 19 metres in diameter by 6.7 metres top water level (TWL) with two (2) 30 hp pumps to transfer liquid through a 150 mm pipe to the leachate storage pond. Two (2) 20 hp leachate feed pumps feed the sludge digestion/holding tank through a 200 mm pipe.

2) Liquor Storage Tank

One (1) 6.8 metre diameter by 5.6 m high liquor storage tank to hold liquid waste from organics processing with two (2) 30 hp liquor pumps to transfer the liquor to the equalization tank through a 100 mm pipe.

3) Leachate Storage Pond

One (1) storage pond with approximate volume of 48,000 m^3. Pond to be approximately 3 metres deep and hydraulically connected to a pump maintenance hole containing two (2) 50 hp effluent pumps to transfer leachate back to the equalization tank through a 150 mm line.

4) Heat Exchangers

Assumed space required approximately 2 metres long by 0.6 metres wide by 1.5 metres tall.

5) Boilers

The system shall be capable of heating 850 L/min of water to at least 15 degrees Celsius.

6) Sludge Digestion/Holding Tank

One (1) sludge digestion/holding tank to be 19 metres diameter by 6.7 metres TWL. Tank Installed with inlet and outlet baffles and one (1) jet mixing manifold with 20 hp submersible jet mixing pump. Liquid piping from equalization tank to terminate inside the tank with 200 mm flange connection. Sludge digestion tank installed with three (3) 200 mm electric operated control valves to fill mixed liquor holding tanks. Pipes from sludge digestion tank to the mixed liquor holding tanks to be 200 mm.

7) Mixed Liquor Holding Tanks

Three (3) mixed liquor holding tanks to be 19 metres diameter by 6.7 metres TWL. Each tank installed with one (1) jet aeration manifold and one (1) 30 hp jet mixing pump (3 total). Liquid piping from sludge digestion/holding tank to terminate inside the tank with 200 mm flanged connection. Air piping to terminate inside the tank with a 150 mm flange connection with 150 mm air feed pipe coming through the tank roof. Mixed liquor holding tank installed with two (2) 100 mm electric operated control valves (6 total) and 100 mm line to fill leachate digestion tanks and one (1) 100 mm electric waste sludge control valve (3 total) and line to return sludge to sludge digestion/holding tank. Mixed liquor holding tank also installed with one (1) aeration pressure blower package driven by one (1) 50 hp motor (3 packages total).

8) Leachate Digestion Tanks

Six (6) leachate digestion tanks to be 19 metres in diameter by 6.7 metres TWL. Tanks installed with one (1) decanter each with 250 mm flange connection and piping to mixing tank (6 total) and one (1) jet aeration manifold with 30 hp jet mixing pump each (6 total). Each leachate digestion tank installed with one (1) aeration pressure blower package driven by one (1) 60 hp motor each (6 total).

9) Mixing Tank

One (1) mixing tank to be 3.4 metre diameter by 2.8 TWL with one (1) 1.5 hp top entry agitator. Inlet and outlet piping to be 200 mm.

10) Clarifier Tank

One (1) clarifier tank to be 7.6 metre diameter by 3.7 TWL with gravity connection to effluent storage pond. Outlet piping to be 200 mm.

11) PH Adjustment

One (1) pH adjustment system with chemical addition pump and 5 m^3 chemical storage tank.

12) Effluent Storage Pond

One (1) effluent storage pond with approximate volume of 5,150 m^3. Pond liquid level to be 2.5 metres deep (maximum) and connected to a pumping station containing three (3) 30 hp effluent pumps to fill tanker trucks. Pond to include a high level gravity emergency overflow to drainage ditch.

13) Sludge Storage Tank

One (1) sludge storage tank to be 4.3 metre diameter by 2.8 TWL with one (1) 30 hp sludge pump to transfer sludge to sludge dewatering facility with 200 mm piped connections from the clarifier and sludge digestion tanks. One (1) 5 hp mixer installed in sludge storage tank. One (1) 5 hp sludge feed pump to feed dewatering process through a 200 mm line.

14) Greenhouse

One (1) greenhouse building to be approximately 8.5 metre by 91.5 metre for sludge dewatering. Floor to be sloped to collect liquid from solids dewatering

15) Sludge Dewatering Pad

One (1) sludge dewatering pad to be approximately 55 metres by 30 metres (excluding berms and trench) with sloped floor to collect liquid from solids dewatering.

16) Sludge Thickening Polymer Addition System

One (1) sludge thickening polymer addition system including polymer metering pump, polymer low shear dispersion mixers, one (1) ½ hp water pressure booster pump, and associated controls.

4.5 Contingency Measures and Maintenance

The following provides a summary of operational conditions that may be encountered and contingency and/or maintenance options that could be undertaken.

Operational Condition	Contingency Options
Higher Flows than Design	Treatment process can be operated at 1,200 m^3/day with minimal effect on effluent quality.
Lower Flows than Design	Treatment process can be operated with fewer leachate digestion tanks operating to reduce flows. Alternatively, leachate digestion tanks and mixed liquor holding tanks can be operated at approximately 25% of their design flow without affecting system performance.
Higher metals loading or toxic constituents than assumed	Provision within the pre-treatment building will be made to direct raw wastewater from the initial equalization tank to the chemical mixing tank and clarifier before flowing through the biological treatment processes to remove excess metals.
Disruption to hauling treated liquid effluent	During normal operations, the effluent storage pond will be kept at a minimum volume so that in the event of a disruption to the hauled effluent program, the operator has approximately two weeks of storage at the design flows to fix the issue. If the operator chooses, the flow rate through the pre-treatment system can be temporarily reduced and leachate stored in the leachate storage pond in order to gain greater than two weeks storage in the effluent storage pond. Pumping from the leachate collection system beneath the landfill can be temporarily reduced or suspended.

5.0 PROPOSED MONITORING

Environmental monitoring related to the leachate pre-treatment system of the CRRRC will be carried out concurrently with the overall Site monitoring program. As such, reference should be made to the overall facility D&O report for monitoring, trigger mechanisms and contingency measures related to groundwater, leachate, surface water, sediment, dust, noise, odour and biology.

In addition to the monitoring of process variables required to properly operate the pre-treatment system, testing of the pre-treated effluent will be completed and compared to the City of Ottawa Sewer Use Bylaw (City of Ottawa, 2003), as required by the agreement between Taggart Miller and the City of Ottawa.

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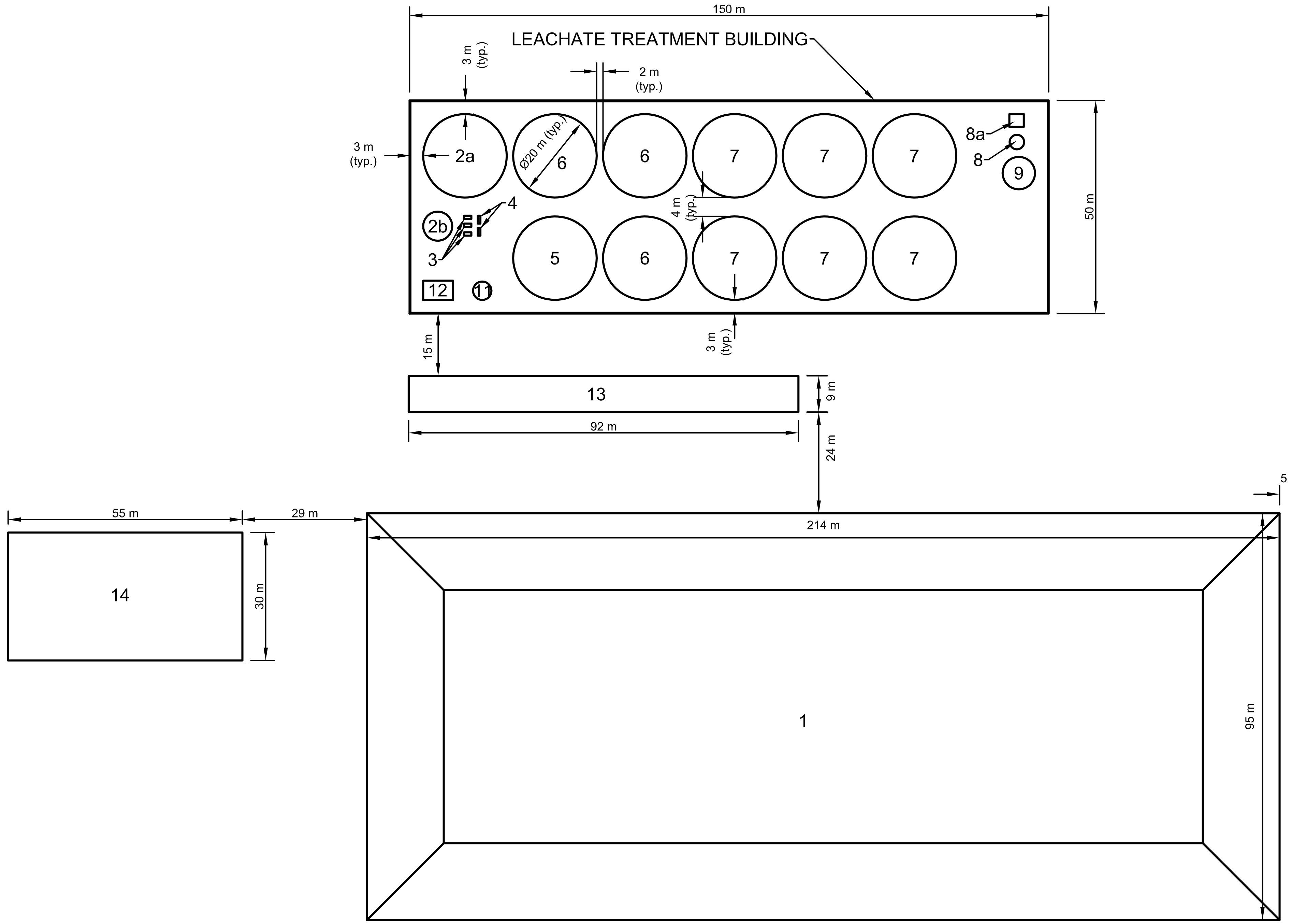
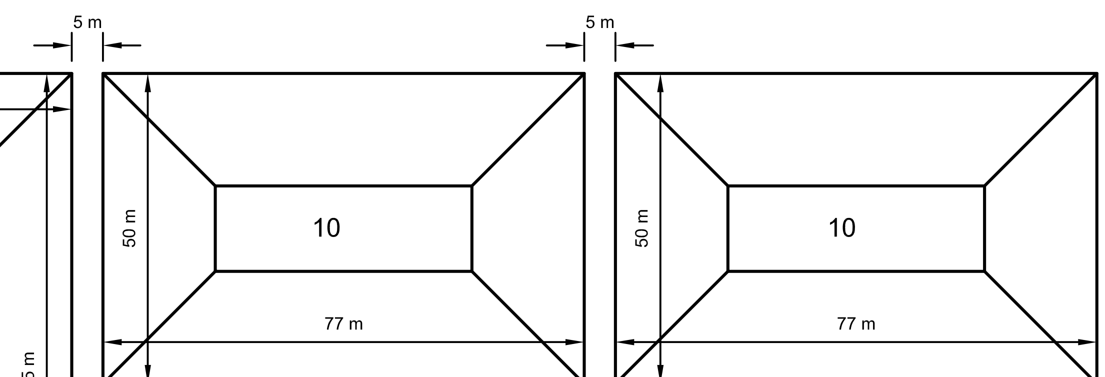
Ministry of the Environment (MOE). (1998). *Landfill Standards – A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites.* Last Updated: January 2012.





No.	Description
1	Leachate Storage pond and/or tank (s)
2a	Equalization tank
2b	Liquor storage tank
3	Boilers
4	Heat exchangers
5	Sludge digestion holding tank
6	Mixed liquor holding tank
7	Leachate digestion tank
8	Mixing tank
8a	Chemical storage/preparation area
9	Clarifier
10	Treated Effluent Ponds or Tanks
11	Sludge storage tank
12	Sludge process control/ polymer storage area
13	Green house
14	Sludge dewatering pad

NOTES

1. BUILDINGS, PONDS, PAD AND LAYOUT SUBJECT TO CHANGE DURING FINAL DESIGN.

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LEACHATE PRE-TREATMENT SYSTEM LAYOUT

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			FILE No. 1211250045-V4-lea-1-2.dwg	
DESIGN	I.T.M.	Nov. 2013	SCALE N.T.S.	REV. 0
CADD	M.L.F.	Nov. 2013	**Figure 1**	
CHECK	P.L.E.	Aug. 2014		
REVIEW	P.A.S.	Aug. 2014		

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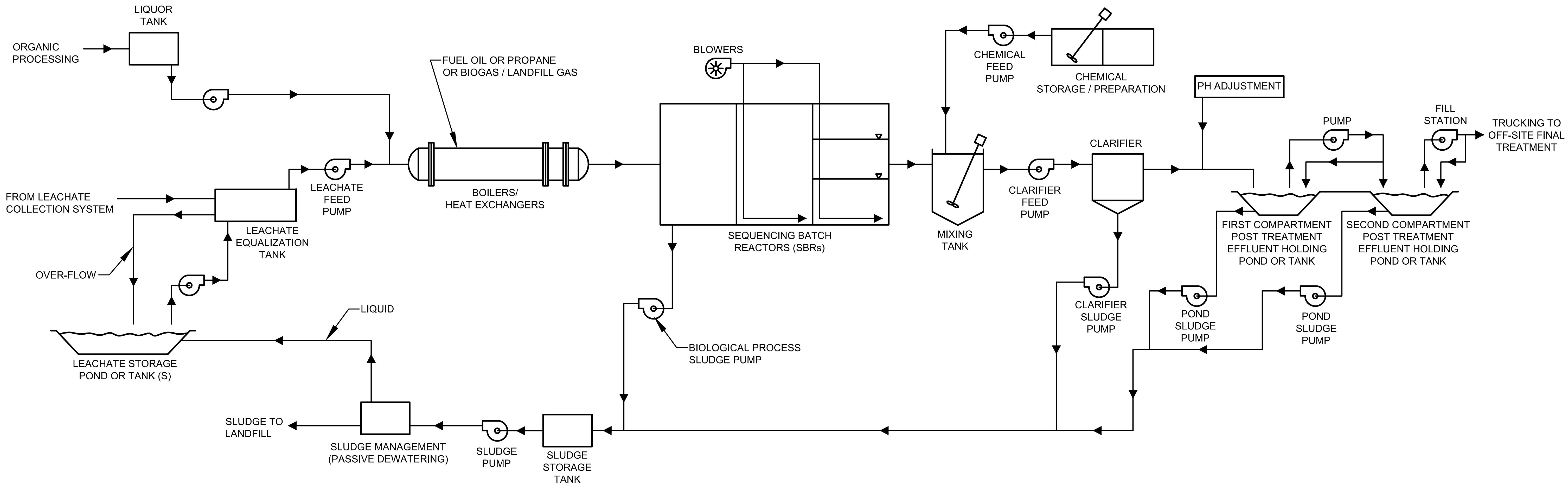

PROJECT

CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LEACHATE PRE-TREATMENT SYSTEM SCHEMATIC

Golder Associates
Ottawa, Ontario

PROJECT No. 12–1125–0045			FILE No. 1211250045-V4-lea-1-2.dwg	
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CHECK	P.L.E.	Aug. 2014		
REVIEW	P.A.S.	Aug. 2014		

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