ATTACHMENT 1

Design and Operations Report

March 2011

DURHAM YORK ENERGY CENTRE

Design and Operations Report in Support of Environmental Protection Act Section 27 Certificate of Approval (Waste) Application

Submitted to:

Ontario Ministry of the Environment
Director Section 27
Environmental Assessment and Approvals Branch
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Toronto, Ontario
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REPORT

Report Number: 10-1151-0343 (5000)

Golder Associates

Definitions

"Environmental Assessment" means the document titled Durham/York Residual Waste Study Environmental Assessment Study Document (As amended November 27, 2009).

"Non Hazardous Municipal Solid Waste" means the waste that is generated within the Regional Municipalities of Durham and York and collected at Regional facilities and direct haul from curbside vehicles as part of the proponent's municipal collection process.

"Processed Waste" means waste that has been sorted, baled, mulched or otherwise handled to allow the waste to be diverted for recycling.

"Proponent" means the Regional Municipality of Durham and the Regional Municipality of York.

"Site" means the 12.1 hectare parcel of land referred to as Clarington 01 in the environmental assessment and is located south of Highway 401 on the west side of Osbourne Road and north of the CN Rail corridor in the Municipality of Clarington.

"Residual Waste" means waste that is destined for final disposal or further processing at an approved waste disposal facility.

"Undertaking" means the construction and operation of a thermal treatment waste management facility on the Site, as set out in the environmental assessment.

"MCR" Maximum Continuous Rating (see Appendix A).

Units of Measure

Mass/Weight

t – Metric tonne

Mg – Mega grams

Kg – kilogram

g – Gram

Mg – milligrams

µg – microgram

Distance

m – metre

Km – kilometre

Power

W – Watt

kW -- kilowatt

MW – megawatt

Area

m^2 – square metre

Volume

L – Litre

mL – millilitre

m^3 – cubic metre

Rm^3 and DSm^3 – dry cubic metre of flue gas corrected to standard conditions (25°C, 101.3kPa, 11% O_2) as defined by MOE APC on Incinerators Policy 01-03-02

Time

s – second

min – minute

hr – hour

wk – week

y – year

Miscellaneous

% – percent

°C – temperature in degrees Celsius

Hz – Hertz

kPa – kilopascals

MPa – Megapascals

KVA – Kilovolts Ampere

ou – odour unit

MJ – Mega joule

GJ – Giga joule

MMBTU – One Million British Thermal Unit

N – Newton

ppmdv – part per million by dry volume

ppmv – part per million by volume

ppm – part per million

V – Volt

Vdc – Volts direct current

Acronyms

AAR – Acoustic Assessment Report

AODA – Accessibility for Ontarians with Disabilities Act

ACC – Air Cooled Condenser

APC – Air Pollution Control

CA – Combustion Air

CEM – Continuous Emission Monitoring

CN – Canadian National

CofA – Certificate of Approval

Covanta – Covanta Energy Corporation

DAS – Data Acquisition System

DCS – Distributed Control System

Durham-York – The Regional Municipalities of Durham and York

EA – Environmental Assessment

EAAB – Environmental Assessment and Approvals Branch

ECP – Emergency & Contingency Plan

ESC – Erosion and Sediment Control

Facility – The proposed Durham York Energy Centre

HHV – Higher Heating Value

HVAC – Heating, Ventilating and Air Conditioning

IC&I – Industrial, Commercial and Institutional

ID – Induced Draft

IGR – Internal Gas Recirculation

I/P – Current-to-pressure

IR – Infrared

LPM – Litres per Minute

MCC – Motor Control Centre

MCTD – Maximum Continuous Turndown

MHSW – Municipal Hazardous and Special Waste

MOE – Ontario Ministry of the Environment

MSW – Municipal Solid Waste

NFe – Non-Ferrous

NO_x – Nitrogen Oxides

NPSH – Net Positive Suction Head

OJT – On the Job Training

O.Reg – Ontario Regulation

POR – Points of Reception

RF – Radiofrequency

RPM – Revolutions per Minute

SNCR – Selective non-Catalytic Reduction

SOP – Standard Operating Procedures

SSO – Source Separated Organic

SWMP – Stormwater Management Pond

TG – Turbine-Generator

TSSA –Technical Standards and Safety Authority

UPS – Uninterruptable Power Supply

VFD – Variable Frequency Drive

VWO – Valves Wide Open

WEEE – Waste Electronics and Electrical Equipment

WHMIS – Workplace Hazardous Materials Information System

WPCP – Water Pollution Control Plant

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Specifications Summary

Proponent:	The Regional Municipalities of Durham and York
Operation Reference:	Durham York Energy Centre
Address:	72 Osbourne Road, Courtice, Ontario, L1E 2R2 Clarington Energy Business Park, Clarington, Ontario
Technology:	Martin GmbH Reverse Reciprocating Stoker Grate
Waste Streams:	Municipal Solid Waste
Site Size:	12.1 hectares
Operating Days:	365 days per year
Hours of Operation:	Operating Hours: 24 hours / day (7 days / week)
Annual Maximum Waste Thermally Treated:	140,000 tonnes

1.0 INTRODUCTION

The Regional Municipalities of Durham and York ("Durham-York") are developing an Energy from Waste Facility (the "Facility") located on the west side of Osbourne Road, south of Highway 401 and north of a Canadian National (CN) Rail Corridor in the Municipality of Clarington (see Figure 1). Covanta Energy ("Covanta") will design, build and operate the Facility. The Facility is a Thermal Treatment Facility, capable of processing post-diversion residual waste and recovering materials and energy to export to the marketplace. Only non-hazardous municipal solid waste (MSW) collected at Regional facilities from municipal collection and direct haul from curbside vehicles within the jurisdictional boundaries of the Regional Municipalities of Durham and York will be accepted at the Facility.

An Environmental Assessment (EA) Study has been completed to address the Durham-York's solid waste needs and long-term disposal requirements. The Ontario Ministry of the Environment (MOE) Notice of Approval to Proceed with the Undertaking was published in November 2010 (Appendix B).

This report is a Design and Operations Report for the Facility and has been prepared in support of the application for a CofA for a thermal treatment Facility under Part V of the *Environmental Protection Act.* It describes the design and operations of the proposed Facility and has been written in accordance with the MOE *Guide for Applying for Approval of Waste Disposal Sites* (September 2010). Table 1 summarizes the MOE Design and Operation Report requirements and their corresponding locations in this document.

Table 1: Design and Operations Report Conformity Summary

Requirement	Report Section
Thermal Treatment Facility	
Site Plan/Location Map	Figure 1
Waste Sources, Types and Quantities	5.5, and Appendix E
Maximum Quantity of each Type of Waste	Appendix E
Description of Thermal Treatment Process	6.0
Description of Thermal Treatment Unit Design	6.0, 7.0, 9.0
Description of all Residual Wastes Generated	8.0
Monitoring and Control Programs A)Noise B)Odour C)Litter D)Dust E)Vermin/Pest	13.0
Emergency Operation and Contingency Plan	12.0
Record Keeping, Reporting, Labelling, Complaint, Monitoring Procedures	15.0
Stormwater Management Plan	11.0
Site and Waste Handling Procedures	5.0, and Appendix D
Site Fencing, Security, Access and Hours of Operation	3.0
Facility Maintenance and Inspection	14.0
Staff Training and Qualifications of Staff	15.1
Noise Impact and Mitigation	13.1
Decommissioning Plan	16.0

All process data and descriptions presented in this report are current to the level of Facility design at this time and will be refined as required or appropriate during completion of the detailed design of the Facility. These changes will not result in material changes to Facility operations.

This Design and Operations Report will evolve with the progression of the Facility. As such, Covanta and Durham-York will periodically review the relevant sections of the Design and Operations Report to ensure it is accurate and effective, and will complete updates, as required. These updates can be submitted to the MOE and added to the CofA for which approval is sought by amending notice.

1.1 Function of Site

The Facility will provide a safe and environmentally acceptable method of waste disposal through thermal waste treatment and will generate electrical power via a steam-turbine generator. The net electricity produced by the Facility will be sent out to the local grid and distributed by HydroOne Inc. The Facility will also have provisions to extract steam from the process to supply heat to a future hot water district heating loop that could service the neighbouring Courtice Water Pollution Control Plant (WPCP) and the surrounding Clarington Energy Park. Additionally, the Facility will recover ferrous and non-ferrous metals from the ash residue stream for recycling.

The Facility will include two mass-burn thermal treatment units; each with a nominal nameplate capacity of 218 tonnes/day (Maximum Continuous Rating (MCR)) designed to annually process up to 140,000 tonnes of waste with an average higher heating value (HHV) of 13.0 MJ/kg. The HHV of 13.0 MJ/kg was determined based on waste characterization studies performed by Durham-York. The thermal treatment units will be designed to process solid waste having an HHV ranging from 8.4 MJ/kg to 15 MJ/kg; therefore, actual waste processing rates will vary based on waste heating value. Each unit incorporates an independent process train with a combustion grate, boiler and air pollution control equipment, which can continue to process MSW if the other process train is not operating (see Figure 2).

It is anticipated that over the 35 year planning period, the maximum design capacity of the Facility could be up to 400,000 tonnes per year. The expansion of the Facility beyond the approved capacity of 140,000 tonnes per year would be subject to environmental screening requirements under Ontario Regulation 101/07, as amended, or the applicable piece of legislation at the time of expansion. In addition, an amended CofA would be required.

Solid waste delivered to the Facility will be received within an enclosed tipping building and discharged into a concrete solid waste storage pit. MSW mixing and handling in the refuse pit, and MSW feeding into the boilers will be handled by two refuse cranes designed to accommodate the increased processing capacity of the first expansion of the Facility.

Once fed into the feed hopper and down the feed chute, the MSW is charged into the furnace by a hydraulic ram feeder and then travels across a Martin reverse reciprocating stoker-grate. The grate runs are independently and variably controlled to thoroughly mix the MSW and promote complete combustion over a range of MSW characteristics and moisture content.

Natural gas will be used as auxiliary fuel for start-up and shutdown and its use will comply with good combustion practices and the Facility's environmental approval limits. Bottom ash and grate siftings collected in the boiler hoppers will be quenched in the ash dischargers. Residue will be drained of free moisture as the ash is discharged onto a vibratory conveyor. The conveyor will transport the material to the ferrous and non-ferrous metals recovery systems, with the remaining residue discharged to the residue storage building where it will await transport to a licensed disposal facility. Fly ash and reaction products from the scrubber and baghouse hoppers will be transported to the fly ash conditioners by a dedicated enclosed screw and drag chain conveyor system. The fly ash conditioners will thoroughly mix and stabilize the ash and deposit the conditioned material into a dedicated bunker in the residue building. Residue will be loaded into vehicles for transport to a licensed disposal site.

Superheated steam will be generated in the boilers and a steam distribution header will carry the steam to the turbine generator, which will have a nameplate rating of approximately 20 megawatt (MW). The turbine will exhaust to an air-cooled steam condenser.

Flue gases from the boiler will be directed through the air pollution control system consisting of a scrubber in series with a fabric filter (baghouse). The Covanta VLN™ process will be incorporated into the boiler and grate design to control and reduce Nitrogen Oxide (NO_x) emissions. In addition, an ammonia-based Selective Non-Catalytic Reduction (SNCR) system will provide for further NO_x reduction. Refer to section 7.1 for more information pertaining to VLN™ and SNCR. A single stack and flue (common to both thermal treatment units) will be erected according to good engineering practice for safe distribution of the flue gas. The stack shell will be large enough to incorporate an additional flue for the first expansion.

2.0 SITE LOCATION AND LAND-USE

The Facility will be situated on undeveloped land, which is owned by the Region of Durham in the Municipality of Clarington. The site is 12.1 hectares in size and is located in the Clarington Energy Business Park south of Highway 401. The site is located on the west side of Osbourne Road, north of the CN Rail corridor. The closest commercial property is Manheim's Auto Auction, north of the Site, and Coparts Auto Auction, east of the Site, both of which are located within 1 km of the Site. The lands east and west of the Site are mostly undeveloped and are currently used for agricultural purposes. The Courtice WPCP is located directly south of the Site, and the Darlington Nuclear Generating Station is located approximately 1.8 kilometres to the east. The nearest major intersection is Highway 401 and Courtice Road, which is about 1.7 kilometres from the Site. A Site location plan is provided as Figure 1. The legal survey for the Site is shown in Figure 3.

The information provided below outlines the regional and local land use designations and zoning applicable to the site.

The Land Use Designation Plan and Zoning for the Site and surrounding area are provided in Figures 4 through 7. In general, the official plan and zoning designations of this site permits a waste to energy facility. Amendments to the Regional Municipality of Durham Official Plan, the Municipality of Clarington Official Plan (and corresponding Secondary Plan), and the Municipality of Clarington Zoning By-Law 84-63 are not required to permit the proposed municipal Facility. The Regional Municipality of Durham signed a Community Host Agreement with the Municipality of Clarington to host the Facility.

Official Plan of the Regional Municipality of Durham (Figure 4):

Designation: Urban System - Employment Area

Municipality of Clarington Official Plan (Figure 5):

Designation: Employment Areas - Business Park

Clarington Energy Business Park Secondary Plan (Figure 6):

Designation: Light Industrial 1 (north portion of the site) and Light Industrial 2 (southern portion of the Site)

Municipality of Clarington Zoning By-Law 84-63 (Figure 7):

Designation: Energy Park Light Industrial ((H) ML1) Zone and Energy Park General Industrial ((H) ML2) Zone

3.0 SITE LAYOUT

3.1 Overview

The Facility will be located on a 12.1 hectare property in the Clarington Energy Business Park as shown in Site location plan (see Figure 1). An integral part of the site layout is site access/egress, signage, roadways, traffic, landscaping, fencing and security. The scale house will be the controlling point for the Site access.

The overall building location plan is provided in Figures 8 and 9. The main building of the Facility will house the tipping area, MSW storage area, boiler enclosures and the air pollution control equipment in line. On the east side of the main building is the administration building, control and electrical rooms, and turbine building. Located in a separate building to the west of the main building is the grizzly and residue storage building. Near the east corner of the site is the Visitor's Centre.

The air cooled condenser will be located near the turbine-generator (TG) building. The switchyard will be located near to the electrical generation source, which will be coordinated with the location of the air cooled condenser and the aesthetics of the plant.

3.2 Access/Egress

Access and egress will meet or exceed all of the required codes and regulations including the Ontario Building Code, and any codes and ordinances of the Municipality of Clarington. Additionally, access for the disabled will be provided in those areas designated by the local code and in accordance with *Accessibility for Ontarians with Disabilities Act* (AODA).

The Facility will have a dedicated entrance road and entrance for trucks, as well as a public and employee parking lot. There are two proposed routes for refuse trucks to access the Facility. For route 1, trucks will exit Highway 401 at either the Holt Road or Courtice Road onto the South Service Road and then down Osbourne Road to access/leave the Site. For route 2, refuse trucks will use Highway 401, followed by a dedicated service road off of Courtice Road to access the Site. General truck access/egress routes are illustrated in Figures 8 and 9 respectively.

Adequate parking and manoeuvring areas will be provided for both Facility staff and visitors. There will be at least 65 marked parking spaces for employees and visitors, and 2 bus spaces on the north east corner of the Facility in the area adjacent to the Visitor's Centre.

3.3 Hours of Operation

The Facility's operating schedule will be on a continuous basis; 24 hours/day, 7 days/weeks, 365 days/year. MSW will be delivered up to 6 days a week between 7:00am to 7:00pm, except on statutory holidays. The proposed operating schedule may vary depending on demand and Facility needs.

3.4 Staffing

The Facility is expected to operate with an average of approximately 35 employees during normal operations. The employees are categorized into the following groups: management, administration, operations and maintenance. Note that this number does not include visitors, Regional staff, as well as construction and outage personnel.

3.5 Signage

3.5.1 Outdoor

Identification signs, directional signs and traffic controls signs, signals, lane divider markings, and painted pavement marking within the Facility site for disabled persons, and control of vehicles to and on the site will be furnished and installed. In addition to traffic control signage, there will be a sign erected during the construction phase describing the nature of the Facility and authorizing authorities. A permanent sign describing the Facility, approved by Durham-York, and compatible with the architecture of the Facility, will be erected prior to, or upon acceptance of the Facility. In addition, a Facility identification sign will be installed at the main entrance of the Facility, which includes 24-hour contact information to report emergencies or complaints.

The Site signage system will direct all suppliers and visitors to the appropriate areas for their specific business at the Facility.

Moreover, an electronic display board will be located on or near the Visitor's Centre showing the most recent emissions results for key parameters.

3.5.2 Indoor

Signs and graphic designs for identification and directions will be provided. Signage such as Exits, Fire Escape diagrams, building labels, door labels for room use and pipe labels will be employed for safety, ease of operation and direction. The signage system used will provide simple and direct indications using graphics, colour and/or text. Additionally, at the scale house there will be a clear visible notice of prohibited wastes along with a clear warning of potential hauler bans and other penalties for violators.

3.6 Roadways

Traffic patterns have been designed to minimize crossing traffic, as well as maximize views (sight distances) especially at road intersections.

Roadways will either be asphaltic concrete or reinforced concrete designed for the appropriate loading conditions. Asphalt pavement will be either conventional multi-layered system of sub-base, aggregate base, asphalt binder and surface course, or full depth asphalt pavement. The pavement thickness will be appropriately selected based on plant traffic. Covanta will have a dedicated street sweeper on-site to ensure that roads are maintained in a clean condition.

The maintenance road leading to the boiler building is unpaved (refer to Figures 8 and 9). This road is accessed infrequently and only for the purpose of inspecting and maintaining the boilers. Covanta will employ appropriate dust control measures if necessary on this roadway.

Table 2: Preliminary Breakdown of Road Surfaces

Road	Paved	Crushed Stone
Main Entrance/exit and plant periphery	✓	
Residue Building	✓	
Grizzly Building	✓	
Tipping Building and Tipping building ramps	✓	
Parking areas	✓	
Turbine-Generator, and Air Pollution Control	✓	
Switchyard		✓
Fire Water Tanks		✓
Maintenance Road leading to Boiler Building		✓
Continuous Emission Monitoring (CEM) enclosure	✓	
Ammonia tank storage area	✓	
Carbon and lime silos	✓	
Air-cooled condenser		✓

3.7 Fencing and Security

Security of the Facility includes a combination of measures including, personnel, video recording and proper lighting. The entrance gate will be closed and locked when the scale house is not operational and is under camera surveillance at all times. The entire Facility is enclosed with a security fence. A separate security fence with a locked gate will be provided around the switchyard. Security lighting is provided at the exterior of all buildings and in the parking lots. The closed circuit television system will include a TV camera for the entrance.

Sufficient outdoor lighting of roads, walkways and parking areas will be provided to ensure the safety and security of all operations at the Facility, the safe movement of people and vehicles, and adequate security. The exterior of the buildings will also be adequately lit for safe night operations. All doors, both overhead and personnel passage doors, will have artificial lighting for safety.

All parking areas will have artificial lighting that will meet local codes and standards.

All visitors arriving at the Site will be required to sign in and follow the Facility safety procedures. Visitors to the Facility will be escorted by Facility staff at all times in designated areas or appropriately monitored.

3.8 Landscaping

The landscape design will compliment the building's aesthetic theme as well screen some views of the Facility. The location of trees and shrubs will consider safety and sight lines, especially at roadway intersections.

Plants and trees will be native to the local climate and hardy for the adverse conditions that they may encounter at the Site. The local soil conditions and the frequency and intensity of rainfall will be considered in the selection and application of planting materials. Protection of the soils from erosion until suitable ground cover can be established will be considered. Also, lawn and landscaping will be constructed to take full advantage of natural rainwater seepage into the ground. Manicured lawns will be minimized to entrance areas and administration areas. Other grassed areas will be native and/or meadow grasses that require minimal maintenance.

4.0 FACILITY BUILDINGS AND AREAS

The major structures of the Facility comprise the MSW receiving, maneuvering, and tipping area structure, MSW storage structure, boiler structure, maintenance building, control room, turbine building, residue building, air pollution control building, administration building, and Visitors Centre. The vehicle receiving, maneuvering, vehicle loading/unloading and storage areas (i.e. the refuse pit and boiler refuse feed chutes), and the service area (i.e. the control room, maintenance and personnel/administrative areas) and turbine area, will be combined into a common or contiguous, enclosed structure.

The residue building will be equipped with roll-up doors to allow vehicles to drive through. All residue storage areas will be roofed (i.e., protected from rain) and complete with a ventilation system with filtration to control any unexpected dust. The boilers, MSW storage area, residue storage area, air pollution control area and turbine/generator will be fully enclosed.

The breakdown of the major areas of the Facility is as follows:

- The Tipping Area – Trucks enter this area to tip their loads into the refuse pit.
- The MSW Storage Area – This area contains the refuse pit, refuse handling cranes and boiler hoppers.
- The Boiler Enclosure– This area contains the boilers and grates, feedwater equipment and the deaerator.
- The Maintenance Area – This area contains space and tools to service equipment, as well as, provides storage for spare parts.
- The Control Room Block – This building contains the control room, battery room, and electrical equipment for various pieces of equipment.
- The Turbine Enclosure – This area houses the steam-turbine generator, the low pressure feedwater heaters and water treatment equipment.
- The Air Pollution Control Enclosure – This area contains most of the air pollution control equipment.
- The Residue Building – This building contains residue processing equipment, as well as space for residue storage and residue truck loading.
- The Administration Area – This area contains the Facility's administration area, as well as facilities for the plant staff.
- The Visitor's Centre – This building will have Regional offices and provide educational facilities for visitors.

Figures 8 and 9 outline the Site layout, and shows the location of the Facility components. Further, Appendix C includes preliminary architectural drawings showing:

- North and West Elevation of the Facility;
- South and East Elevation of the Facility; and
- Visitors Centre Plan and Elevation.

All major equipment not requiring direct contact with the environment will be enclosed in buildings providing a controlled working environment and process isolation from the environment. All major structures, excluding the

Visitor's Centre and the residue building, will be combined into a common enclosed structure. Preliminary figures of equipment and building layouts, including descriptions, have been provided in their respective sections.

The Facility is designed to prevent transmission of noise and odour between the control room/administration area and the remainder of the Facility.

4.1 Administration Area

Space is provided at the Facility to house administrative and clerical personnel. The administrative building will be provided with full environmental conditioning for temperature and humidity. Filtered, positive pressure outside make-up air systems will be provided to hold down dust penetration. This environmental conditioning will be separate from systems used elsewhere in the plant.

4.2 Maintenance Building

A maintenance building will be furnished and installed at the Facility to allow for maintenance of equipment installed in the Facility and for Facility vehicles, containers, etc. This building will include open floor areas, bench areas, and an area for welding. This environmental conditioning will be separate from systems used elsewhere in the plant.

4.3 Central Control Room

A central control room will be furnished to allow for the efficient controlling, monitoring and supervising of plant operations. The central control room will be provided with full environmental conditioning for temperature and humidity. Filtered, positive pressure outside make-up air systems will be provided to hold down dust penetration. This environmental conditioning will be separate from systems used elsewhere in the plant.

The central control room will be furnished with an individual bathroom, with basin and water closet. Additionally, the control room will also provide sufficient space to accommodate visitors.

The following essential plant systems will be controlled primarily from the control room:

- Solid waste and auxiliary fuel feed to boilers;
- Combustion air and flue gas systems;
- Steam and feedwater systems;
- Turbine-generator and associated auxiliaries;
- Electrical power generation, distribution and utility tie-ins;
- Air pollution control system;
- Plant auxiliary support systems;
- Security systems;
- Safety controls;

- Central communications; and
- Emergency response systems.

5.0 WASTE HANDLING AND RECEIVING

MSW is expected to be delivered to the Facility up to 6 days a week. All MSW deliveries will enter through the gate and scale house. The trucks will proceed to the tipping building where the MSW will be discharged into a concrete solid waste storage pit, the refuse pit. MSW mixing and handling in the refuse pit and MSW feeding into the boilers will be handled by two refuse cranes designed to accommodate the increased processing capacity of the first expansion of the Facility. Refer to Figures 10 and 11 for a process and power generation pictorial, and simplified process flow diagram respectively.

Acceptance and bypass of MSW at the Facility is based on maintaining adequate pit inventory for current and future operating conditions; for instance single boiler operation during a scheduled maintenance outage. Scheduled outages will be coordinated with MSW deliveries to minimize the impact on the Facility's short-term ability to accept waste, in turn, minimizing the need for bypassing MSW due to the lack of pit capacity. In the case of a long-term or unscheduled outage, bypassed MSW will be directed to a licensed disposal facility.

Preliminary Standard Operating Procedures (SOPs) for the handling of rejected and bulky wastes have been developed and provided in Appendix D.

5.1 Mass Balance

The Facility is a zero process wastewater discharge facility and utilization strategy provides for the maximization of water reuse. Process water will not be sent to the storm or sanitary sewer systems or be discharged into the natural environment. Under normal operating conditions, the Facility will operate at a water deficit and require municipal water to maintain enough water for the process.

A complete mass balance is shown in Figure 12 and the corresponding streams are described in Table 3.

Table 3: Preliminary Mass Balance at Normal Operating Conditions

Stream	Description	Flow (1) kg/hr or (lpm)
1	Municipal Solid Waste	18,167
2	Boiler Steam Outlet	67300
3	Steam To Soot Blowers	0
4	Steam To Boiler Feedwater Pump Turbine	0
5	Main Steam To Main Steam Desuperheater	0
6	Boiler Steam To STG	67,300
7	Main Steam Bypass To Desuperheater	0
8	Extraction Steam For Export	0
9	Not Used	-
10	Not Used	-

Stream	Description	Flow [1] kg/hr or (lpm)
11	Extraction Steam To Deaerator	2,695
12	Extraction Steam To Feedwater Heater No. 2	3,607
13	Extraction Steam To Feedwater Heater No. 1	2,486
14	Drain From Feedwater Heater No.1 To Condensate Receiver	6,093
15	Exhaust Steam To Air Cooled Condenser	55,600
16	Boiler Intermittent Blowdown	0
17	Not Used	-
18	Condensate Pump Suction From Condensate Receiver	63600
19	Conditioned Fly Ash	938
20	Demineralizer Reverse Osmosis Unit Supply	(39)
21	Boiler Makeup Water To Storage Tank	(31)
22	Condensate From Feedwater Heater No. 2 To Deaerator	63,600
23	Demineralized Water From Storage Tank To Boiler Blowdown Heat Exchanger	1,875
24	Demineralized Water From Boiler Blowdown Heat Exchanger To Condensate Receiver	1,875
25	Continuous Boiler Blowdown	1,374
26	Blowdown Tank Flash Steam To Deaerator	529
27	Continuous Blowdown Tank Drain To Boiler Blowdown Heat Exchanger	845
28	Boiler Blowdown Heat Exchanger To Waste Water Holding Tank	845
29	Extraction Steam To Air Heaters	2,893
30	Air Heaters To Deaerator	2,893
31	Deaerator Vent	0
32	Deaerator System Losses	1,030
33	Boiler Feedwater Pump Suction	68,700
34	Feedwater Pump Discharge To Boiler	68,700
35	Feedwater To Main Steam Desuperheater	0
36	Combustion Air To Air Heater Inlet	94,100
37	Combustion Air From Air Heaters To Furnace	94,100
38	Boiler Reverse Osmosis System Reject To Waste Water Storage Tank	(8)

Stream	Description	Flow [1] kg/hr or (lpm)
39	Quench Water To Ash Dischargers	910
40	Residue To Landfill	3,298
41	Slaking / Dilution Water	1,276
42	Condensate to Feedwater Heater No.1	63,600
43	Lime Feed	164
44	Dry Fly Ash (Includes Lime and Carbon)	526
45	Carbon Injection	9
46	Baghouse Air Leakage	3,714
47	Flue Gas To Scrubber System	124,000
48	Facility Potable Water To Sanitary Sewer System	(15)
49	Flue Gas From Chimney	129,000
50	Condensate To Desuperheater	0
51	Desuperheater Exit To Air Cooled Condenser	0
52	Condensate From Air Cooled Condenser To Condensate Receiver	55,600
53	Feedwater Heater No.1 Condensate To Feedwater Heater No. 2	63,600
54	Drain From Feedwater Heater No.2 To Feedwater Heater No. 1	3,607
55	Blowdown To Waste Water Holding Tank	845
56	City Water Makeup To Facility Potable Water	(15)
57	Combustion Air To Boiler	14,020
58	SNCR Inlet	248
59	Waste Water To Waste Water Settling Basin	(7.5)
60	Fly Ash Conditioners	(4)
61	Fire Protection Water Storage Tank Supply	0
62	Irrigation	0
63	Feed Hopper and Transition Piece Cooling	(7.5)
64	Makeup To Waste Water Holding Tank	(11)
65	Service Water and Miscellaneous Uses	(7.5)
66	Not Used	-
67	Plant Makeup	(65)
68	Waste Water Holding Tank To Scrubbers and Basin	(29)

Stream	Description	Flow [1] kg/hr or (lpm)
69	Waste Water Settling Basin To Waste Water Transfer Pumps	(15)
70	Plant Makeup from City Water	(80)
71	Waste Water Transfer Pumps Recirculation	0
72	Not Used	-
73	Pozzolan	95
74	Cement	89
75	Not Used	-

Note: (1) Quantities in parenthesis indicate litre per minute (lpm). Water balance flow rates are for two units at 100 percent MCR.

5.2 Material Storage

MSW delivered to the Facility will be stored in the refuse pit which is sized to provide 7 days of storage capacity. The maximum refuse pit storage capacity is 3,050 tonnes, which is based on a MSW density of 415 kg/m^3 (see Appendix E). The approximate storage volume of the refuse pit is 7,350 m^3. Section 5.9 provides design information pertaining to the refuse pit.

On site waste storage will consist of the following:

- Processible waste stored in the refuse pit;
- Bottom ash; and
- Conditioned Fly ash.

Further, conditioned fly ash and bottom ash is stored in bunkers located in the residue building. The fly ash storage capacity is 36.5 days at normal throughput rates, whereas bottom ash storage capacity is 7 days at normal throughput rates. Refer to section 8.1 for information on layout design and storage in residue building.

The maximum quantity of bottom ash and conditioned fly ash stored in the residue building is approximately 630 tonnes and 700 tonnes respectively. Both values are based on their individual densities, as referenced in the material storage calculations included in Appendix E.

Sorted metals are stored in bunkers, also located in the residue building, with storage capacities of 7 days for both ferrous and non-ferrous metals at normal throughput rates.

Incoming bulky unprocessible waste is stored in 2 roll-off bins located on the tipping floor and then transfer trailers would be loaded in the residue building or containers will be loaded on the tipping floor. Once the waste is loaded into the covered trailers it will be sent to a licensed landfill in New York State, or an alternative approved disposal facility. The length of time that the unprocessible waste will be stored on site is dependent on the time that it takes to accumulate a full transfer trailer load. It is anticipated that the unprocessible waste will be removed on a weekly basis. Refer to Appendix D on SOPs pertaining to the handling of bulk waste.

Table 4 summarizes the approximate maximum quantity of waste to be stored in the refuse pit and the residue building at any given time.

Table 4: Waste Storage Capacities in Reuse Pit and Residue Building

	Storage Capacity (days)	Quantity (tonnes)
Processible Waste (Refuse Pit)	7	3050
Bottom Ash (Residue Building)	7	630
Conditioned Fly Ash (Residue Building)	36.5	700
	Total	4,380

5.3 Truck Traffic

MSW will be delivered to the Facility in standard packer vehicles or fully enclosed transfer trailers with capacities up to 90 m^3.

There are 2 proposed routes for refuse trucks to access the Facility. For route 1, trucks will exit Highway 401 at either the Holt Road or Courtice Road onto the South Service Road and then down Osbourne Road to access/leave the Site. For route 2, refuse trucks will use Highway 401, followed by a dedicated service road off of Courtice Road to access the Site. General truck access/egress routes are illustrated in Figures 8 and 9 respectively.

A large sign will be provided upon arrival to guide trucks through the Facility. Once through the gate, trucks will proceed to the 2 weigh scales located on the south side of the site. Only firms with contracts with Durham or York Region or the lower tier municipalities within Durham or York Region can deliver MSW to the Facility.

Adequate queuing space for refuse vehicles is provided on the entrance roadway, including capacity for the expected increase in incoming traffic resulting from the first expansion.

Based on the annual processing capacity, there will be an average of 31 trucks per day arriving at the Site to drop off waste, and 9 trucks per day taking residual materials from the site. Therefore, an average of approximately 40 trucks is expected daily, excluding delivery trucks.

5.4 Weigh Scale and Scale House

Truck traffic into and out of the Facility is controlled by a scale house and gate. The scale house is equipped with two automated truck scales. The scale house is equipped with a computerized record keeping system to maintain an accurate accounting of all MSW delivered to and all residues, recovered ferrous and non-ferrous metals and unprocessed waste removed from the Facility. One scale is dedicated to weighing the incoming solid waste, while the other scale will be used to weigh outgoing untared vehicles. Each scale will include a digital weigh meter, scoreboard readout, a printer and a personal computer for recording the daily total of the net weight delivered. The system will have the capability of being a completely automatic system. The scale system will include provisions for recording the time and date as well as vehicle gross, net and tare weights. Traffic over the scales will be controlled by Facility staff. The inbound scale shall be provided with a radiation monitoring and alarm system to detect the presence of radioactive sources in the incoming waste stream. Preliminary SOPs for radiation monitoring and handling have been developed to ensure that no radioactive material is tipped into the refuse pit. Preliminary SOPs for the handling of radioactive waste is provided are Appendix D.

After being weighed, the refuse trucks will proceed directly to the tipping building.

5.5 Wastes Accepted at the Site

The waste to be managed at the Facility will be non-hazardous solid waste from the following sources:

- MSW from residential sources generated within Durham and York Regions remaining following at-source* diversion; and
- A portion of post diversion Industrial, Commercial and Institutional (IC&I) waste traditionally managed by the respective Region at Regional waste management facilities.

*At-source programs refer to those initiatives undertaken at the source of waste generation (e.g., at home or work/business) to eliminate the generation of waste to an appropriate Facility. Both Durham and York have at-source diversion programs, which include:

- Collecting, processing and marketing of blue box recyclables;
- Composting of source separated organic (SSO) waste;
- Composting of leaf and yard waste;
- Operations of depots for the collection of Municipal Hazardous and Special Waste (MHSW);
- Operation of depots for the collection of Waste Electronics and Electrical Equipment (WEEE); and
- Depots for the collection of tires, textiles and construction/demolition materials, and other bulky recyclables.

Therefore, the waste that is brought to the Facility is residual waste that was not captured through these diversion programs, or residual waste that remains following efforts by residents to avail themselves of the diversion programs available.

IC&I waste being delivered to the Facility will generally consist of municipally collected or resident delivered waste from small industrial, commercial, and institutional generators (i.e. downtown central business district) that have access to the same at-source diversion programs as the residential sector. There will be no international waste materials generated from marinas or airports accepted at the Facility.

5.6 Waste Screening Procedures

Waste will only be accepted from approved haulers that have a valid CofA, except for municipal or exempt vehicles as per Section 16(2) (a) of Regulation 347 *General – Waste Management*, made under the *Environmental Protection Act*, R.S.O. 1990.

The following materials (as defined by Regulation 347 *General – Waste Management*) will not be accepted at the Facility:

- hazardous industrial waste;
- acute hazardous waste chemical;
- hazardous waste chemical;
- severely toxic waste;
- ignitable waste;
- corrosive waste;
- reactive waste;
- radioactive waste;
- pathological waste;
- leachate toxic waste;
- PCB waste; and
- liquid industrial waste.

Prior to hauling waste to the Facility, Durham-York employ waste screening procedures to ensure that only appropriate residual waste is sent to the Facility. This includes, but is not limited to:

- Any locations that generate waste that is delivered to the Facility have access to at-source waste diversion programs;
- Durham-York have municipal By-Laws that restrict generators from placing recyclable or hazardous materials in the waste stream;
- Durham-York have By-Law Enforcement Officers that complete curbside checks of the waste; and
- Regional staff or contractors inspect waste being delivered to the transfer stations to ensure that it is acceptable.

All incoming waste vehicles must proceed to a weigh scale to allow the vehicle weight, waste type and source to be recorded. Radiation detection equipment is permanently mounted at the weigh scale in order to measure any potential radiation in incoming or outgoing loads (see Appendix D for SOPs on handling of radioactive wastes). Moreover, trucks will be selected at random and screened for unacceptable waste. At a minimum, one Facility personnel will be present in the tipping area while waste is being unloaded. Both the tipping area personnel and the refuse crane operator check for unacceptable waste that may be inadvertently accepted into the Site.

Loads that contain the following unacceptable materials and thus would be in contravention of the site CofA and pose Health and Safety issues will be refused if detected (refer to section 5.7 for handling of unacceptable materials):

- Hazardous materials (propane cylinders, full paint cans, used motor oil containers, etc);

- Radioactive materials; and
- Bio-medical wastes (sharps, hospital wastes, etc.).

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 Ontario Regulation 347.

5.7 Handling of Unacceptable and Hazardous Waste

If after the normal screening procedures conducted by Durham-York's waste collection and transfer programs, unacceptable materials are still found in the contents of a truck that has been unloaded in the Tipping area, the contents will be moved to a separate area for loading onto a waste transport vehicle to the appropriate disposal facility (assuming such material is neither leaking nor hazardous). Further, a curbed area will be located on the west side of the tipping hall for temporary storage of materials.

Hazardous material with an immediate threat (e.g. explosives, ruptured drums, etc.) will follow the procedure outlined below:

- Material should be left in place and roped off, if possible;
- Personnel and traffic should be prevented from working in the area;
- Appropriate government agency will be contacted;
- Unidentified and potentially hazardous waste will be sampled and tested at an approved laboratory;
- Specialist contactor will determine status of any suspect waste and provide specific handling procedure, if necessary; and
- Removal of all hazardous materials from the Facility will be accomplished in accordance to provincial and federal procedures and employing only licensed hazardous waste transporters.

Any truck detected to contain radioactive material will be isolated on site for proper investigation and handling by Facility personnel. If a truck contains radioactive material, the entire load will be rejected. The majority of the loads will be returned to the generator or hauler. However, for approved circumstances a truck may be allowed, to be isolated in the tipping area to allow for natural decay of the radioactive isotope, or the generator/hauler will be allowed to hire an outside contractor to sort through the load to remove and isolate the radioactive material. All instances of radiation alarms will be documented and reported.

Other unacceptable waste, such as bulky waste will be placed in containers and disposed of in a proper landfill.

The environmental Emergency and Contingency Plan (ECP) will include a specific step-by-step guide to handle unacceptable waste. Further, the MOE Spill Action Centre, and other relevant agencies and personnel contact information will be included in case of an environmental emergency resulting from unacceptable and hazardous waste.

Preliminary SOPs for handling of radioactive wastes, in addition to rejected and bulky wastes have been developed and provided in Appendix D.

5.8 Tipping Floor

The tipping floor will be totally enclosed with an overhead entrance door and sliding exit door. The entrance door will be approximately 4.9 m wide by 5.5 m high. Trucks will enter on the east side of the building and then back-up toward the refuse pit. The trucks will then exit through an exit door on the west side of the tipping floor. The exit door (11 m wide by 5.5 m high) is designed wider to allow trucks to back into the far tipping bays safely. Refer to Figure 13 and Table 5 for Preliminary Layout of Tipping Area of the Facility design information.

The entire tipping floor will be sloped toward the pit with a 150 mm difference in elevation overall. Storage walls subject to damage through repeated impacts will be constructed of high strength (minimum 41 MPa) concrete.

Four tipping bays will allow simultaneous discharge of MSW from multiple vehicles into the refuse pit. Back-up wheel stops provided at each tipping bay prevent vehicles from backing into the refuse pit, but allow for cleaning of the floor by the front-end loaders. Trucks entering the tipping enclosure are directed to a specific tipping bay by a tipping floor operator and discharge their waste onto the floor for inspection by the tipping floor operators. Any unacceptable waste is removed and placed in a dedicated pile or area within the tipping building for subsequent disposal as indicated in section 5.7. Waste discharged onto the tipping floor would be for inspection purposes only. No waste would be stored on the tipping floor for an extended period of time.

Table 5: Preliminary Layout of Tipping Area of the Facility

Preliminary Tipping Hall Dimensions	30.5m x 25.9m
Number of Tipping Bays	4
Number of 8.25m Openings (2 – 4.12m bays)	2
Opening Height	12.7m

Standard operations and maintenance procedures require both dry and wet cleaning methods of the tipping floor, either using a broom sweeper or by wash down with hoses. When water is used and there is some residual waste remaining on the tipping floor, the resulting wastewater can contain solid debris and suspended solids and this water would not be a practical source of process water. The tipping floor therefore is sloped towards the pit to permit the washdown water to flow into the pit, which is sealed and completely self contained.

Best management practices will be employed to ensure that moisture does not accumulate in the bottom of the refuse pit. The crane operator continually brings the waste from the bottom of the pit to the top and loads this waste into the feed hopper. The small amount of water that enters the refuse pit either with the incoming waste or as a result of tipping floor washdown will not adversely impact waste characteristics and the mixing of waste in the pit will avoid the accumulation of water in the bottom of the pit and prevent any possible negative impact on the Facility.

Odours created from the MSW that is being stored in the refuse pit will be controlled by continuously drawing combustion air for the thermal treatment units from above the refuse pit. The air that is eventually drawn into the thermal treatment units originates from louvers in the tipping enclosure and the truck entrance and exit doors. The doors and louvers are located on the end of the tipping enclosure opposite of the refuse pit and the combustion air fan inlet duct. Locating the refuse pit in between the doors and intake ducts, results in a slightly lower air pressure over the refuse pit than at the entrance and exit doors. Further, locating the refuse pit close to the intake ducts and away from the entrance and exit doors allows for anticipated dynamic fluctuations in ambient air conditions outside of the enclosure, e.g., gust of wind. This configuration makes it difficult for any odours to escape from the enclosure. In the rare event that all units are offline, doors and louvers will be shut to control odour emanation, and MSW deliveries will be adjusted until the units are back online.

5.9 Refuse Pit

The refuse pit is constructed of reinforced concrete up to the charging floor level on all four sides except above the tipping bays. Pit walls and floor are designed to prevent seepage of water into or out of the pit. The refuse pit enclosure roof elevation includes space for the two overhead, traveling cranes. The structure also includes a concrete charging floor with feed hoppers. The refuse enclosure is separated from the boiler enclosure by a dust wall.

The refuse pit is sized to allow continued operation of the Facility over weekends and on holidays. It will provide storage for approximately 3,050 tonnes or 7 days of MSW with an average density of 415 kg/m^3. The MSW storage volume used in determining the storage capacity includes storage below the tipping floor elevation as well as stacked storage between the tipping floor elevation and the charging floor elevation. Refuse pit design will be in accordance with the Ontario Fire Code. Table 6 outlines the size of the refuse pit.

Table 6: Preliminary Size of Refuse Pit

Size	Base
Length	33.2 m
Width	11.6 m
Depth from Tipping Floor Level	7.6 m
Pit Floor Depth below Grade	5.5 m

5.10 Refuse Cranes

Two overhead travelling bridge cranes with polyp type (orange peel) grapples are provided to mix MSW and transfer it from the refuse pit to the charging hoppers of the boilers. Each refuse crane is designed to handle full capacity operation, keeping the tipping bays cleared and thermal treatment units properly charged. The second crane provides backup and can be used during peak delivery times to assist in refuse pit management. The cranes span the entire length and width of the refuse storage pit, furnace hopper, and charging floor. Power supply for cross travel will be by the festoon cable method. A bucket type grapple will also be provided to assist in cleaning out the bottom of the pit, when necessary.

The refuse cranes are operated remotely from the control room. The vantage point of the crane operators looks over the refuse pit with a view of the tipping floor to the operators' right side. Each crane has a separate control station that will be equipped with television monitors to allow observation into each of the combustion units charging hopper. The stations are also equipped with a communication system that allow the crane operator to have voice communication with the Facility tipping floor, scale house and the front end loader operator. The cranes have semi automatic controls that raise a loaded grapple and locate it over a pre-selected charging hopper. Loading of the discharge, returning to pit and filling of the grapple will be manual. The operator will have the ability to override the automatic operation at any time. Dimensions of the refuse crane are provided below.

Table 7: Preliminary Dimensions of Refuse Crane

Preliminary Crane Data	
Span Approximation	18.9 m
Runway	42.2 m
Lift	26.5 m
Grapple	Approximately 4.60 m^3

6.0 THERMAL TREATMENT PROCESS

6.1 Refuse Fired Steam Generators

After the MSW is charged into the feed chute hoppers, the MSW is metered into the Refuse Fired Steam Generator from the bottom of the feed chutes by hydraulic feed rams. The feed rams are designed to provide an even distribution of MSW over the entire width of the grate. The proprietary reverse reciprocating action of the Martin Stoker Grate agitates the fuel bed continuously in a manner which causes the MSW to burn from the bottom of the MSW bed, resulting in thorough burnout of combustible matter. The residue is then cooled in a quench bath. A simplified process flow diagram is presented in Figure 11.

The furnace/boiler combustion units will be normally operated at unit MCR; however, they are capable of operating at a Maximum Continuous Turndown (MCTD) point safely and for extended periods, without supplemental fuel firing. Each boiler may be turned down to a minimum of 80% of design heat input while maintaining design steam temperature. Throughput for each stoker can be turned down to 66% of design and still maintain safe operating conditions.

Refuse boilers will consist of the following:

- Single drum, top supported, multiple pass, watertube type units, with integral gas-tight welded waterwall cooled combustion chamber and radiation section, evaporator, superheater and economizer;
- One natural gas auxiliary fuelled Low NO_x burner per boiler, 50% of MCR heat release, approximately 59.5 GJ/hr each. The natural-gas-fired auxiliary burner will be available to maintain flue gas temperature in the furnace region during operating conditions and as required during start-up and shutdown conditions; and
- The feedwater flow through the economizer will be controlled to maintain a constant economizer flue gas exit temperature by using a feedwater water bypass.

Table 8: Steam Generator Nameplate Rating per Train

Design MSW Throughput per day	218 tonnes
Design MSW HHV	13.0 MJ/kg
Refuse Design Unit Heat Input per unit	118 GJ/hr

Preliminary building and equipment layouts of boiler, turbine generator and air cooled condenser area are provided in Figures 14 and 15.

6.1.1 Feed Hopper and Chute

Each thermal treatment unit will be provided with a feed hopper located at the charging elevation of the Facility. Solid waste handling crane operators watch the hoppers and load waste into them as necessary to maintain consistent waste feeding. MSW enters the feed chute from the hopper. The feed hopper opening is approximately 5.5m x 5.0m and will have a sloping side transition to the chute opening.

The solid waste feed chute is a rectangular connection between the feed hopper and the feeder. The chute cross section is approximately 1.5 m x 4.5 m and the unit is approximately 7.5 m long. The chute is inclined 15 degrees from vertical. This chute serves two functions. It provides a continuous supply of solid waste to the feed table and acts as a seal between the furnace and the atmosphere since the induced draft fan maintains the furnace at a slightly negative pressure.

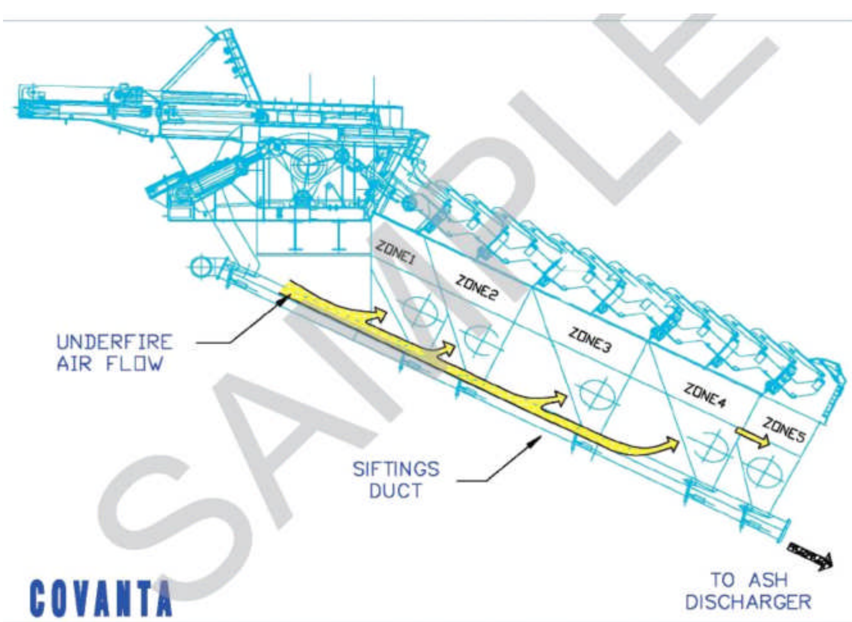
The upper portion of the feed chute includes a shut-off damper to close the feed chute if insufficient quantities of solid waste are in the chute to maintain an adequate seal which minimizes adverse environmental impact during the boiler shutdown process. The lower portion of the feed chute is surrounded by a water jacket which does not come into direct contact with the waste. To the extent hot flue gas contacts the inside of the lower feed chute; the walls are cooled by the water surrounding them.

Jamming and bridging of materials in the solid waste feed chute is minimized by the design of the feed hopper and chute. The slopes and angles incorporated into this design have been developed to provide the least restrictive and clearest flowing path to the ram feeders. Should plugging of the feed chute occur, standard operating procedures to address feed chute plugs have been developed (refer to Appendix D for preliminary SOPs on Feed chute plugs).

6.1.2 Martin Stoker

The stoker grate is comprised of individual grate runs across its width, each grate run having a separate hydraulic feed ram, grate actuation system, residue discharge roller or weir and combustion air distribution system. The number of grate runs is determined by the required system capacity and allowable grate heat release rate. The entire grate system will be inclined downward from the feed end toward the discharge end and consists of alternating rows of fixed and moving grate bars in each run. Exhibit 1 shows a typical stoker design.

Exhibit 1 –Typical Stoker Design



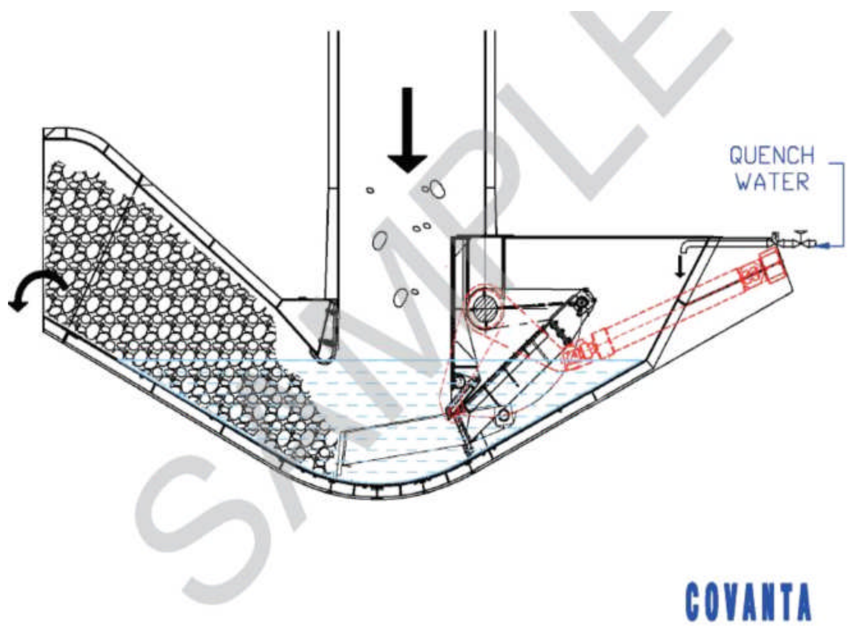
Unlike conventional stoker designs, the moving grate bars push upward at 30 to 50 strokes per hour against the natural gravitational downward movement of the refuse. This stoker action agitates the burning refuse to form an even depth of fuel bed. Burning refuse is pushed back underneath the freshly fed refuse to achieve continuous drying, volatilization, ignition and combustion.

Each stoker is furnished with one Martin residue discharger. The residue discharger receives the burned out material as it falls over the residue discharge roller, cools it in the quench bath and is pushed up the inclined discharge chute by the internal ram. Water is naturally displaced from the residue and flows back down to the water bath as the residue travels up the inclined plate of the discharger. The residue will have an expected water content of between 15 and 25 percent by weight.

The water level will be maintained at a preset level by varying the water added to the ash discharger to make up for losses with discharged ash residue and evaporation. The set point for water level is selected to maintain a seal at the grate that prevents in-leakage of air into the combustion unit.

Each stoker also includes an automatic grate siftings removal system under each grate run which periodically sweeps the undergrate plenums and conveys the siftings to the residue discharger. Exhibit 2 shows a typical Martin Ash Discharger.

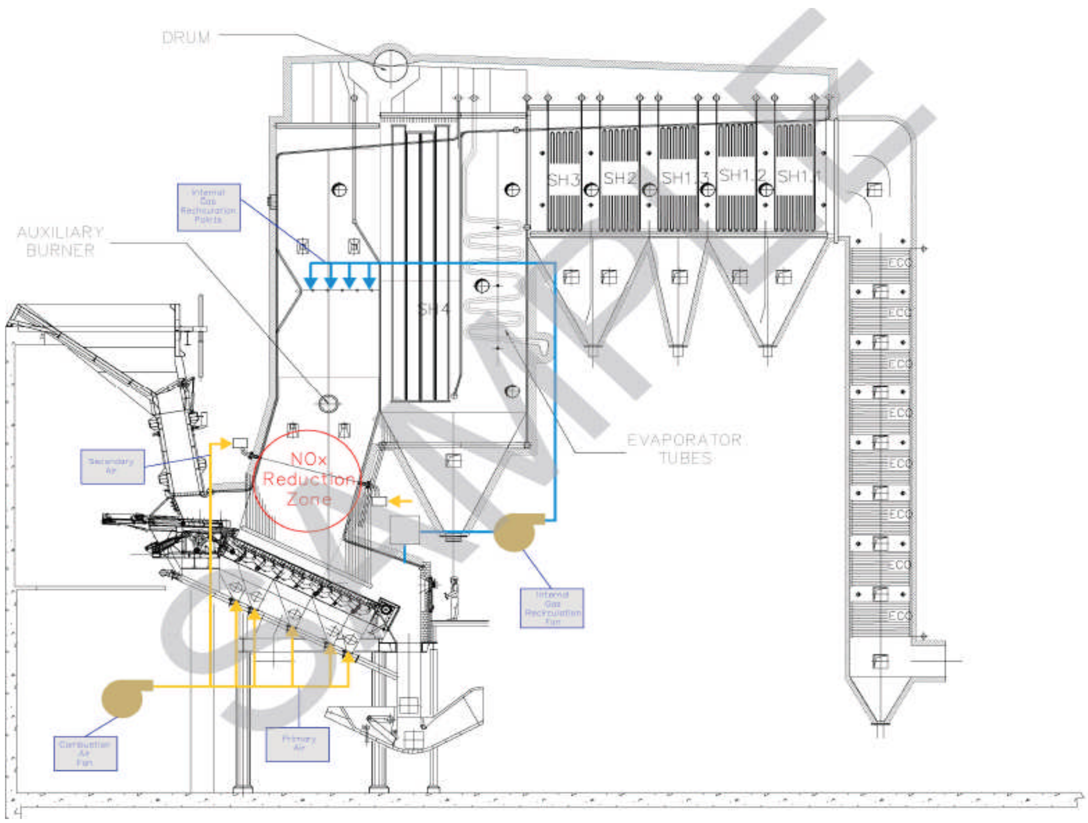
Exhibit 2 - Typical Martin Ash Discharger



6.1.3 Furnace and Boiler

Located above the stoker grate is the boiler furnace/combustion chamber, constructed of gas tight, continuously welded waterwalls down to the grate surface. Refer to Table 8 for boiler design information. Exhibit 3 shows a typical cross-section of a boiler.

Exhibit 3 – Typical Boiler Cross-Section



In the combustion chamber, unburned gases are led back under the rear arch directly into the high temperature combustion zone. This permits the maximum burnout of non aqueous condensable matter and eliminates odours. The combustion chamber exit temperature is sufficiently high to destroy odorous vapours.

At the lower furnace throat, secondary air nozzles provide additional oxygen to combust unburned gases such as carbon monoxide and hydrocarbons and shape the flames. Flue gases are recirculated from above the clinker roll into high velocity flue gas jets located near the boiler's nose on the furnace side walls, causing intense turbulence. This assures maximum combustion of any remaining unburned gases before they pass into the boiler convection section, superheater and economizer.

Following combustion in the furnace, the products of combustion (flue gases) pass through screen tubes at the outlet of the furnace and flow downward through the platen style final superheater section and its membrane water wall enclosure, thereby lowering gas temperature. At the bottom of this pass, the flue gas is turned upward and flows through a convection heat transfer surface and its membrane waterwall enclosure. The flue gas temperature will thus be further reduced as it transfers its heat to the water in these tubes.

The change in direction or flow reversal of the gases at the end of the second pass will be provided to "throw out" the larger fly ash particles in the gas stream, which in turn will to reduce the particulate load on the downstream convective heat transfer surfaces. As the flue gas leaves the convection surface, it enters and flows across the boiler superheater tube surface wherein the boiler steam will be superheated. This transfer of heat continues to lower flue gas temperature. Finally the flue gas passes across the boiler economizer tube surfaces to lower its temperature to the design temperature for entry to the air pollution control system.

The furnace is designed and operated to minimize the concentration of combustion-related pollutants such as carbon monoxide and hydrocarbons. The boiler design incorporates state of the art features including combustion air distribution and control, location and sizing of heating surfaces and appropriate cleaning methods during operations.

Furnace walls above the grate surface are protected from high temperature corrosion by an application of silicon carbide tile, gunnite refractory coating and Inconel.

The boiler design provided is the natural circulation type, wherein the flow of water, water and steam mixture and steam occurs naturally due to differences in densities of water and steam in various boiler sections.

Water is pumped to the boiler drum by the boiler feed pump. Prior to reaching the drum, the water passes through the boiler economizer, wherein the water temperature will be elevated by absorption of heat from the flue gases. Upon reaching the drum, the water flows downward through circulating tubes or pipes that supply water to each of the boiler heating surfaces which include the furnace membrane tube walls, the radiation pass walls, the convection zone and superheater pass membrane enclosures and the convection zone heating surfaces. As all of these surfaces receive heat from the flue gas, the water contained therein will be converted to a water/steam mixture which rises in the tubes and will be released in the steam drum. As the steam and water rises in the circuits, the circuits will be replenished with the denser water from the drum by natural circulation.

In the steam drum, water and steam will be separated by their natural density differences assisted by separating devices installed in the drum. The saturated steam flows to the boiler superheater where it will be heated by the flue gases to the design steam temperatures. Steam flow through the superheater occurs naturally due to the pressure differential between steam drum and superheater outlet.

The superheater is arranged in multiple stages with two stages of water spray attemperation to closely control final superheat temperature as well as interstage temperature. The interstage attemperator will be provided for greater control over final steam temperature.

To minimize erosion, low flue gas velocities will be employed, and fly ash hoppers will be arranged under the boiler and superheater sections to minimize fly ash carryover.

The flue gas leaving the primary superheater will enter the serpentine configuration economizer sections. These sections will be enclosed in a vertical steel casing. The flow of feedwater in the economizer will be counter to the flow of flue gas. The economizer will be constructed from carbon steel tubes, with sufficient clearances between tubes designed to avoid plugging.

Strategically located and automatically sequenced rotary and retractable type sootblowers will be provided to enable gas side cleaning of the boiler, primary superheater and economizer tubes. Retractable sootblowers constructed of suitable alloy material will be used in the high temperature zones.

Boiler drum and superheater outlet safety valves will be provided with silencers. Both continuous and intermittent blowdown systems will be provided. The continuous blowdown system design will be based on maintaining steam purity. The intermittent blowdown system will also function as a collection point for all boiler drains including drum drains, header drains, economizer drains and superheater drains.

Table 9: Preliminary Boiler Design Data

Feedwater temperature	135 ºC
Steam temperature	500 ºC (superheated)
Steam pressure	90.7 bar
Secondary air temperature	9 ºC
Primary (underfire) air temperature	93 ºC
Flue gas boiler exit temperature	165 ºC
Internal Recirculated Gas temperature	150 ºC
Approximate 100% (MCR) steam output guaranteed per unit	33,640 kg/hr
Approximate Aqueous ammonia and carrier water injection rate per unit	125 kg/hr

6.2 Combustion Air System

Each boiler will have its own independent train of combustion air equipment. The combustion air system consists of a combustion air (CA) fan, internal gas recirculation (IGR) fan, air heater and associated ductwork. The combustion air fans shall provide primary air, secondary air, and seal air (see Table 10). The combustion air will be taken from the tipping floor and MSW storage area and directed to the combustion air fan inlets. Combustion air ducts run from the air intake above the refuse pit to the CA fan and from fan and to air heater and to undergrate hoppers and siftings ducts. Secondary air ducts run from the CA fan outlet to the flow element then to the secondary air headers and nozzles, including dampers to balance flow to air injection zones. The recirculated flue gas will be taken from above the stoker's clinker roller/weir and directed to the IGR fan inlet. To ensure maximum burnout of MSW with low heating value and high moisture content, steam heated combustion air heaters will be located at the forced draft outlets to heat the incoming air to 93-150 ºC.

A series of five plenum chambers along the length of each grate run admit primary combustion air at rates precisely controlled to suit the combustion conditions of each burning zone as the MSW moves from feed end to discharge. Dampers control the air rate to the first four zones. The underfire air flow to the fifth zone is from the fourth zone. These dampers will be designed to individually regulate the amount of air fed into the various zones of each grate run.

Table 10: Preliminary Fan Design Conditions

Preliminary CA Fan MCR Conditions	
Mass Flow Rate	54,300 kg/hr
Temperature	26.7ºC
Pressure	4.48 kPa + losses in duct system and air heater at MCR flow
Preliminary IGR Fan MCR Conditions	
Mass Flow Rate	14,000 kg/hr
Temperature	150ºC
Pressure	6.0 kPa (24 in WC) + 100% losses in duct system at MCR flow

7.0 AIR POLLUTION CONTROL SYSTEM

After leaving the boiler, flue gas and any entrained fly ash will enter the APC system for gas cleaning. Each boiler has its own independent train of APC equipment. The system consists of an SNCR system for NO_x reduction (located in the furnace), a powder activated carbon injection system for mercury reduction, flue gas scrubber, fabric filter baghouse, induced draft fan, stack and associated ductwork. Refer to Figure 16 for the preliminary flue gas equipment area and APC building layout.

All air pollution control processes are integrated with the Facility's distributed control system (DCS). The DCS includes annunciation to inform operators if a system is not achieving a specific setpoint. This alarm system is designed to enable operator interface to avoid a situation where stack emissions are greater than desired. If an equipment malfunction creates a situation where the concentrations approach the maximum allowable limit, operators and the DCS will implement efforts to remedy the situation before an exceedance of the limit occurs.

7.1 Covanta's VLN™ System and SNCR System – NO_x Control

Two systems will work in conjunction to control NO_x emissions: Covanta's VLN™ system and an aqueous ammonia SNCR system. Combining SNCR with the VLN™ process and integrating the SNCR controls with the VLN™ combustion controls yields the following synergistic effects which enhance the performance of the SNCR system.

7.1.1 VLN™ System

The VLN™ process employs a unique combustion air system design featuring an internal gas recirculation (IGR) injection system located in the upper furnace. IGR is an internal stream drawn from the rear of the combustor, above the burnout zone of the grate. This gas contains an oxygen concentration near that of air, since very little combustion occurs in the burnout zone. A single fan supplies the primary and secondary air streams, while a second hot gas fan is used for the internal IGR stream.

Similar to a conventional energy from waste process, the quantity of primary air in the Covanta VLN™ process is adjusted to minimize excess air during the combustion of the waste on the grate; however, secondary air flow in the VLN™ process is significantly less than that of a conventional energy from waste facility. The distribution of flows between the primary air, secondary air and IGR gas streams is controlled to yield the optimal combustion gas composition and temperature profile to minimize NO_x and control combustion. The control methodology takes into account the heating value of the waste and the fouling condition of the furnace. The flow of IGR is set to achieve complete coverage of the furnace cross-section to ensure good mixing with the combustion gases. IGR ensures high combustion efficiency and yields uniform flue gas temperature and velocity profiles, which improves the performance and reliability of downstream boiler equipment. The IGR nozzles are located on the side waterwalls of the upper furnace; their positioning in the furnace is critical to the VLN™ process performance.

7.1.2 Selective Non-Catalytic Reduction System

A SNCR system will be provided with each of the two units. The system will be designed to maintain continuous compliance with NO_x emission by adjusting the injection rate and location of aqueous ammonia during normal operations. Multiple levels of injection are provided to accommodate flue gas temperatures during varying conditions. The stack NO_x analyzer provides information to the DCS to assure continuous compliance.

Aqueous ammonia in a water solution of approximately 19 % ammonia by weight will be delivered and stored at the Facility. The system consists of an aqueous ammonia storage tank, aqueous ammonia feed pumps, carrier water supply from the boiler make-up water system, a nozzle purge air system, aqueous ammonia injection nozzles and an automatic control system.

7.2 Carbon Injection System

A carbon injection system will be provided to reduce mercuy and dioxin in the fluegas stream. The system will be designed to meet the emission limitations.

A pneumatic feed system, injecting activated carbon directly into the flue gas duct-work downstream of the economizer, shall be provided. Each activated carbon injection train will be fed from a common activated carbon storage silo. The system will include a blower, eductor, surge bin, gravimetric feeder, piping, wiring, process controls and other accessories needed for a complete, operational system. All activated carbon injection equipment shall be located in the skirted area of the carbon storage silo.

The silo will be located adjacent to the APC area and will be sized for 1 ½ truck loads, approximately 85 m^3. The silo will be able to store enough carbon for approximately 84 days of use for the intial Facility.

The injection rate will be adjusted prior to commissioning, during the optimization testing, based upon initial testing and will operate consistent with subsequent stack test results. The activated carbon will be injected into each train at the following approximate rates to reduce mercury emissions.

Table 11: Estimated Carbon Injection Rates per Unit

MCR Throughput (Normal Conditions)	4.5 kg/hr
Design Injection Rate	13.6 kg/hr

A truck fill panel, fill pipe and vent filter will be provided to convey carbon from the bulk delivery truck to the silo using the truck's conveying blower. Self-unloading carbon truck deliveries average approximately 20 tonnes per delivery. During filling, the conveying air will be exhausted from the silo through a silo vent type dust collector. The dust collector will be provided complete with an exhaust fan, sized for approx. of 17.4 Nm^3/min, a differential pressure gauge and switch, and a pulse-jet type of dust collector system. The maximum air-to-cloth ratio will be approximately 1 m/min. Interlocks will be required between the fill connection and the vent filter to start the exhaust fan, alarm on high pressure differential across the dust collector, and start of pulse-jet cleaning as required for proper dust collector cleaning efficiency and operation. The truck unloading operation is expected to take between 2 and 3 hours to complete.

7.3 Dry Recirculation Scrubber

Each combustion unit will be provided with a dedicated dry recirculation scrubber that will be operated independent from the other unit to mitigate acid gases. The two units will be located inside the Facility enclosure and will share a common reagent system for storage of lime and carbon. The storage silos for lime, carbon and recirculated residue will be located inside the Facility enclosure.

A dry scrubbing reactor, one per boiler unit, will be located between the economizer outlet and the baghouse. Hydrated lime will be injected directly into the flue gas duct. The hot flue gas will react with the lime and concurrently dry the reaction products. Acid gas removal performance will be controlled by adjusting the quantity of lime injected. Additionally, a portion of the fly ash and lime collected in the baghouse will be re-injected into the duct to utilize unreacted lime and decrease lime consumption.

7.3.1 Reagent Feed System

Each combustion unit will be provided with a dedicated dry recirculation scrubber that will be operated independent from the other unit. The two units will be located inside the Facility enclosure and will share a common reagent system for storage of lime and carbon. The storage silos for lime will be located inside the Facility enclosure. The carbon silo will be located adjacent to the APC building.

Each dry recirculation scrubber will include a reactor for injecting fresh lime and carbon and recirculated residue from the baghouse and/or residue storage silo. The flue gas temperature will be reduced through the evaporation of water which will be injected directly via nozzle atomization or with the recirculated residue or both. The injection rate of water will be controlled through a dedicated process control system. The injection rate of fresh lime will be adjusted to maintain a preset stack concentration with carbon being injected at a constant rate.

The treated and cooled flue gas then flows to the high efficiency baghouse where the fly ash particulate, scrubber reaction products and unreacted lime will be collected and removed from the gas. The filter cake, which accumulates on the fabric filters also provides a substrate of unreacted lime carried over from the scrubber, allowing additional reaction with acid gases and further reduction of acid emissions.

7.4 Fabric Filters (Baghouse)

Solid phase particulate, fly ash particulate, carbon, scrubber reaction products and unreacted lime will be collected and removed from the flue gas by the baghouse. A baghouse will be provided for each combustion/steam generator/acid gas scrubber in the Facility.

A pulse-jet type baghouse will be provided downstream of the dry recirculation scrubber to control particulate matter emissions. The filter cake which accumulates on the fabric filters also provides a substrate for gaseous reactants carried over from the dry scrubber, further reducing acid gas and other pollutant emissions. Each fabric filter consists of steel casing compartments with inlet and outlet manifolds, isolation dampers, dampers, and filter bags.

The selection of bag material and fabric coatings will be optimized for the basis for the intended service. The CEM opacity system will be used as the filter bag leak detection system to monitor bag condition. The baghouse will be insulated with design considerations to prevent corrosion, buildup of fly ash and spent salts, and erosion.

Special attention will be given to the design to avoid cold spots at structural supports and other penetrations through the insulation barrier. Hopper accessories will include hopper heaters, vibrators, and high level alarms. Hoppers will be provided with knife gate isolation valves. Baghouse collection screw conveyors will have rotary valves to provide a seal for bag house hoppers. Hoppers will be sufficiently sized and sloped at an angle to prevent buildup of fly ash. Adequate poke holes and other means will be provided to aid clearing of a bridged hopper.

Gas normally flows across the filter bags from the outside to the inside, and results in the deposition of particulates on the bags' external surface. Bags are cleaned by isolating a module and pulsing a volume of compressed air into each bag to create a “wave” down the length of the bag, dislodging just the right amount of filter cake to attain the ideal pressure drop and still maintain enough filter cake to facilitate reactions with gaseous reactants. Each module is equipped with a gas tight fly ash hopper system to collect fly ash that is dislodged from the filter bags and is directly connected to the enclosed fly ash conveying system.

Baghouses, one per boiler unit, will be designed for indoor installation. It will contain isolatable modules (arranged in 2 parallel rows), all operating in parallel and each with its own hopper. The number of modules will ensure that taking a compartment out for cleaning and having another compartment out for maintenance will not result in excessive pressure drops across the remaining compartments, unit curtailment because of limited induced draft (ID) fan capacity or the inability to keep the bags clean.

Baghouses are designed for variations of temperature and pressure due to failure of other components in the system, such as quench malfunction, loss of an ID or CA fan or the malfunction of a flue gas damper. The operating temperature of the baghouses will range from 135ºC to 145ºC, while the design temperature is expected be approximately 260ºC.

7.5 Induced Draft Fans

After passing through the fabric filter, the cleaned flue gases from the thermal treatment unit will be vented through a flue by means of an induced draft fan located at the base of the fabric filter. A dedicated ID fan will be provided for each thermal treatment unit with a Variable Frequency Drive (VFD), having backward curved blades and a split housing. Fans will be provided with vibration switches. Table 12 outlines the ID Fan preliminary design.

Table 12: ID Fans Preliminary MCR Data

Mass Flow Rate	64,700 kg/hr
Temperature	135°C
Static Pressure	3.5 kPa
Inlet Pressure	-3.25 kPa

7.6 Stack

The cleaned flue gas from the thermal treatment units will be vented up through a common steel flue. The common flue will be supported by a carbon steel chimney shell that is designed to hold both the initial common flue and an independent future flue for the first expansion unit. Refer to Table 13 for stack design.

Table 13: Stack Design

Chimney height	87.6 m (from elevation 0.0 m)
Initial Flue ID	1.71 m at exit
Chimney Shell ID	6 m

7.7 Continuous Emissions Monitoring

The CEM systems for of the two combustion units provide continuous monitoring of the following parameters:

- Baghouse outlet: opacity, moisture, O_2, NOx, SO_2, HCl, HF, NH_3 & THC (as methane); and
- Economizer outlet: O_2, SO_2, CO.

Further, a long-term continuous sampling device will also be installed to monitor dioxin and furan emissions over a fixed period of time.

The dedicated CEM system is based upon separate flue gas sample and transport systems for the economizer and ID fan inlet sample points, each of which will transport the sample to a free-standing CEM enclosure.

A computerized data acquisition system (DAS) will be used for monitoring the output from the CEM system, data correction and averaging and report development. The DAS will include a computer console with printer and keyboard with software required for reporting requirements. The CEM system will be equipped with communication devices and software to enable transmission of CEM data to remote locations, if required. Additional information on Facility's emissions monitoring system can be found in the companion Section 9 Application for Approval (Air and Noise).

7.7.1 Continuous Operations Reporting System

As part of the Facility operations, the following operational monitoring equipment is also provided to provide feedback on the combustion units operations;

- Temperature measurement device for combustion zone or a surrogate;
- Long-term Integrated continuous dioxins sampling device;
- Flue gas stack exit temperature;
- Temperature and pressure of the steam for each boiler; and
- Mass flow rate of steam for each boiler.

8.0 ASH HANDLING AND ASSOCIATED SYSTEM

Ash management and storage occurs in the fully enclosed residue building. All residue mixing and/or handling areas are fully enclosed, well ventilated and sufficiently protected from extreme weather conditions (e.g. freezing conditions, etc.). In addition, all areas are designed to facilitate cleanup and good housekeeping. In accordance with Best Management Practices, the residue building is periodically washed down. The floor is sloped toward the residue piles that absorb any washdown water. All conveyors handling residue that are located outside are fully enclosed.

The residue storage building is not connected to any other structure to prevent dust from infiltrating other parts of the Facility. To minimize any dust escaping to the environment during the conveying, separating, and truck loading process, the residue building is totally enclosed and has a filtered ventilation system. The ventilation system also draws air from the grizzly area and along the enclosed conveyor gallery.

Residue and metals are deposited and temporarily stored in the fully enclosed residue building to await transport to an appropriate landfill or recycling centre. Each residue stream has dedicated bunker(s) for storage of 7 days (with the exception of conditioned fly ash which has storage capacity for 36.5 days) of MCR Facility operations based on storage of ash stacked by front end loaders in bunkers with a 45º angle of repose.

Residue containers or trucks are also loaded in the fully enclosed residue storage building. Residue containers are enclosed so as not to present a hazard to either plant personnel or the general public while residue is being loaded and transported to the landfill. In general, all residue loading and unloading systems are designed to be dust free through the following procedures:

- Residue is loaded inside the building with the doors closed;
- The building is fully ventilated to a dust collection system; and
- The ash has a moisture content of 15-25% thus reducing potential for dust.

No visible emission of dust from any doorway, window, vent, louver or other opening is allowed under normal operating conditions.

8.1 Residue Building

The Facility's bottom and fly ash handling and associated systems are sized for a processing capability of the expanded Facility. Conveyors are used inside of the buildings to transport residue from each unit to the residue building.

Only a single train of bottom ash equipment is provided. The bottom ash will be transported via front end loader if a system component must be taken out of service (refer to section 8.2).

The fly ash handling system will separately collect air pollution control residue (fly ash and spent salts of reaction) and boiler fly ash. The fly ash will be mixed with Portland cement, pozzolan and water for micro encapsulation (chelation) prior to truck loading and subsequent transportation (refer to section 8.3).

Residue will be stored in bunkers located in the residue building. The storage area will be divided into eleven compartments with inside dimensions summarized Table 14. Design dimensions are based on MCR. Refer to Figures 17 and 18 for the preliminary residue storage building layout.

The fly ash storage capacity is of 36.5 days at normal throughput rates, whereas bottom ash storage capacities are of 7 days at normal throughput rates. Both ferrous and non-ferrous metals storage capacities are 7 days at normal throughput rates.

The residue building will be fully enclosed and equipped with a filtered ventilation system for dust control.

Table 14: Storage area within the Residue Building

Compartment	Quantity	Dimensions
Building Size	-	41.5 X 24.8 m
Ferrous metal bunker[1]	1	7.0 X 4.6 m
Non-Ferous metal Bunker	1	3.1 X 4.6 m
Residue Bunker	2	7.0 X 10.4 m
Conditioned Fly ash Bunker	7	6.95 X 4.6 m

1 Ferrous metals bunker will also accomodate ferrous from the grizzly overs

The design density of ash that will be used for sizing is provided is as follows:

- Bottom Ash Bays – normal mass rate with 1280 kg/m^3 density
- Conditioned Fly Ash Bay – normal mass rate with 1300 kg/m^3 density
- Ferrous Metals Bay – normal mass rate with 720 kg/m^3 density
- Non-Ferrous Metals Bay – normal mass rate with 1200 kg/m^3 density

8.2 Bottom Ash

The bottom ash handling system is sized such that items able to pass through the refuse feed chute will be able to be passed by the bottom ash handling system. The bulk residue from the boiler grate is discharged into a water-filled ash discharger. The ash dischargers, one per boiler, feed the ash onto a main vibrating conveyor with integral grizzly scalper, which runs across the boiler building. The grizzly scalper, located at the end of the vibrating conveyor, then extracts pieces larger than 200 mm from the main residue stream. Oversized pieces are transported to the residue building via front end loader. Undersized pieces are fed onto an inclined belt conveyor for transport to the residue building where they are subjected to magnetic separation of ferrous material followed by separation of nonferrous metals via an eddy current magnetic separator.

The vibrating pan and belt conveyors used will be heavy duty construction, sized to handle the type of residue typical of solid waste.

In accordance with Regulation 347, incinerator ash (bottom ash), as defined, resulting from the incineration of waste that is neither hazardous waste nor liquid industrial waste is not a hazardous waste and may be disposed of at a site that is approved to receive solid non-hazardous waste.

The bottom ash will be transported off site in covered transfer trailers to an appropriately licensed disposal facility. Bottom ash residue trucks will drive right into the building to be loaded. The bottom ash may be used as daily cover material at a landfill and the Covanta Research and Development group are continually investigating new and more beneficial uses for this material.

8.3 Fly Ash

In accordance with Regulation 347, fly ash will be collected and stabilized separately from bottom ash.

The fly ash handling system transports fly ash from the scrubber hopper, the baghouse hoppers, and the economizer and superheater hoppers to the residue building. Transportation of the fly ash from the various hoppers shall be via a series of horizontal and inclined screw conveyors and drag chains. A separate fly ash handling system is required for each combustion unit, although main transport conveyors will be common. The drag chain and screw conveyors will be dust-tight to prevent leakage of fly ash.

Facility design is based on conditioning of fly ash with pozzolan and cement. Once in the residue building, the fly ash conveyors deposit the fly ash into one of two surge bins. The surge bins allow for fluctuations in the fly ash transport system and consistent fly ash conditioning. The surge bins are designed to hold 2 hours of fly ash generated at the expanded Facility rate.

8.3.1 Fly Ash Conditioning System

The primary purpose of the fly ash conditioning system is to adequately mix the fly ash with water, pozzolan and Portland cement and deposit it directly to a fly ash bunker in the residue building. 2 redundant fly ash conditioning systems will be installed, each sized for the expanded Facility. From the surge bins, the fly ash is fed to the conditioners via rotary valves, and combined with Portland cement, pozzolan and water at appropriate rates. The properly mixed ash is then discharged into the first fly ash bay. After 3 days, the stabilized mixture is broken up and moved to a second storage bay to continue curing. After 3 more days, the mixture is broken up and moved to the third bin. This process continues for a total of 21 days (3 days - 7 storage bays). After 21 days, the ash is stabilized and ready for transport to an appropriately licensed disposal facility.

The treated fly ash from the Facility will be tested in accordance with the provisions of Regulation 347 (Toxicity Characteristic Leaching Procedure) to confirm that it is non-hazardous. Refer to Appendix D for preliminary SOPs pertaining to conditioned fly ash characterization and testing. This includes a protocol for sampling (frequency and methodology) and analysis. More detailed SOPs for conditioned fly ash characterization will be developed prior to commencement of operations at the Facility, as required.

Preliminary mass flow rates of Portland cement and pozzolan are shown in Table 15.

Table 15: Preliminary Mass flow rates of Portland cement and Pozzolan

Portland Cement	90 kg/hr
Pozzolan	95 kg/hr

8.4 Metals Recovery

After the bottom ash has been screened by the grizzly, the smaller residue that has been separated out will be conveyed to the residue building where it will be screened for both ferrous and non-ferrous metals.

Materials recovered at the Facility will be sold to the marketplace as recovered recylable materials through contracts established once the Facility is under construction. Sorted metals will also be stored in bins located in the residue building. Both ferrous and non-ferrous metals storage capacities are 7 days at normal throughput rates.

8.4.1 Ferrous Recovery

The ferrous recovery system will be designed to remove 80 % of ferrous metals. The system will consist of the following:

- Rotary drum magnet located above the feeder conveyor to recover the magnetic ferrous material;
- Vibrating screen to agitate and remove loose dirt and scale;
- The vibratory screen follows the magnet to ensure that recovered ferrous is of good quality; and
- All necessary chute work and product distribution conveyors.

8.4.2 Non-Ferrous Metal Recovery

A non-ferrous metal recovery system is designed to remove 60 % of the non-ferrous metals that are in the bottom ash stream.

- The system consists of the following equipment:
- Vibratory screen to separate the residue into two streams;
- A vibratory feeder to ensure an even and uniform flow of residue onto the eddy current separator;
- An eddy current separator; and
- All necessary chute work and associated diverter gates.

Non-ferrous and ferrous metals recovered at the Facility will be sold to the marketplace.

8.5 Reagent Storage

The following reagents will be stored at the Facility:

- Carbon used for dry recirculation system;
- Lime used for dry recirculation system;
- Pozzolan used for fly ash conditioning;
- Cement used for fly ash conditioning; and
- Ammonia used for SNCR system.

Refer to Figures 8 and 9 for the approximate locations of the reagents stored at the Facility.

To control emissions to the atmosphere during the transfer of reagents from trucks into storage units at the Facility, carbon, pozzolan, cement, and lime will have a bin-vent type dust collector. Ammonia will vent back into the truck. In addition, the ammonia tanks will be dyked to contain any potential spillage and any spillage from the dry reagents will be clean-up.

Silos will be designed to prevent bridging and rat-holing of the reagent for consistent operation.

Storage silos for dry material will be designed such that a delivery truck mounted blower will be capable of unloading the reagent directly into the silo by means of a positive pressure conveying system through a fill pipe to the top of the silo. The conveying air will be exhausted from the bin through a silo vent type dust collector. The dust collector will be provided complete with an exhaust fan, sized for approximately 17.4 Nm^3/min, a differential pressure gauge and switch, and a pulse-jet type of dust collector system. The maximum air-to-cloth ratio will be approximately 1 m/min.

8.5.1 Carbon Storage

Activated carbon will be stored in a silo. A pneumatic feed system injecting activated carbon directly into the flue gas duct-work, downstream of the economizer will be fed from a common activated carbon storage silo.

The silo will be located adjacent to the APC area and will be sized for 1 ½ truck loads, approximately 85 m^3. The silo will be able to store enough carbon for approximately 84 days of use for the intial Facility.

A truck fill panel, fill pipe and vent filter will be provided to convey carbon from the bulk delivery truck to the silo using the truck's conveying blower. Self-unloading carbon truck deliveries average approximately 20 tonnes per delivery. During filling, the conveying air will be exhausted from the silo through a silo vent type dust collector. The truck unloading operation is expected to take between 2 and 3 hours to complete.

8.5.2 Lime Storage

The storage silo size for the lime has an approximate volume of 85 m^3, and will store approximately 40 tonnes of hydrated lime.

Lime for the APC system will be delivered to the Facility in self-unloading trucks and stored in a storage silo. The truck unloading operation is expected to take between 2 and 3 hours to complete. Self unloading lime truck deliveries average approximately 20 tonnes per delivery.

8.5.3 Pozzolan and Cement Storage

Silos will be located outside of the residue building near the ash conditioning system.

Storage silo size for the Portland cement and pozzolan will store approximately 35 tonnes of each reagent. Silo sizes for Portland cement and pozzolan are approximately 25 m^3 and 45 m^3 respectively.

The silo is designed such that the delivery truck mounted blower will be capable of unloading the cement or pozzolan directly into the silo by means of a positive pressure conveying system through a fill pipe to the top of the silo. The conveying air will be exhausted from the bin through a silo vent type dust collector.

8.5.4 Ammonia Storage

Ammonia will be stored in a 36 m^3 storage tank located southeast of the APC building. The ammonia storage tank installation will be in accordance with *Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities* (May, 2007) and other applicable requirements. Secondary containment will constructed with a contained volume of impoundment equal to 110 % of the volume of the tank, and such that the horizontal trajectory of a potential leak from the tank will confined within the impoundment.

Aqueous ammonia solution will be delivered to the Facility in tank trucks with carrying capacity of approximately 22.7 m^3. Trucks will be unloaded using truck mounted transfer pumps, and vapour displaced from the receiving tank will vent back to the truck to prevent the release of ammonia vapour during the unloading process.

9.0 POWER GENERATION

Steam produced by the thermal treatment units' boilers will be routed to a steam turbine generator set. Exhaust steam from the turbine will be condensed in an air-cooled surface condenser. The condensate is then pumped through 2 feedwater heaters to the deaerator, from which it is pumped back to the boilers for steam production. The air cooled condenser will also serve as a bypass condenser to allow for continued operation of the thermal treatment units for periods of time that the turbine generator is off-line for maintenance. All piping, valves and fittings associated with the power cycle will be sized to support plant operations at peak capacity. Design and construction will be in accordance with applicable standards.

All steam piping will be furnished with low point drains to continuously or intermittently remove accumulated condensate. Condensate piping will be provided with high point vents and low point drains. The turbine extraction system will be designed to prevent water induction to steam turbines.

Specific design information pertaining to power generation is provided in the sections below. Further a mass and energy balance diagram is provided in Figure 12.

9.1 Main Steam System

The main steam system will be designed to deliver full steam production from the initial thermal treatment units' boilers to the steam generator. It also provides steam to the steam jet air ejector equipment, and the boiler soot blowers (on an intermittent basis). The main steam system may deliver steam to a full capacity boiler feed pump turbine driver, if the motor driven pumps are not available. A bypass line will be provided to direct full steam production to the condenser while bypassing the turbine. Isolation valves at the turbine exhaust allow maintenance to be performed on the turbine generator while continuing to burn municipal solid waste, condensing the steam and thereby avoiding depletion of boiler feedwater inventory.

A line from the main steam header, including an automatic pressure-reducing and desuperheating spray station, provides steam to the extraction steam system, as backup to the medium pressure turbine extraction line. The associated spray water will be supplied from the boiler feedwater pump discharge. Safety requirements regarding boiler over-pressurization are met with automatic safety release valves.

9.2 Extraction Steam System

The extraction steam system is designed to provide the required steam from uncontrolled turbine extraction points to the 2 low-pressure feedwater heaters, a deaerator and the steam jet air ejectors.

Steam from the first extraction point will be supplied to the air heater and steam jet air ejectors (and future hot water district heating loop). Steam from the second will be supplied to the deaerator. The third and fourth extraction points (lower pressure) will be supplied to the low-pressure feedwater heaters.

Exhaust steam from the boiler feed pump turbine drive will be discharged to the medium pressure extraction header for use in the deaerator.

The steam turbine will have provision to extract steam for future district heating for the Clarington Energy Park and Courtice WPCP.

9.3 Condensate System

Steam exhausted from the turbine will be routed to the air-cooled condenser. Condensate is removed from the condensate receiver by one of the two 100 percent capacity condensate pumps.

The condensate pump discharge provides cooling for the steam jet air ejector condenser and the turbine gland steam condenser. Condensate is then directed to 2 low-pressure shell and tube heat exchangers. The condensate is then directed to the deaerator.

Make-up water to the system is directed from the boiler make-up water storage tank through the boiler continuous blowdown heat exchanger (to cool blowdown and recover heat) and to the condensate receiver. A control valve is provided to regulate condensate flow rate and maintain a condensate receiver level.

A control valve locate downstream of the gland steam condenser directs flow to a recirculation line which is routed back to the makeup water holding tank to the deaerator to maintain deaerator level.

Table 16: Preliminary Design Conditions for Condensate Pump Sizing

Flow per pump[1]	
MCR	1,066 l/min
Rated (Based upon turbine bypass operation)	1,577 l/min
Net Total Head (not finalized)	94.5 m

1 Includes makeup to condensate receiver

9.4 Feedwater System

Condensate will be supplied to the feedwater pumps from the deaerator storage tank. 2 motor-operated pumps rated at 50 % initial Facility capacity, or 1 turbine driven pump rated at 100 % initial Facility capacity will be in service. The steam turbine driven feed pump will be used as a backup for the motor-driven pump in the event that electrical power is not available. Each pump discharge line has a recirculation line back to the deaerator to prevent the pumps from overheating during low flow operation. The boiler feed pumps will feed the boilers through the economizers. This will provide additional heating of the feedwater prior to entering the boiler steam drum, thus increasing the thermodynamic efficiency of the system, and lowering the flue gas temperature to a level appropriate for entering the air pollution control system. The amount of feedwater entering the economizer will be controlled to maintain a constant flue gas exit temperature.

9.5 Boiler Make-Up Water Treatment System

The boiler make-up water treatment system provides makeup water of appropriate quality for the boiler to compensate for losses due to: boiler blowdown, deaerator venting, leakage, and sootblowing steam.

The reverse osmosis pre-treatment system will include two trains, each consisting of two, 100 percent capacity multimedia filters to treat the incoming feed water and remove suspended solids above 10μ. The reverse osmosis system design capacity is 61 litres per minute. The captured suspended solids will be processed at the Facility.

9.6 Feedwater and Boiler Chemical System

The chemical feed system minimizes corrosion, scaling, and deposition in the boiler, and corrosion of the condensate and feedwater systems. Chemical feed packages will be provided to scavenge oxygen, control pH and control the development of corrosive or scaling conditions.

9.7 Boiler Blowdown System

A complete boiler blowdown system designed according to good engineering practice for industrial power plant design will be provided with each thermal treatment unit. The system consists of a continuous blowdown flash tank with vent to deaerator, blowdown heat exchanger, wastewater holding tank with atmospheric exhaust in a safe area, and all necessary piping, valving and controls. The system will be capable of completely draining a single boiler/economizer into the wastewater holding tank in approximately 4 hours.

9.8 Steam Turbine Generator

The Facility consists of 2 waste steam generators and 1 steam turbine generator with a maximum gross output of approximately 20 MW. The turbine generator set will be designed to generate 72,000 kg/hr of steam

The air heater extraction port on the turbine will be sized to provide steam to an onsite heat exchanger for the closed loop hot water district heating for the Clarington Energy Park and Courtice WPCP.

Table 17: Preliminary Design Conditions of the Turbine Generators

Steam Flow	
Valves Wide Open (VWO)	72,000 kg/hr
Normal Operation (MCR)	67,285 kg/hr
Voltage	13,800 V, 60Hz, 3 phase
Power factor	0.85 lagging – unity
Rated Capacity (approximate) at VWO Steam Flow	20.0 MW, 23530 KVA

9.8.1 Air Cooled Condenser for Turbine Generator

A description of operating conditions of the air cooled condenser is provided in Table 18.

Direct air cooled condenser package including condenser complete with duct from turbine, isolation valves, blanking plate, steam jet air ejectors, relief valves and other required accessories.

The Condenser is designed to accept full turbine bypass flow and must be isolatable from the turbine under this mode of operation. Note that in turbine bypass mode, the main steam pressure must be controlled by a backpressure control valve.

Table 18: Air Cooled Condenser (operating conditions) for Turbine-Generator

Normal Operation (MCR)	
Steam to Condense	55,265 kg/hr
Temperature of steam	57ºC
Design dry bulb temperature (5 % summer value)	29.4ºC
Turbine Bypass Operation (MCR)	
Throttle Steam to condense (at boiler outlet conditions)	81,985 kg/hr
Temperature of steam (after desuperheat)	87.8ºC
Pressure of steam (after letdown)	345 mbar
Minimum Condensate Receiver Total Volume	14,000 litres

9.9 Closed Cooling Water System

The system will be provided to ensure an adequate supply of cooling water to various operating plant equipment. Two 100 percent capacity cooling water pumps and an air cooled heat exchanger are provided. The air cooled heat exchanger will be located outside near the air cooled condenser. A surge tank is provided with sufficient capacity to accommodate maximum expansion of the system water and to ensure adequate net positive suction head for the cooling water pumps.

- Cooling water is circulated to the following pieces of plant equipment:
- Instrument and Service Air Compressors;
- Generator Air Coolers;
- Turbine Lube and Control Oil Coolers;
- Boiler Feedwater Pump Bearings; and
- Boiler Blowdown and Steam Sample Coolers.

Table 19: Closed Cooling Water System using an Air Cooled Heat Exchanger Design Conditions

Heat Load	6.1 GJ/hr
Cooling Water	2,214 L/min
Design Dry Bulb	29.4^{o}C
Approach to Dry Bulb	5.5^{o}C

10.0 POTABLE, PROCESS AND WASTEWATER

The Facility water and waste water system is designed to provide suitable quality water to each process use. The Facility is designed to be a "zero wastewater discharge" Facility, with the exception of the Facility's sanitary uses.

The Facility water supply will be from the Region of Durham's municipal water system.

10.1 Water Consumption

The Facility is planned as a "zero (process) wastewater discharge" Facility. The water utilization strategy provides for the maximization of water reuse. Equipment water discharges within the Facility are cascaded to those water uses that can use poorer quality make-up water there by reducing the amount high quality municipal water used.

The Facility is estimated to consume less than 100 litres per minute (lpm) of water under normal operating conditions. A water balance was developed for MCR conditions (see Figure 19) and is described below.

Major water consuming equipment is as follows:

- boiler steam generator salt removal via blowdown;
- boiler makeup water treatment system losses;
- steam losses due to deaerator and other miscellaneous vents;
- flue gas spray water (for flue gas quench);
- residue quench and fly ash conditioning;
- plant washings; and
- potable and sanitary uses.

The water uses have been comingled such that initial process water waste streams, such as process blowdowns, are collected and directed to evaporative end uses, such as flue gas scrubber and an ash quenching tank. The potable water system will be used by plant employees as a once-through system to sanitary waste discharge and will not be intermixed with process waste water. For example, potable water uses include drinking water, employee sanitary uses, showers and wash water. Potable water will also be utilized as the supply to the fire protection system and irrigation.

The water used within the process will either evaporate or be captured within the wastewater holding tank or settling tank and re-used. Water from The Regional Municipality of Durham will be used as the only source of water for the Facility. Municipal water will be used directly for the potable water supply within the Facility, fire protection water, irrigation, feed hopper and transition piece cooling, and service water for washdown and maintenance purposes. Service water can be potable and/or is of sufficient quality which can be used in the plant processes such as washdown and scrubbing. Water used for transition piece cooling and within the flue gas scrubber will evaporate.

Boiler makeup water is needed to replenish water that has evaporated during de-aeration or has been blowndown to help keep the boiler water clean. The boiler make-up water treatment system provides makeup water of appropriate quality for the boiler to compensate for losses due to: boiler blowdown, deaerator venting, leakage and soot blowing steam. The municipal water used for boiler make-up water will be demineralised using reverse osmosis; the demineralised water is used within the boiler to produce steam to run the turbine and carry the ammonia for the SNCR system.

10.2 Sanitary Wastewater

Sanitary wastewater originates from domestic use of water supply in sinks, toilets and showers. These facilities are discharged through internal plumbing to the Clarington Municipal sanitary sewer system. Applicable local sanitary sewer connection permits will be obtained prior to commencement of operation. The Energy Park will be serviced, taking into account the needs of this Facility. The sanitary sewer connection will be sized for domestic use only and will not be connected to any process water or floor drain systems.

10.3 Process Wastewater

This Facility will be a zero process water discharge facility.

Primary wastewater sources will be handled as follows:

- The continuous reject water flow from the boiler make-up water treatment system, as well as boiler blowdown, will be directed to the waste water holding tank where it will be reused as flue gas quench water, as water supply for fly ash conditioning and makeup for the settling basin.
- Any process wastewater containing solids, such as floor drains, ash discharger overflow and drain water, boiler and turbine-generator washdown water and APC area washdown water, will drain via grey water drains and trenches to the Waste Water Settling Basin located just south east of the APC building. No other drains shall be connected to this settling basin/sump. Water drawn from the settling basin is used to quench the bottom ash and provide moisture content for dust control. Water from the settling basin shall also be directed to hose stations on the tipping floor for refuse pit dust control. The basin will not be provided with an overflow connection to the municipal sewer system or site storm water system. To maintain an adequate supply of quench water, water from the wastewater holding tank will be pumped into the wastewater settling basin.
- Washdown from the tipping hall, if necessary, will be directed to the refuse pit where it will be absorbed by the waste. Any washdown from residue handling areas is directed to the residue storage piles.

Any processes that utilize reused water will be supplemented by municipal water cascading down from the wastewater holding tank.

Where spillage, leakage or concentrations of oil may occur from equipment and/or storage areas, a floor curb will be built around such equipment and/or storage areas with a trapped floor drain to prevent oil from being entrained in the waste water and drains/trenches.

No process materials or waste will be kept outside of the main Facility buildings. Stormwater from the Site is expected to be of comparable quality to typical runoff from rooftops, roads and parking areas because it will not be exposed to process materials. Refer to Figure 20 for a schematic of the settling basin, which outlines its design.

10.4 Plumbing

The plumbing system design will meet the requirements of all local plumbing codes. References to the local plumbing code mean the plumbing code/standard that is invoked by the authorities having jurisdiction in the locality where the plant is being built.

11.0 STORMWATER MANAGEMENT

The Site is approximately 12.1 ha and consists of 4 fields with hedgerows around each field. Under existing conditions, approximately 50 % of the Site is ploughed and the remaining 50 % is fallow fields (Jacques Witford (JW), July 2009). The surrounding land use consists of agricultural land to the east and west, industry lots (Auto Auctions with parking lots) to the north and west and Courtice Water Pollution Control Plant to the south.

A small portion of the Site in the south east corner has been cleared to allow for an access road which runs westward from Osbourne Road to the centre of the Site and then turns south towards the CN Rail property boundary. A small grass swale was constructed along the portion of the access road which heads south to provide flow direction to the south property boundary.

The existing runoff from the Site flows overland and most likely ponds in the southwest corner of the property. Overflow from this low point onsite discharges to the CN Rail swale which runs parallel with the south border of the Site. The swale is heavily vegetated and is relatively small with an estimated capacity of approximately 0.14 m^3/s (JW, July 2009). According to JW (July 2009) the CN rail swale capacity increases significantly approximately 300 m west of the site with a depth of over 1 m at bankfull conditions. The estimated conveyance capacity of the swale approximately 300 m west of the site is approximately 2.3 m^3/s which is greater than the 100 yr 24 hr peak flow storm event from the site, which is approximately 0.5 m^3/s. Flow within the CN rail swale is intermittent and is likely seasonal (JW, July 2009).

A tributary of Tooley Creek joins the CN rail swale approximately 580 m northwest of the site and continues to drain northwest along the CN rail line until it confluences with Tooley Creek. The Tooley Creek tributary is the conveyance channel for the property north of the Site (i.e. the Auto Auction site).

Tooley Creek is a warm water creek in the northern reaches and has been noted to have cold water springs north of Highway 401 as reported by the Central Lake Ontario Conservation Authority (JW, July 2009). Tooley Creek is a permanently flowing creek; however there is no stream gauge present on the creek. Jacques Whitford completed a water balance for Tooley Creek to estimate the average annual flow which was estimated to be approximately 0.12 m^3/s. At the confluence of the CN rail swale and Tooley Creek there is a culvert which conveys the creek under the railway towards Lake Ontario.

The Facility will obtain water from the Region of Durham which will be the only source of water for the Facility. This Facility will be a zero process water discharge facility; as such no water from the process will be sent to the sanitary sewer system or be discharged into the natural environment. Under normal operating conditions the Facility operates at a water deficit and requires municipal water to maintain enough water for the process.

A separate application has been submitted to the MOE Environmental Assessment and Approvals Branch (EAAB) for an industrial sewage works approval for stormwater works under Section 53 of the *Ontario Water Resources Act*. That application addresses stormwater containment within the site to maintain pre-development peak flows up to the 100 year storm event and to treat storm water runoff to reduce suspended solids.

The current Stormwater Management Pond (SWMP) design provides the same, or better, level of stormwater management (quantity and quality) as the preliminary design described in the EA documents. Using the EA values for the SWMP volume, based on the commitment to contain the entire 100-year post-development storm, and given the modified real estate constraints for Energy Park Drive and the area along the south side of the property which will be used for a planned stormwater drainage swale, the current design, therefore, utilizes a dual SWMP approach, with one pond located in the original location (southwest area of the site) that is capable of containing approximately 40 % of both the 100-year flow and Erosion and Sediment Control (ESC) requirements, and one pond located in the southeast corner of the site capable of containing the balance of the 100-year storm and ESC requirements. This dual pond approach has the added benefit of providing better overland gravity flow to these ponds when the permanent storm water conveyance system capacity is exceeded during a flood event in excess of the 100 year storm. The permanent pond volume is oversized for the post-development design based on the governing size required for sediment and erosion control during construction.

12.0 ENVIRONMENTAL EMERGENCY AND CONTINGENCY PLAN

Emergency and Contingency planning is required to ensure that disruptions in the planned operations (e.g., power outages, labour disputes, etc.) can be accommodated in a safe and efficient manner. Covanta will train all employees in the appropriate contingency measures to be followed in the event of emergencies or an interruption to normal operating procedures.

A detailed ECP, specifically prepared for the Facility, will be completed pending receipt of operating approvals. The ECP will be submitted, as required by EA Notice of Approval condition 17, a minimum of 60 days prior to the receipt of non-hazardous MSW at the site or such other date as agreed to in writing by the Director.

A Table of Contents for a typical ECP is included in Appendix F.

Development of the ECP will consider the requirements of both the Ontario Fire Code and legislated occupational health and safety requirements.

The ECP will be kept up-to-date and a copy retained in a central location at the Facility and will be accessible to all staff at all times. The ECP will deal with the prevention of, preparedness for, response to and recovery from an environmental emergencies. It will be reviewed with the Clarington Fire Services prior to commencement of operations at the Facility.

The ECP will include, but will not be limited to:

- Emergency response procedures, including notification procedures in case of a spill, fires, explosions or other disruptions to the operations of the Facility;
- Cell and business phone number and work locations for all person(s) responsible for the management of the Site;
- Emergency phone numbers for the local ministry office, the ministry's Spills Action Centre, and the Clarington Fire Services;
- Measures to prevent spills, fires and explosions;
- Procedures in the event of a fire;
- Details regarding equipment for spill clean-up and all control and safety devices;
- Shut down procedures for all operations associated with the undertaking including alternative waste disposal site locations;
- Maintenance and testing program for spill clean-up equipment and firefighting equipment;
- Training for site operators and emergency response personnel; and
- A plan, identifying the location and nature of wastes on site.

The Facility will have an emergency evacuation and notification plan in the event that a fire cannot be easily extinguished with available fire extinguishers and fire suppression equipment, and evacuation/notification is warranted.

In the event that a disruption to operations occurs such that the Facility cannot process waste, incoming waste can be temporarily stored in the refuse pit until the maximum capacity is reached. Best Management Practices will be followed to ensure that odours are not problematic, such as closing doors and louvers. If the processing disruption will be extended such that the maximum pit capacity may be exceeded, waste will no longer be accepted at the Facility, and on-site wastes may transferred to another approved disposal facility. The Facility has arrangements to deliver bypass waste to Covanta's other locations depending on their own waste inventory. These facilities are located in Upstate New York and other nearby states. Further, Covanta has good working relationships with other waste disposal companies and can therefore make arrangements to use their disposal facilities, if necessary.

The ECP will be reviewed, modified or expanded on an annual basis or following a significant event. This will ensure that the plans are kept current, and that Facility staff understand and are trained in their responsibilities. The plans will be maintained at the Facility in a readily available or conspicuous location.

12.1 Fire

The fire protection systems, interior sprinkler systems and exterior fire main system will meet the requirement and standards of Ontario Fire Code. In addition, the fire protection system will meet the requirements and standards of the insurance underwriter. Further, maintenance and testing program for firefighting equipment will be included in the ECP as indicated in condition 17.3 of the EA Notice of Approval.

The fire protection system will include all piping, water cannons, valves, fire extinguishers, sprinklers, hydrants, hose cabinets, hose, pumps, fittings and accessories, both underground and above ground, inside buildings, by the boiler and air pollution control equipment, and special items. In addition to a dry pipe sprinkler system located over the tipping hall pit and charging hopper parapet, water cannons arranged for local operation are to be provided. These cannons will be strategically located and arranged to avoid inadvertent impact by the crane grapple. Large emergency smoke relief hatches (solenoid release operated) will be provided in the roof above the parapet-pit area.

Two 9,650 lpm fire pumps will be provided. One of these pumps will be redundant to the other and isolated in a fireproof enclosure. Both pumps will be provided with diesel drives.

12.2 Power Disruptions

The Facility includes the following design components for power disruption prevention and mitigation:

- The Facility is equipped to continue processing waste for a period of time when disconnected from the grid. The turbine generator will be designed to generate power for in house load only, while bypassing the balance of the steam to the Air Cooled Condenser (ACC);
- The Facility has a purchase agreement to buy electricity from Hydro One;
- A steam driven boiler feedwater pump will be maintained on standby for use during emergency conditions, in the event of an electrical power failure;

- In case of a station blackout, a standby 250 kW diesel generator is provided to power the auxiliaries necessary to assure an orderly shutdown of the plant in the event of a total loss of station power. The stand-by diesel generator is located on the west side of Facility (Figures 8 and 9). A double walled fuel tank will supply the diesel generator and will provide approximately 12 hours full-load operation. The fuel tank is equipped with level control and indication and low-level alarm. In the case of a station blackout in excess of 12 hours, the tank will be refilled from a mobile fuel tank, thus allowing indefinite operation of the standby generator. The fuel tank in double walled to ensure spill containment and compliance with *Technical Standards and Safety Authority (TSSA) Liquid Fuels Handling Code* (2007) requirements. The diesel driven, synchronous generator is connected to a standby motor control centre. Essential loads for shutdown will be grouped on to the standby motor control centre. Upon loss of normal power, the diesel generator will start automatically and come up to speed, and an automatic transfer switch will transfer power to the standby motor control centre long enough to safely shut down the plant (Refer to Appendix D for SOPs pertaining to back-up power – standby diesel generator); and
- A 125 Vdc battery distribution system will be provided to supply critical equipment and protective devices for a minimum of 4 hours following a complete loss of normal power. Typically, battery loads would include medium and low voltage switchgear breaker controls, the uninterruptible power supply system, annunciator(s), various critical control circuits, emergency lube oil pump; emergency seal oil pump, control room emergency lighting, etc. At the end of the 4-hour duration, the batteries will have capacity to close all circuit breakers required to re-energize the battery charger.

During start-up of thermal treatment process, natural gas shall be used for one (1) auxiliary burner in each furnace to raise the temperature in the furnace to above 1000°C. This process (Phase 1 – Start-up) will take about 6 hours prior to MSW being fed into the system. Each burner will have a maximum thermal input rating of 56 MMBtu/hr and will meet the NO_x limits of MOE *A-9 Guideline - NO_x Emissions from Boilers and Heaters* of 46.9 ppmv at 3% O_2 for natural gas fired heaters above 10 MMBTU/hr. Further, the burners will be run for less than 500 hrs per year and would be exempt from MOE Guideline A-9. Phase 2 of start-up is the transition period when MSW (60% of heat input) is initially charged to the grate and auxiliary burners (natural gas 40% of heat input) are in operation until stable steady state combustion is achieved.

During shutdown, MSW charged to the feeding grate will be discontinued. Further natural gas from the auxiliary burner will supplement the shutdown process to ensure complete burnout of MSW.

13.0 NUISANCE CONTROL

Fugitive dust, odour, noise and debris emissions will be minimized in the Facility. The MSW will not be handled, received or stored in its unprocessed, as-delivered state at any location in the Facility, other than inside the tipping enclosure and MSW storage area. Refer to section 14.0 of this report for Facility maintenance, inspection and monitoring.

13.1 Noise Control

Noise control is primarily a function of proper plant design and equipment selection. An Acoustic Assessment Report is presented in the supporting documentation for the *Environmental Protection Act* R.S.O. 1990 Section 9 Application for Approval (Air & Noise), which has also been submitted to the MOE for this project. The Acoustic Assessment Report (AAR) has been completed in accordance with MOE Publication NPC-233, *Information to be Submitted for Approval of Stationary Sources of Sound* (October, 1995). Sound level limits for the Facility operations on neighbouring Point(s) of Receptions ("POR(s)") were established in accordance with MOE guidelines. The AAR demonstrated that sound levels from the Facility at identified PORs are at or below the applicable noise limits during the predictable worst case hour of Facility operation and during the periodic testing of the standby diesel generator or diesel fire pumps with both potential entrances.

13.2 Dust Control

As a means of dust control it will be the normal routine that all doors to all buildings throughout the Facility site will be kept closed except when being used. The Facility will be equipped with a dedicated street sweeper to maintain good housekeeping and control dust on the paved Facility surfaces.

Dust control in the main building will be further achieved by drawing boiler combustion air from the tipping hall. The combustion air fans inlet ducts are located near the refuse pit enclosure roof in the area above the refuse feed hoppers. Thus air-borne dust will be carried into the incineration process with the combustion air. In the unlikely event the unit is down, the tipping floor area door will be kept closed, except when refuse trucks are being received.

Fugitive dust emissions from bottom dry ash residues are controlled by handling ash in a totally enclosed system integral to the furnace. The quenched bottom ash, upon exiting the furnace via the ash discharger, has a moisture content of 15 to 25 percent, which aids in preventing the escape of fugitive dust emissions as the residue is conveyed from the main building to the residue storage building. Further, the outdoor portions of all conveyors will be enclosed. The residue material, both the bottom ash and treated fly ash will be loaded into covered trailers inside the residue building. Since all residue loading operations take place inside the residue building, fugitive emissions will be minimal.

As the on-site roads are paved, there are minimal fugitive road emissions. The Facility will have a dedicated street sweeper on-site to clean the on-site roads. Furthermore, gravel surfaces may be watered as required, to control dust.

13.3 Odour Control

All waste handling activities take place in enclosed buildings. The refuse pit is segregated from the tipping hall by a wall open to the tipping hall only through the tipping bays.

Under normal operating conditions both trains will be on line. The tipping hall and refuse pit will continue to be maintained under negative pressure by drawing primary combustion air from these areas. Potential odorous air will be drawn into the furnace and destroyed. The primary air will be introduced into the furnaces thereby subjecting these pollutants to direct flame, high temperature oxidation.

In addition, the louvers on the outside wall will be closed during truck deliveries. The truck entrance and exit doors will be closed when trucks are not delivering MSW. This effectively creates an enclosed area from which to draw combustion air. All MSW trucks are enclosed which reduces the potential for off-site odour.

A potential odour emission scenario could occur if both units are off-line for an extended period of time and the pit contains MSW. This would be an outage condition but all doors and louvers would be closed. Under this scenario, the ID fans could still be in operation, drawing odour air through the units and releasing the uncombusted odourous air into the atmosphere from the 87.6 m stack.

Potential odour emissions from the Facility were assessed following the MOE *Technical Bulletin Methodology for Modelling Assessments of Contaminants with 10-minute Average Standards and Guidelines under O. Reg 419/05 (April 2008)*. The odour scenario assumed that both combustion units were off-line. The Induced Draft fans would continue to operate and draw air from the tipping floor through the system and release the odours from the top of the stack. Odour samples from the Covanta Onondaga facility in Syracuse, New York were used to represent odours at the Facility during normal full load operating conditions. The maximum 10 min odour concentration was calculated to be 0.11 ou/m^3, which is an order of magnitude less than the guideline value of 1 ou/m^3. Refer to the Section 9 Application for Approval (Air & Noise), which has also been submitted to the MOE for more information.

An Odour Management and Mitigation Plan will be developed in consultation with the Ministry and Durham-York. The Plan will include at a minimum:

- Standard operating and shut down procedures;
- Maintenance schedules;
- Ongoing monitoring for and reporting of odour;
- Corrective action measures and other best management practices for ongoing odour control and for potential operational malfunction;
- A schedule for odour testing at sensitive receptors; and
- A section that specifically addresses odour control measures should operation of the Facility be disrupted or ceased.

Odour Management and Mitigation reports will be prepared and submitted to the Regional director annually.

13.4 Litter Control

Litter control throughout the site will be routinely conducted on a daily basis. In addition, the access roads, parking facilities and other paved areas and unpaved areas of the site including fences will be policed as needed. Various areas within the buildings themselves will be policed by the operating or maintenance group who utilizes or is assigned responsibility for them. Janitorial services in the administrative areas will be provided.

13.5 Pest Control

Pest/vector control for the Facility will be subcontracted to a qualified local company. Selection of the contractor will be based on qualifications and experience with similar types of plants and/or large industrial or commercial facilities having significant pest/vector control requirements. The program will be closely monitored by the designated safety coordinator and will be adjusted, as required, to seasonal changes, throughput variations, or simply the actual effectiveness of the program.

14.0 FACILITY MAINTENANCE, INSPECTION AND MONITORING

14.1 Facility Maintenance and Inspection

As part of the plant Final Design, Start-up and Commissioning, all necessary plans and procedures will be developed. A specific Facility and Inspection plan will be assembled based on the Facility specific design and equipment provided to ensure safe reliable environmentally sound operations at all times.

The Facility Maintenance and Inspection Plan will include the following tasks:

- Training Facility employees regarding the plan;
- Recording and maintaining inspection records;
- Reviewing and updating the plan annually;
- Retaining the services of outside services as needed for any maintenance beyond the capabilities of plant personnel;
- Five year Facility and equipment maintenance plan;
- Life cycle replacements of equipment, as applicable; and
- Preventative maintenance plan, which includes a critical spare parts inventory.

Critical spare parts that are identified on the inventory will be kept on site at all times to ensure timely repairs of critical components of the process.

Daily site inspections will be conducted to ensure that the Site is secure, Facility operations are not causing any nuisance impact and/or causing adverse effects on the environment, only non-hazardous waste is being received at the Site, and the Facility is compliant with all regulatory approval requirements.

A designated competent operator will complete a Daily Site Inspection Report, which will include the date and time of the inspection, and the name, title and signature of trained personnel supervising the inspection. If any problems are identified, the corrective action that is completed or planned, will be noted in the inspection report.

The Daily Site Inspection Report will include answers to the following:

- Is the entrance to the site 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 yard clean of litter and scrap?
- Are there any unacceptable odours?
- Is there good surface water drainage in the yard?
- Is the exit to the Facility clean of litter and dirt?
- Are the access roads to and from the Facility free of litter?

- Is the amount of storage of waste within the allowed maximum weight limits

Copies of the Daily Site Inspection Reports will be kept on file at the Facility as indicated in section 15.3. A Table of Contents for a typical Facility Maintenance and Inspection Plan is included in Appendix G.

14.2 Facility Monitoring

Further, the Facility will undergo a third party audit by qualified, independent professional engineer to ensure compliance of the undertaking, as prescribed in Condition 16 of the EA.

The following monitoring and reporting plans are required, as prescribed in the EA Notice of Approval:

- Ambient Air Monitoring and Reporting Plan;
- Air Emissions Monitoring and Reporting Plan;
- Noise Monitoring and Reporting Plan;
- Odour Management and Mitigation Monitoring and Reporting Plan; and
- Groundwater and Surface Water Monitoring and Reporting Plan.

15.0 STAFF TRAINING, REPORTING, AND RECORD KEEPING

15.1 Staff Training

To prepare Covanta personnel for operations and maintenance positions in the Facility, a comprehensive training program is implemented. The program combines classroom instruction, computer based training, and on the job training (OJT).

Initial training will provide new employees with all necessary information pertaining to company history, policies and procedures training. Initial training also covers safety procedures, Workplace Hazardous Materials Information System (WHMIS), Facility systems and equipment trainings and environmental affairs training which includes applicable regulatory overview and Facility permit review. Components of the training are summarized below:

- Introduction to Covanta and the Facility;
- Employee Handbook;
- Personnel Safety;
- WHMIS;
- Introduction to Facility Safety Procedures
  - Lock-out/Tag-out
  - Confined Space
  - Respiratory Protection
  - Electrical Safety
  - Tipping Floor Safety
  - Working at High Elevations
  - Ash Discharger Safety
  - Ash Hopper Safety
  - Emission Compliance
- Occupational health and safety concerns pertaining to the processes and wastes to be handled;
- Management procedures including the use and operation of equipment for the processes and wastes to be handled;
- Environmental emergency and contingency procedures for the processes and wastes to be handled;
- Use and operation of the equipment to be used by the operator;
- Procedures for the refusal of unacceptable loads;
- Procedures for handling ash;

- Site specific written procedures for the control of nuisance conditions;
- Odour recognition training;
- Record keeping procedures; and
- The CofA and other regulatory requirements.

A manual including the aforementioned training will be given to each employee during training. Covanta will maintain a written record of employee training, including the date of training, the name and signature of the employee and a description of the training provided.

15.2 Complaint Procedure

A Complaint Protocol for the Design and Construction and Operation of this Undertaking has been developed to meet Condition 6 of the EA Notice of Approval to proceed, and to ensure that complaints are investigated and dealt with in a timely manner. Additionally, this Complaint Protocol outlines how Durham-York will respond to inquiries, complaints and concerns received during the design, and construction and operation of this Undertaking.

A copy of the Complaint Protocol is included in Appendix H, which includes the following:

- General process for receiving complaints or concerns;
- Measures used to inform the public about the complaint process;
- Procedures for recording/logging complaints;
- Roles and responsibilities of the various stakeholders;
- Action/Response; and
- Quality Assurance.

When a complaint is received, a Record of Complaint (RoC) is completed. The RoC includes the following information:

- Name and contact information of the complainant;
- Tracking number;
- Nature of the complaint or concern;
- Action taken to address or respond to the issue;
- Response provided to the Originator; and
- Resolution of complaint.

The RoC will be entered into a complaint management software database. The database will log the issue, track process and record the action plan and resolution of an issue. This provides a record to allow all appropriate levels of managers to be kept apprised of issues.

Lastly, as per Condition 8 of the EA Notice of Approval to proceed, an advisory committee has been set up to ensure that the concerns about design, construction and operation of this undertaking are considered and mitigated. This committee will include the members and stakeholders prescribed in Condition 8.

15.3 Record Keeping

The following records will be maintained at the Facility in electronic and/or hardcopy format:

a) Up-to-date site plans for all major Facility elements including the building, road network, sewer and drainage systems;

b) Up-to-date Emergency and Contingency Plan;

c) Daily record of waste received including type, date, time of arrival, quantity and source of non-hazardous MSW received;

d) Quantity of unprocessed, processed and residual non-hazardous MSW on the Site;

e) Quantities and destination of each type of residual material shipped from the Site;

f) Daily record of any waste loads rejected, including amounts, reason for refusal and action taken;

g) Daily Site Inspection Reports;

h) Complaint Logs;

i) Employee training records; and

j) An incident report for any fires, spills, accidents on-site or other emergencies on-site.

15.4 MOE Reporting

An annual report will be submitted to the MOE District Office documenting the operation of the Site for the previous calendar year. The report will include the following information:

Monthly summary of the type and quantity of all wastes received at the Site;

k) Monthly summary of the type and quantity of all wastes shipped from the Site and the location to which it was shipped;

l) A description of any material operational issues encountered;

m) Any recommendations for operational changes;

n) Amount of recovered recyclables shipped to market;

o) Amount of residual waste shipped to landfill;

p) Average daily amount of waste received and shipped;

q) Maximum amount of waste that was received in one day in the past year;

r) Amount of waste stored on-site as of date of preparation of Annual Report;

s) Any modifications that were made to the Facility under the operational flexibility afforded by the Comprehensive CofA for the site;

t) Annual water quantity usage;

u) Annual compliance reporting;

v) A summary of the complaints that were received regarding the Facility operation; and

w) Annual Odour Management and Mitigation Monitoring Reports (refer to section 13.3).

16.0 SITE CLOSURE PLAN

Post-closure use of the Site is likely to be of an industrial nature since the Site would likely be part of a fully developed energy park and will still be zoned industrial. At the time of closure and decommissioning, an appropriate plan will be developed, considering:

- Current regulatory requirements;
- Best-practices with respect to equipment and materials salvage;
- Best-practices with respect to hazardous materials management;
- Best use of materials including reuse and recycling of Facility components; and
- Applicable impact management measures identified in the Environmental Assessment.

Report Signature Page

GOLDER ASSOCIATES LTD.

Michael Cant, Associate
Canadian Waste Sector Leader

Pamela Russell, P.Eng.
Associate, Senior Waste Engineer

Anthony Ciccone, Ph.D., P.Eng.
Principal

MK/PR/mk/ms

\\mis1-s-filesrv1\data\active\2010\1151\101f50~1\wastea~1\finala~1\attach~1\report\10-1151-0343 rpt feb11 durham york energy centre waste design and operations.docx

REFERENCES

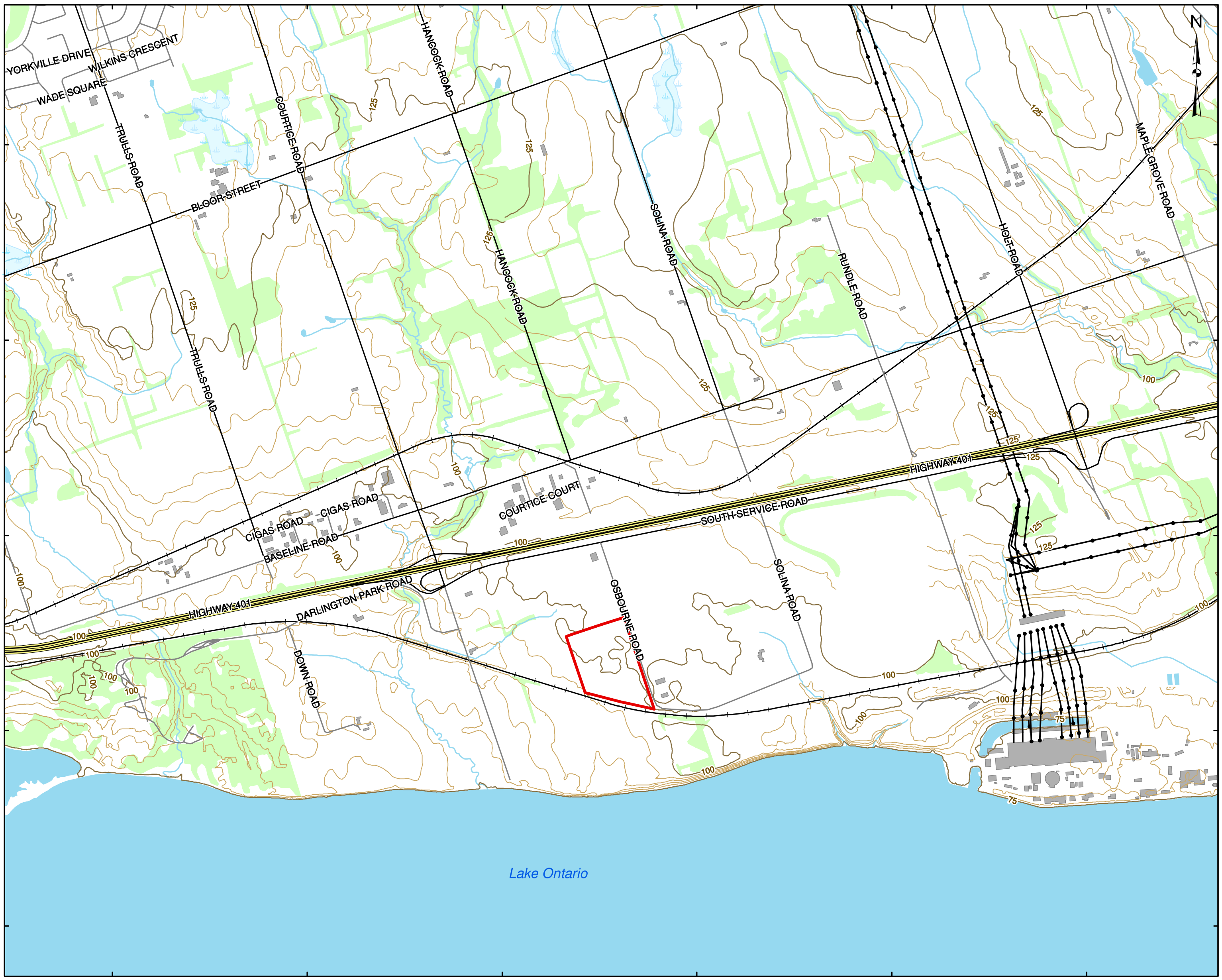
Jacques Whitford, *Surface Water and Groundwater Assessment – Technical Study* Report, Durham York Residual Waste EA Study, Report No. 1009497, July 31, 2009.

Ontario Ministry of the Environment, *Guide for Applying for Approval of a Waste Disposal Site*, September 2010.

Ontario Ministry of the Environment, *Notice of Approval to Proceed with the Undertaking – Environmental Assessment Act* Section 9, EA File no. 04-EA-02-08, October 21, 2010.

Stantec, *Environmental Assessment Study Document, Durham York Residual Waste EA Study*, Report No. 1009497, November 27, 2009. <www.durhamyorkwaste.ca>

FIGURES



LEGEND

- Major Contour (25 m)
- Minor Contour (5 m)
- Expressway
- Highway
- Major Road
- Local Road
- Railway
- Utility Line
- Watercourse
- Waterbody
- Wetland
- Woodlot
- Building Footprint
- Approximate Site Boundary

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

0.5 0.25 0 0.5 1
SCALE 1:20,000 KILOMETERS

PROJECT

DURHAM YORK ENERGY CENTRE

TITLE

SITE LOCATION PLAN

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	25 Aug. 2010		
GIS	PRM	2 Feb. 2011		
CHECK	MK	2 Feb. 2011		
REVIEW	PR	2 Feb. 2011		

FIGURE: 1

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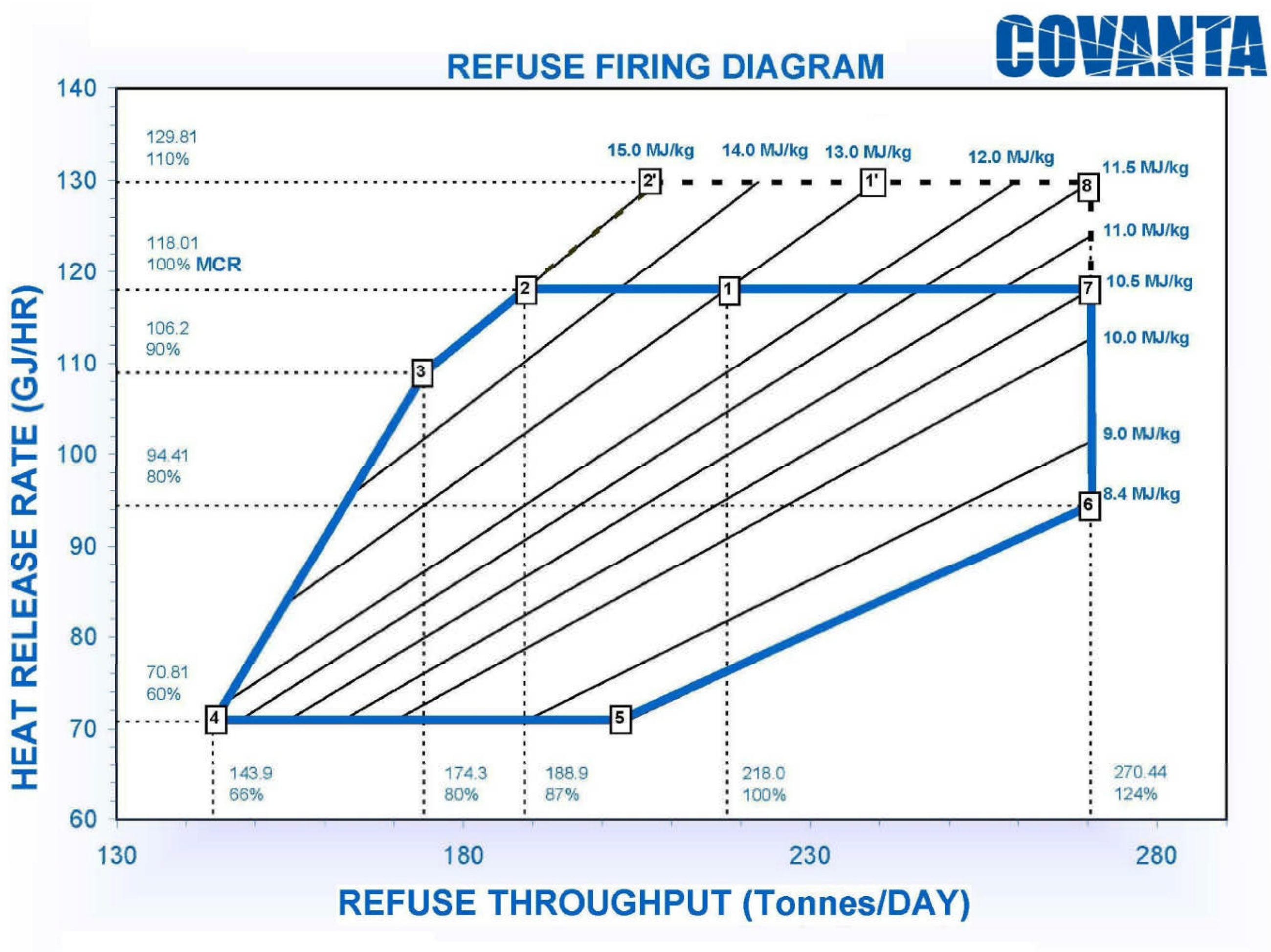


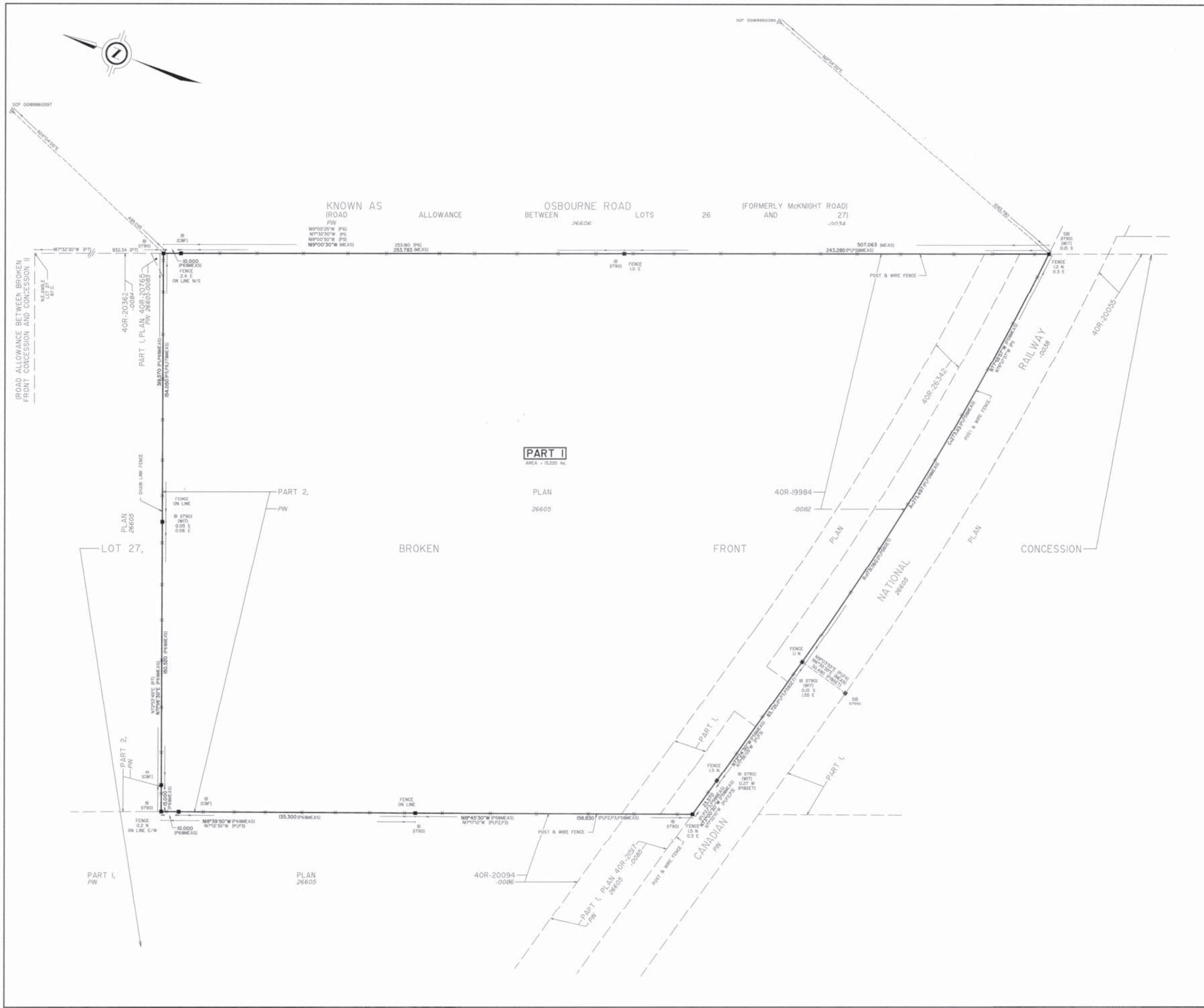
REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT	Durham York Energy Centre			
TITLE	REFUSE FIRING DIAGRAM			
PROJECT No. 10-1151-0343			FILE No.	AA08
DESIGN			SCALE NTS	REV.
CADD	JLJM	Jan. 2011	FIGURE 2	
CHECK	MK	Feb. 2011		
REVIEW	MK	Feb. 2011		

Golder Associates

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA08.dwg Feb 17, 2011 - 10:46am



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.	PLAN 40R-26782
DATE Dec. 1, 2010	RECEIVED AND DEPOSITED
G.C. Laframboise	DATE Dec. 1/10
G.C. LAFRAMBOISE ONTARIO LAND SURVEYOR	"P. Johnstone" ADLR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF DURHAM (No. 40)

SCHEDULE

PART	PART OF LOT	CONCESSION	ALL OF PIN	AREA ha.
1	27	BROKEN FRONT CONCESSION	26605-0082	13.220

PLAN OF SURVEY OF

PART OF LOT 27 BROKEN FRONT CONCESSION

(GEOGRAPHIC TOWNSHIP OF DARLINGTON)
NOW IN THE

MUNICIPALITY OF CLARINGTON

REGIONAL MUNICIPALITY OF DURHAM

SCALE 1 : 1000

20 0 20 40 60 metres

J. D. BARNES LIMITED

METRIC DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES

BEARINGS ARE GRID, DERIVED FROM SPECIFIED CONTROL POINTS (SCPs) 0089860597 AND 0089860598, UTM ZONE 17, NAD83 (ORIGINAL).

DISTANCES ON THIS PLAN ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99999155.

INTEGRATION DATA

SPECIFIED CONTROL POINTS (SCPs): UTM ZONE 17, NAD83 (ORIGINAL).

COORDINATE VALUES ARE TO AN URBAN ACCURACY IN ACCORDANCE WITH SECTION 14 (2) OF O.REG 216/10.

POINT ID	EASTING	NORTHING
SCP 0089860597	680 826.940	4 861 038.345
SCP 0089860598	681 188.771	4 861 114.772

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT SET
△	DENOTES	CONTROL MONUMENT FOUND
SIB	DENOTES	STANDARD IRON BAR
IB	DENOTES	IRON BAR
SCP	DENOTES	SPECIFIED CONTROL POINT
WIT	DENOTES	WITNESS
MEAS	DENOTES	MEASURED
JDB	DENOTES	J.D. BARNES LIMITED
1790	DENOTES	A.V. FLIM, O.L.S.
CBF	DENOTES	COUTTS & FLIM SURVEYING INC., O.L.S.
P1	DENOTES	PLAN 40R-19984
P2	DENOTES	PLAN 40R-21517
P3	DENOTES	PLAN 40R-20094
P4	DENOTES	PLAN 40R-20055
P5	DENOTES	PLAN 40R-26342
P6	DENOTES	PLAN OF SURVEY BY COUTTS & FLIM SURVEYING INC. DATED APRIL 28, 2010.
P7	DENOTES	PLAN 40R-20362

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON NOVEMBER 23, 2010.

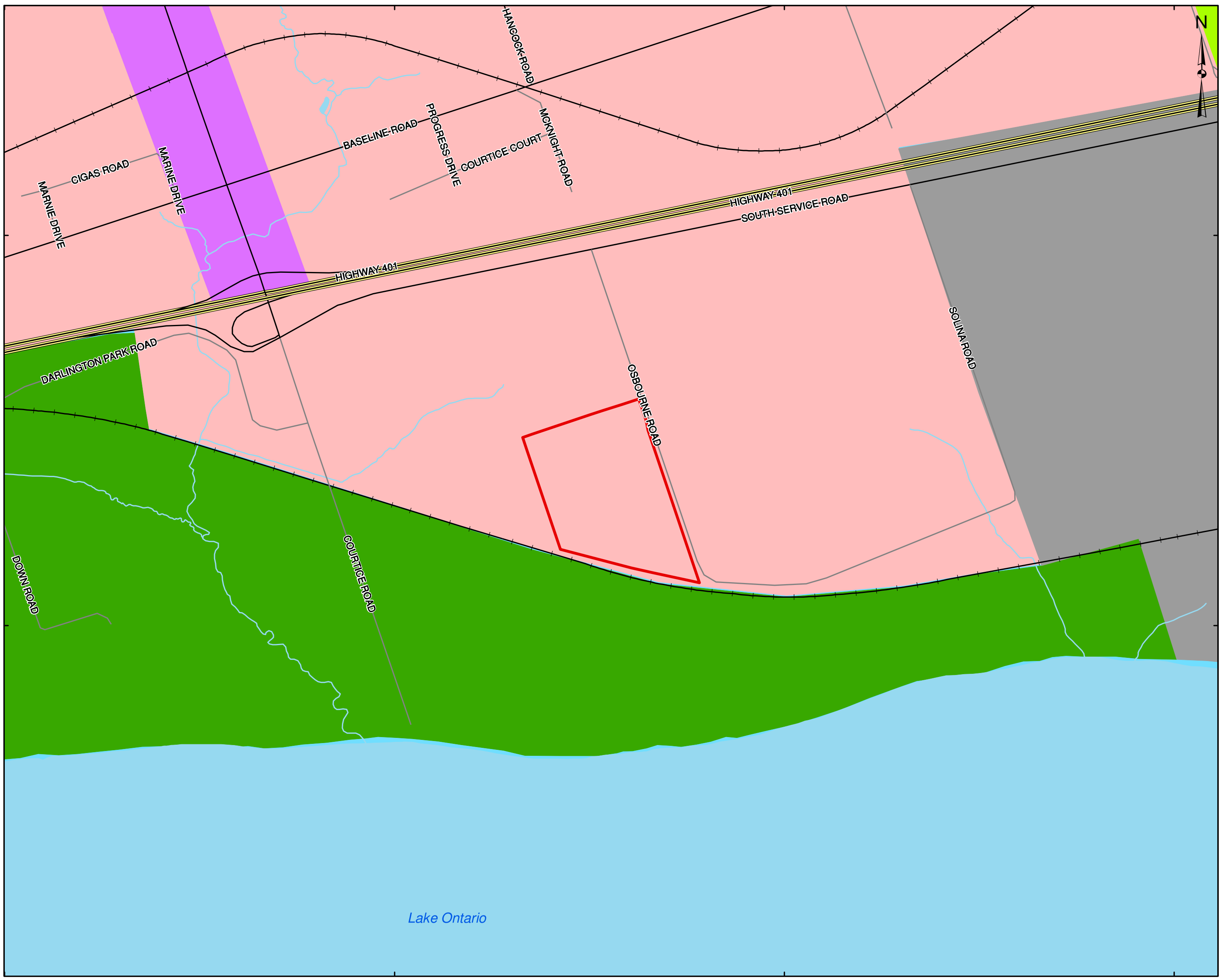
DATE Nov. 26, 2010

G.C. Laframboise
G.C. LAFRAMBOISE
ONTARIO LAND SURVEYOR

J.D. BARNES LIMITED
SURVEYING PLANNING MAPPING GIS
LAND INFORMATION SPECIALISTS
110 SCOTIA COURT, #40 WHITBY, ON L1N 8Y7

DRAWN BY: F.B.J.	CHECKED BY: G.C.L.	REFERENCE NO.: 07-25-015-08
FILE: g:/72501508/72501508-rpl.dgn		DATED: NOVEMBER 26, 2010

PLOTTED: 01 DEC 2010



LEGEND

- Expressway
- Highway
- Major Road
- Local Road
- Railway
- Watercourse
- Waterbody
- Approximate Site Boundary

Durham Region Land Use

- Employment Areas
- Regional Corridor
- Major Open Space Area
- Waterfront Areas
- Darlington Nuclear Generating Station

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Land Use - Durham Region (June 2009)
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Landuse data from Durham/York Residual Waste Study
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

250 125 0 250 500

SCALE 1:10,000 METRES

PROJECT

DURHAM YORK ENERGY CENTRE

TITLE

DURHAM REGION OFFICIAL PLAN LAND USE

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	25 Aug. 2010		
GIS	PRM	2 Feb. 2011	**FIGURE: 4**	
CHECK	MK	2 Feb. 2011		
REVIEW	PN	2 Feb. 2011		

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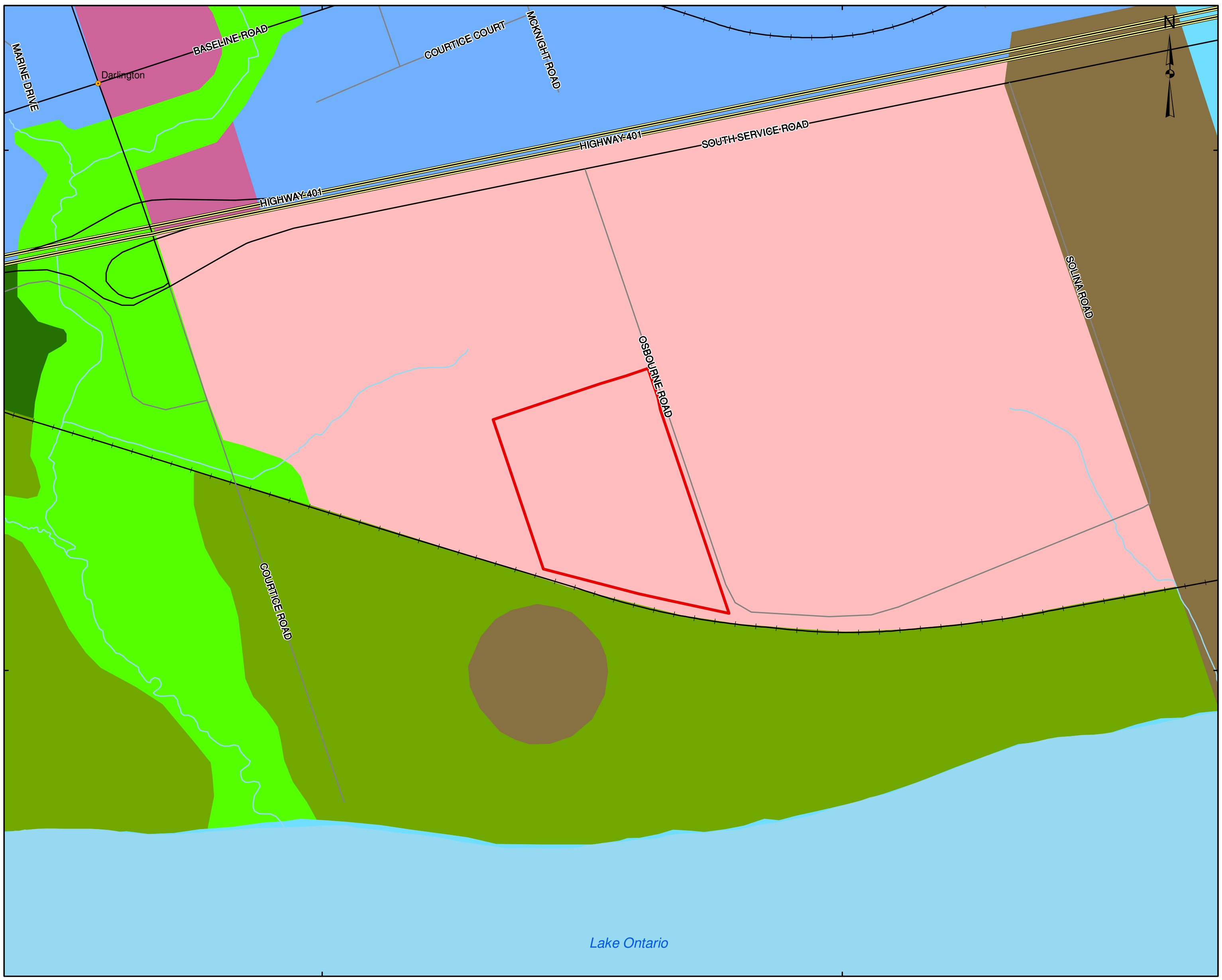

LEGEND

- Expressway
- Highway
- Major Road
- Local Road
- Railway
- Watercourse
- Waterbody
- Approximate Site Boundary

Municipality of Clarington Land Use

- Business Park
- Enivironmental Protection
- General Agriculture
- General Industrial
- Green Space
- Light Industrial
- Prestige Employment
- Utility
- Waterfront Greenway

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Landuse - Municipality of Clarington Official Plan - Map A2 (January 2010)
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Landuse data from Durham/York Residual Waste Study
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

200 100 0 200 400
SCALE 1:7,500 METRES

PROJECT

DURHAM YORK ENERGY CENTRE

TITLE

MUNICIPALITY OF CLARINGTON OFFICIAL PLAN LAND USE

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	25 Aug. 2010		
GIS	PRM	2 Feb. 2011		
CHECK	MK	2 Feb. 2011		
REVIEW	PN	2 Feb. 2011		

FIGURE: 5

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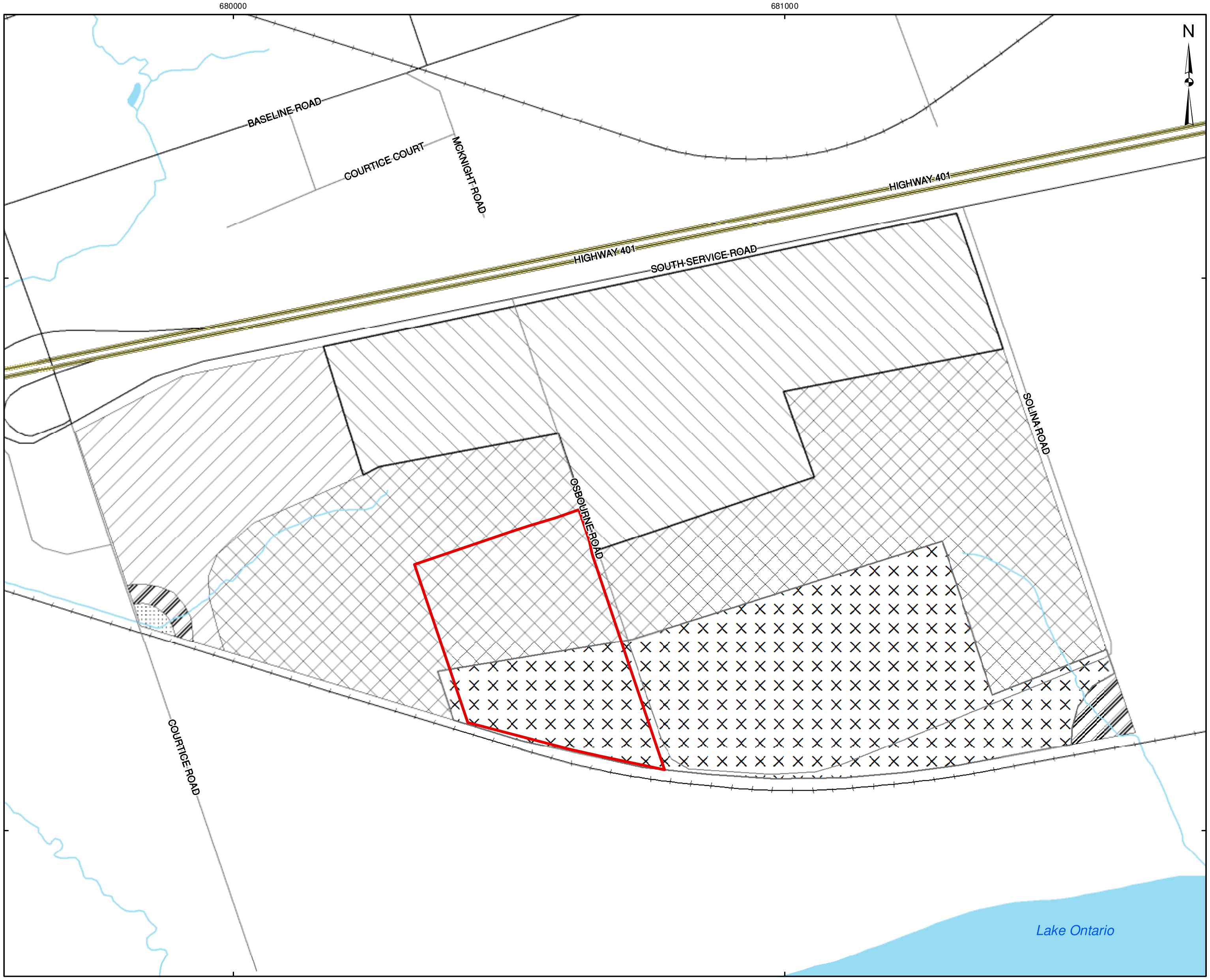

LEGEND

- Expressway
- Highway
- Major Road
- Local Road
- Railway
- Watercourse
- Waterbody
- Approximate Site Boundary

Clarington Energy Business Park Land Use

- Environmental Protection Area
- Light Industrial 1
- Light Industrial 2
- Open Space
- Prestige Employment Cooridor
- Prestige Employment Node

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Land Use - Municipality of Clarington (January 2010)
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

150 75 0 150 300
SCALE 1:7,000 METRES

PROJECT
DURHAM YORK ENERGY CENTRE

TITLE
CLARINGTON ENERGY BUSINESS PARK SECONDARY PLAN LANDUSE

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	25 Aug. 2010	**FIGURE: 6**	
GIS	PRM	2 Feb. 2011		
CHECK	MK	2 Feb. 2011		
REVIEW	PN	2 Feb. 2011		

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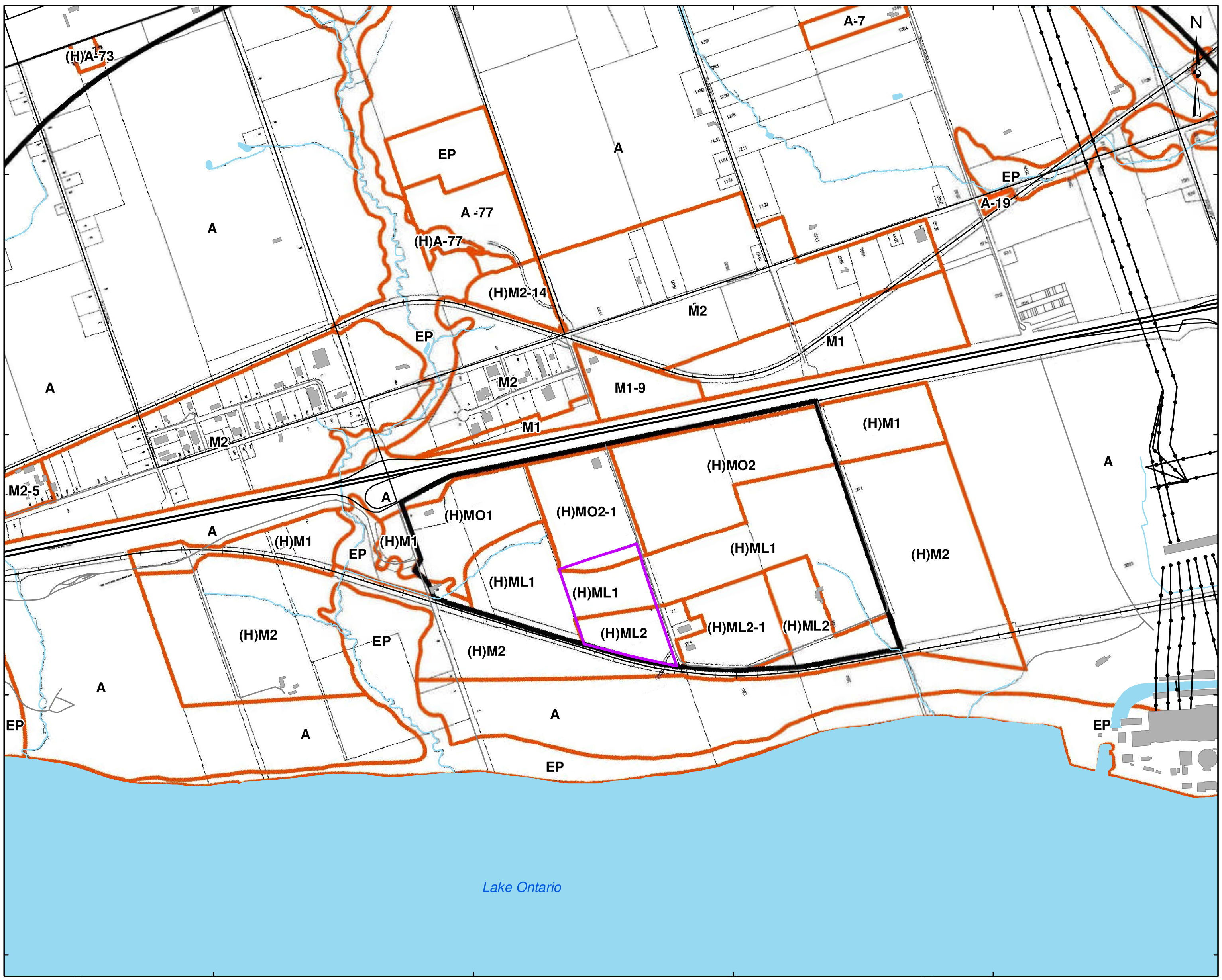

LEGEND

- Highway
- Major Road
- Local Road
- Railway
- Utility Line
- Watercourse
- Waterbody
- Building Footprint
- Approximate Site Boundary
- Zoning

A - Agricultural
M1 - Light Industrial
M2 - Eeneral Industrial
MO1 - Energy Park Office
MO2 - Energy Park Prestige
ML1 - Energy Park Light Industrial
ML2 - Energy Park General Industrial
EP - Environmental Protection

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Zoning - The Town of Newcastle Zoning By-Law 84-63
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

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SCALE 1:15,000 KILOMETERS

PROJECT
DURHAM YORK ENERGY CENTRE

TITLE
MUNICIPALITY OF CLARINGTON ZONING BY-LAW

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343		
DESIGN	PRM	25 Aug. 2010
GIS	PRM	2 Feb. 2011
CHECK	MK	2 Feb. 2011
REVIEW	PN	2 Feb. 2011

SCALE AS SHOWN | REV. 0.0

FIGURE: 7

LEGEND

- Stack
- Truck Access/ Egress Route
- Site Road (Gravel)
- Site Road (Paved)
- Railway
- Roof Plan
- Approximate Site Boundary

ID	Description
A	Carbon Silo
B	Pozzolan Silo
C	Portland Cement Silo
D	Lime Silo
E	Diesel Generator
F	Ammonia Storage Tank

ID	Building	Height (m)
1	Tipping Building	15.0
2	Refuse Building	35.1
3	Admin Building	5.3
4	Boiler Building	35.1
5	Turbine Building	19.0
6	Scrubber Building	35.1
7	Baghouse Building	25.0
8	Maintenance and Storage Building	12.1
9	Control Room	24.2
10	Air Cooled Condensers	24.7
11	Visitor Centre	11.3
12	Electrical Building	5.0
13	Residue Storage Building	17.2
14	Fire Water Pump House	10.0
15	Fire Water Tank	8.0
16	Grizzly Building	6.0
17	Diesel Genset	2.5
18	Scale House	-

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Imagery: Firstbase Solutions, obtained on December 16, 2010, 20 cm resolution.
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

50 25 0 50 100
SCALE 1:2,000 METERS

PROJECT
DURHAM YORK ENERGY CENTRE

TITLE
BUILDING LOCATION PLAN
(ROUTE 1 - OSBOURNE ROAD ENTRANCE)

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	25 Aug. 2010		
GIS	PRM	2 Feb. 2011		
CHECK	MK	2 Feb. 2011		
REVIEW	PN	2 Feb. 2011		

FIGURE: 8

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LEGEND

- Stack
- Truck Access/ Egress Route
- Site Road (Paved)
- Site Road (Gravel)
- Railway
- Roof Plan
- Approximate Site Boundary

ID	Description
A	Carbon Silo
B	Pozzolan Silo
C	Portland Cement Silo
D	Lime Silo
E	Diesel Generator
F	Ammonia Storage Tank

ID	Building	Height (m)
1	Tipping Building	15.0
2	Refuse Building	35.1
3	Admin Building	5.3
4	Boiler Building	35.1
5	Turbine Building	19.0
6	Scrubber Building	35.1
7	Baghouse Building	25.0
8	Maintenance and Storage Building	12.1
9	Control Room	24.2
10	Air Cooled Condensers	24.7
11	Visitor Centre	11.3
12	Electrical Building	5.0
13	Residue Storage Building	17.2
14	Fire Water Pump House	10.0
15	Fire Water Tank	8.0
16	Grizzly Building	6.0
17	Diesel Genset	2.5
18	Scale House	-

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Imagery: Firstbase Solutions, obtained on December 16, 2010, 20 cm resolution.
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17N

50 25 0 50 100
SCALE 1:2,000 METERS

PROJECT
DURHAM YORK ENERGY CENTRE

TITLE
BUILDING LOCATION PLAN
(ROUTE 2 - COURTICE ROAD ENTRANCE)

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	25 Aug. 2010		
GIS	PRM	2 Feb. 2011		
CHECK	MK	2 Feb. 2011		
REVIEW	PN	2 Feb. 2011		

FIGURE: 9

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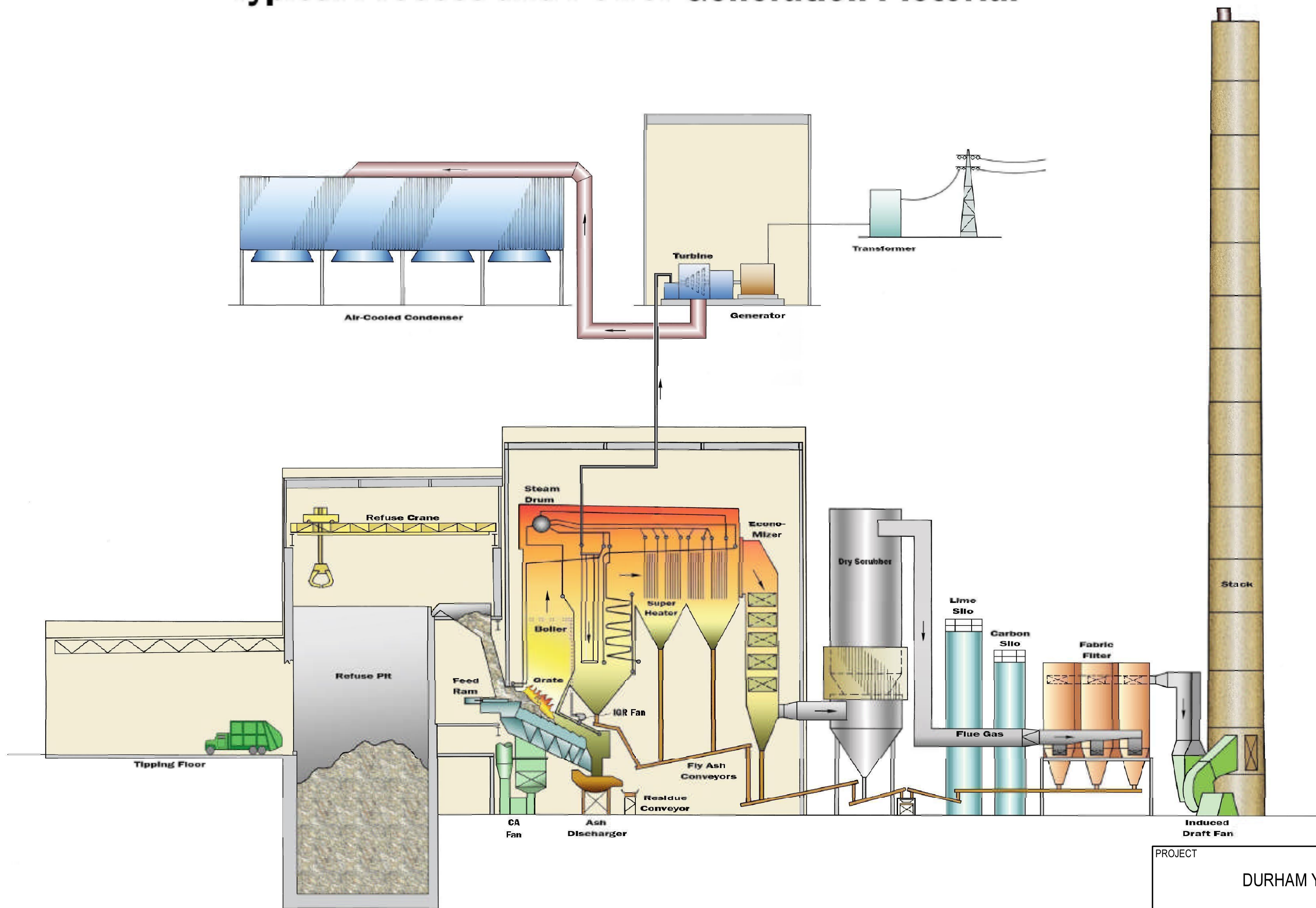
Typical Process and Power Generation Pictorial



REFERENCE

Process and Power Generation Pictorial provided by Covanta Energy Inc.

PROJECT

DURHAM YORK ENERGY CENTRE

TITLE

PROCESS AND POWER GENERATION PICTORIAL

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343		
DESIGN	PRM	13 Jan. 2011
GIS	PRM	2 Feb. 2011
CHECK	MK	2 Feb. 2011
REVIEW	PN	2 Feb. 2011

SCALE AS SHOWN | REV. 0.0

FIGURE: 10

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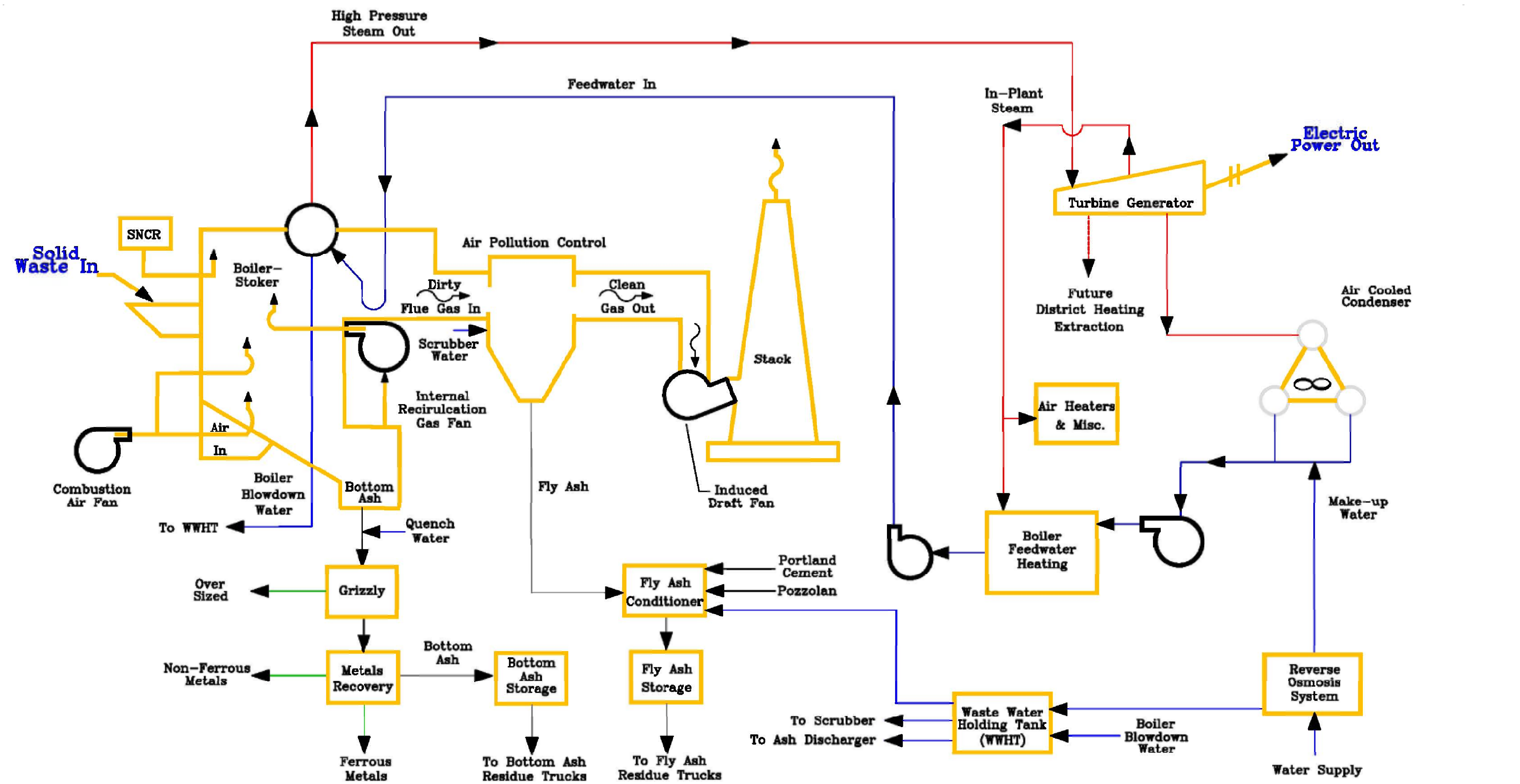

PROJECT

DURHAM YORK ENERGY CENTRE

TITLE

SIMPLIFIED PROCESS FLOW DIAGRAM

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1151-0343			SCALE AS SHOWN	REV. 0.0
DESIGN	PRM	13 Jan. 2011	FIGURE: 11	
GIS	PRM	14 Feb. 2011		
CHECK	MK	14 Feb. 2011		
REVIEW	PN	14 Feb. 2011		

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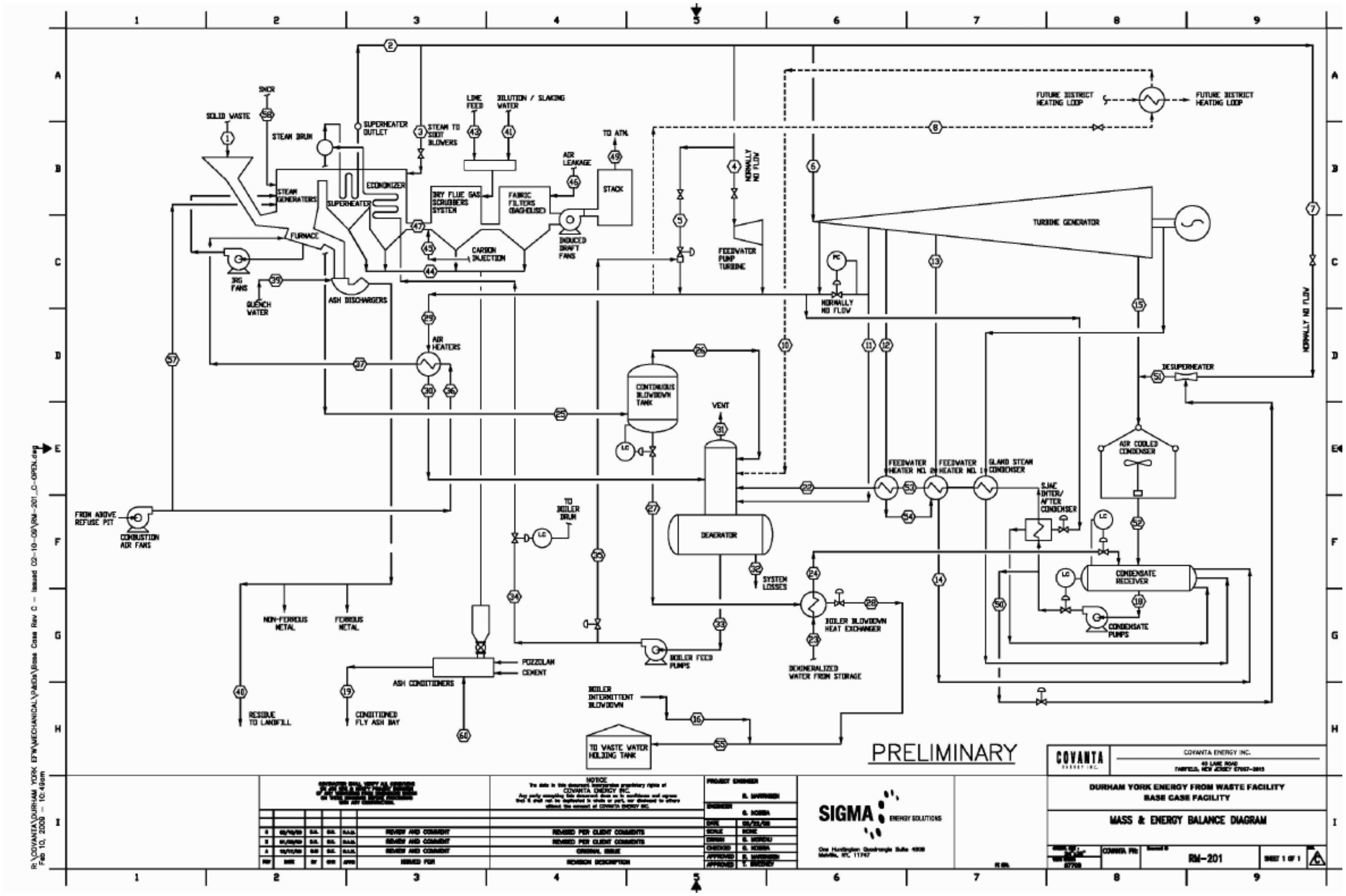


REFERENCE

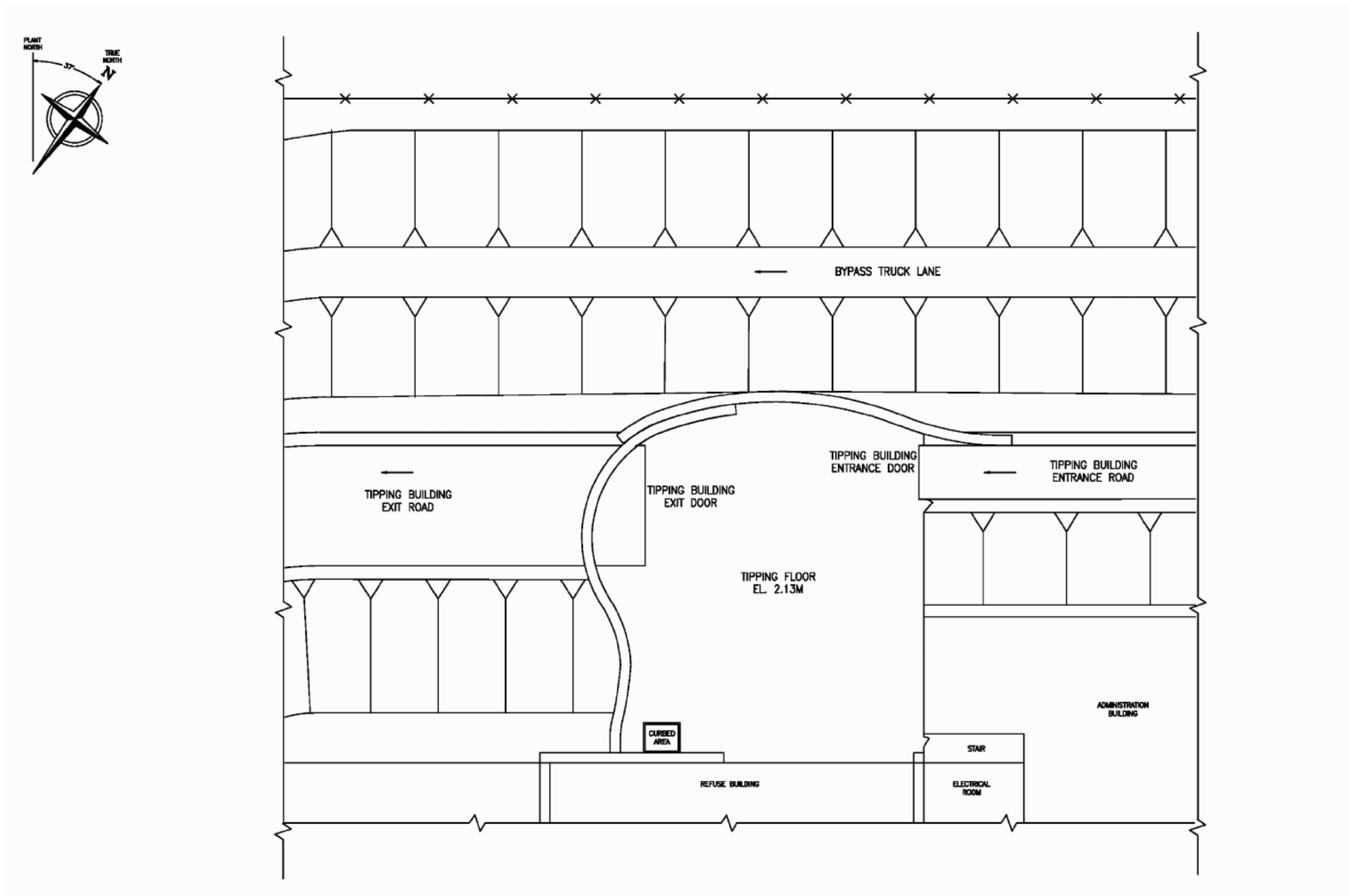
Base plan provided by Covanta Energy Inc.

PROJECT
Durham York Energy Centre

TITLE
MASS AND ENERGY BALANCE DIAGRAM

PROJECT No. 10-1151-0343			FILE No.	AA12
DESIGN			SCALE AS SHOWN	REV.
CADD	PJV	Jan. 2011	**FIGURE 12**	
CHECK	MK	Feb. 2011		
REVIEW	MK	Feb. 2011		

Golder Associates



REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT

Durham York Energy Centre

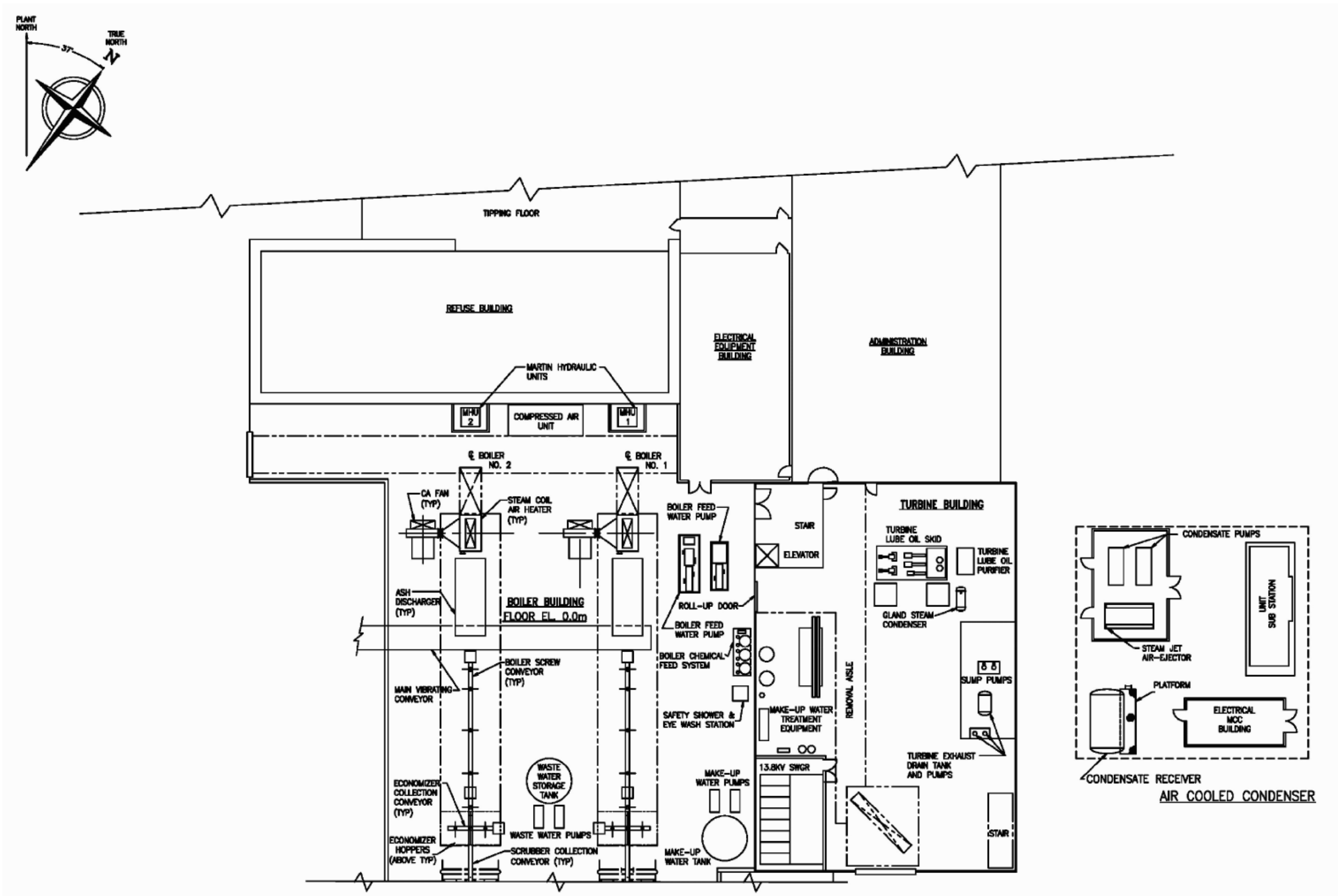
TITLE

PRELIMINARY GENERAL ARRANGEMENT TIPPING FLOOR AREA LAYOUT

Golder Associates

PROJECT No. 10-1151-0343			FILE No. AA13
DESIGN			SCALE N.T.S. REV.
CADD	PJV	Feb. 2011	
CHECK	MK	Feb. 2011	**FIGURE 13**
REVIEW	MK	Feb. 2011	

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA13.dwg Feb 17, 2011 - 10:48am



REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT

Durham York Energy Centre

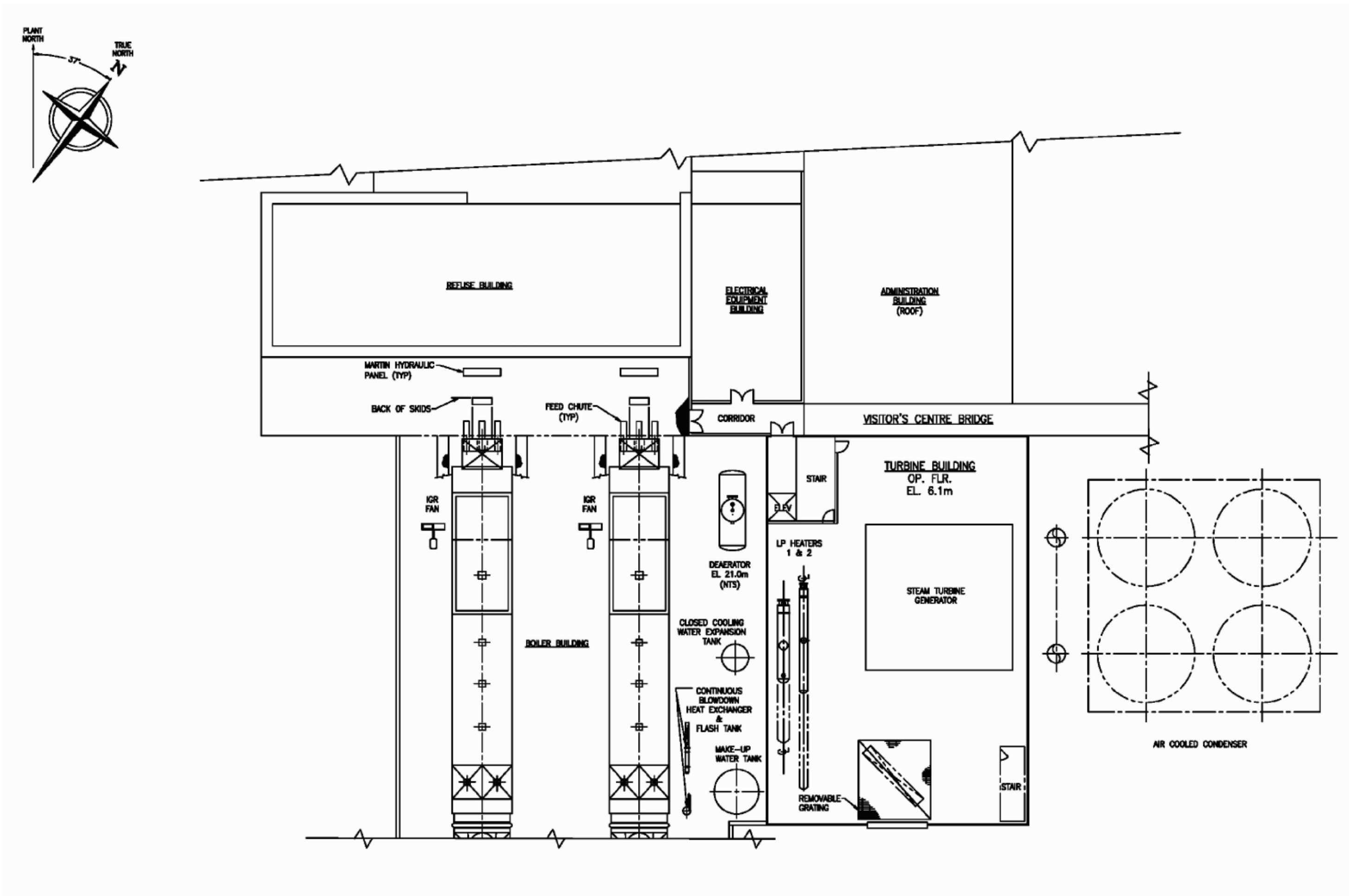
TITLE

PRELIMINARY GENERAL ARRANGEMENT BOILER, TURBINE GENERATOR AND AIR COOLED CONDENSER AREA (EL. 0.0 m)

Golder Associates

PROJECT No. 10-1151-0343			FILE No. AA14
DESIGN			SCALE N.T.S. REV.
CADD	PJV	Feb. 2011	
CHECK	MK	Feb. 2011	**FIGURE 14**
REVIEW	MK	Feb. 2011	

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA14.dwg Feb 17, 2011 - 10:49am

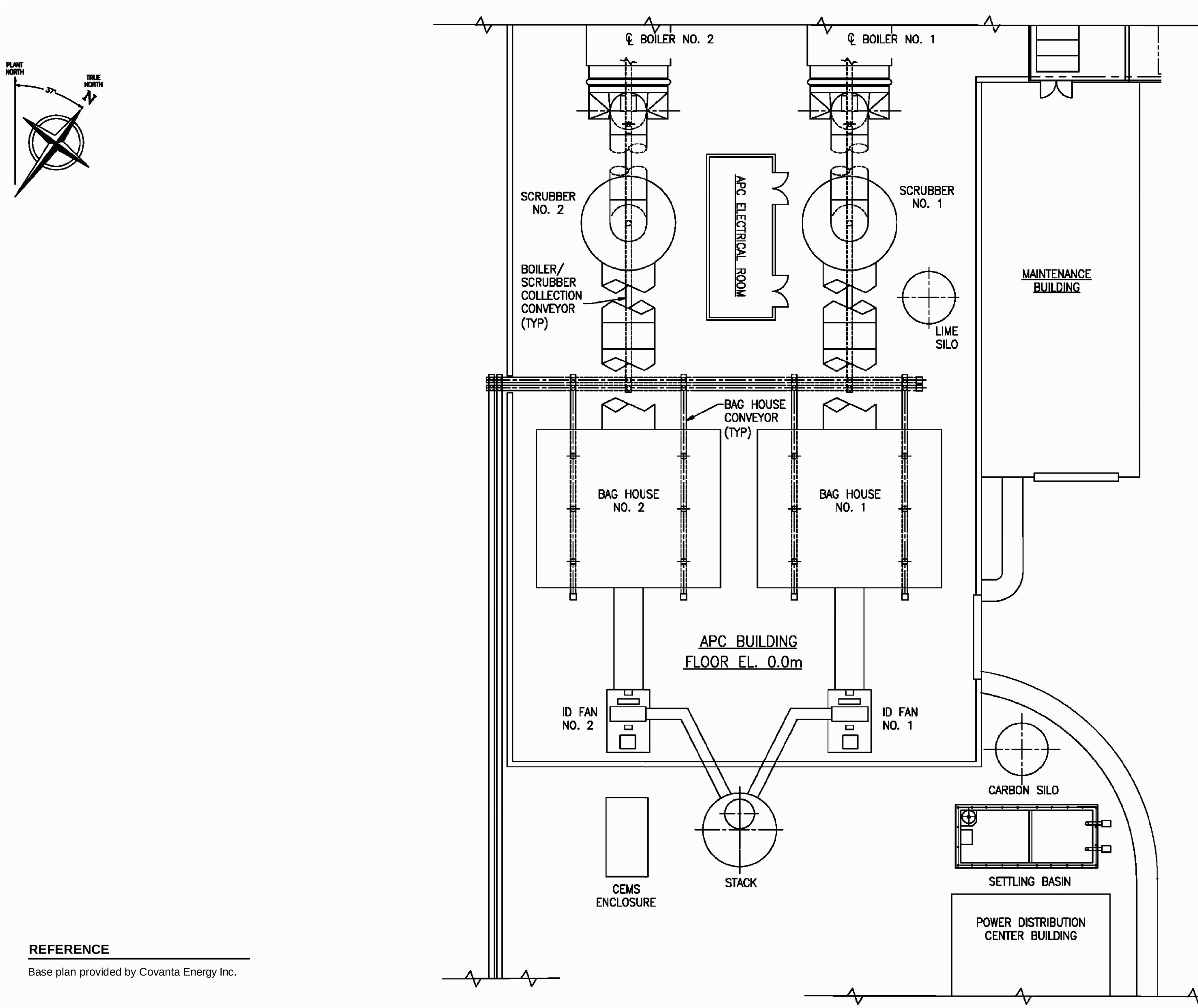


REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT	Durham York Energy Centre			
TITLE	PRELIMINARY GENERAL ARRANGEMENT BOILER, TURBINE GENERATOR AND AIR COOLED CONDENSER AREA (EL. 6.1 m)			
Golder Associates	PROJECT No. 10-1151-0343		FILE No.	AA15
	DESIGN		SCALE N.T.S.	REV.
	CADD	PJV	Feb. 2011	FIGURE 15
	CHECK	MK	Feb. 2011	
	REVIEW	MK	Feb. 2011	

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA15.dwg Feb 17, 2011 - 10:50am



REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT

Durham York Energy Centre

TITLE

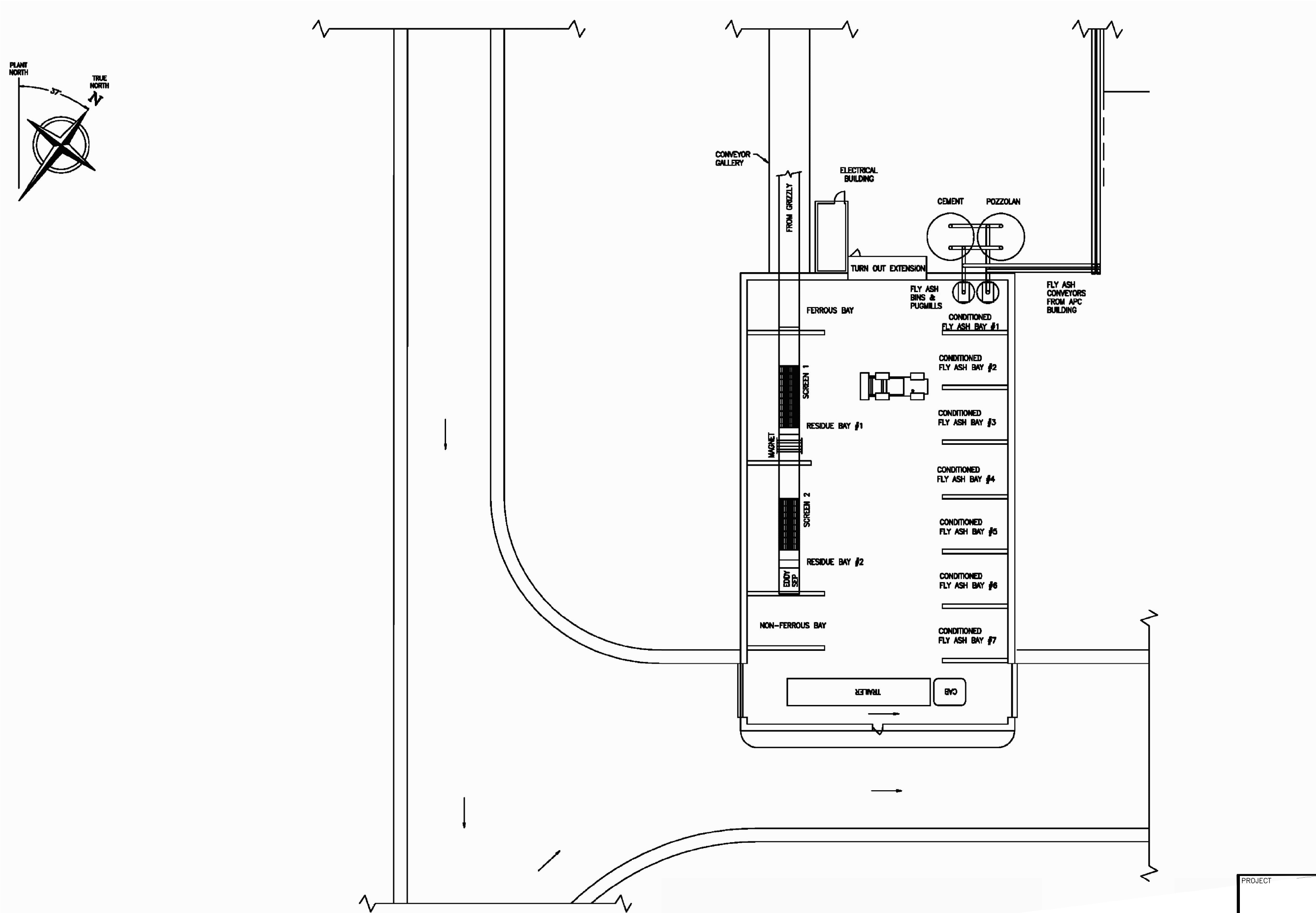
PRELIMINARY GENERAL ARRANGEMENT FLUE GAS EQUIPMENT AREA AND AIR POLLUTION CONTROL BUILDING LAYOUT

Golder Associates

PROJECT No. 10-1151-0343			FILE No.	AA16
DESIGN			SCALE N.T.S.	REV.
CADD	PJV	Feb. 2011		
CHECK	MK	Feb. 2011		
REVIEW	MK	Feb. 2011		

FIGURE 16

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA16.dwg Feb 17, 2011 - 10:51am



REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT

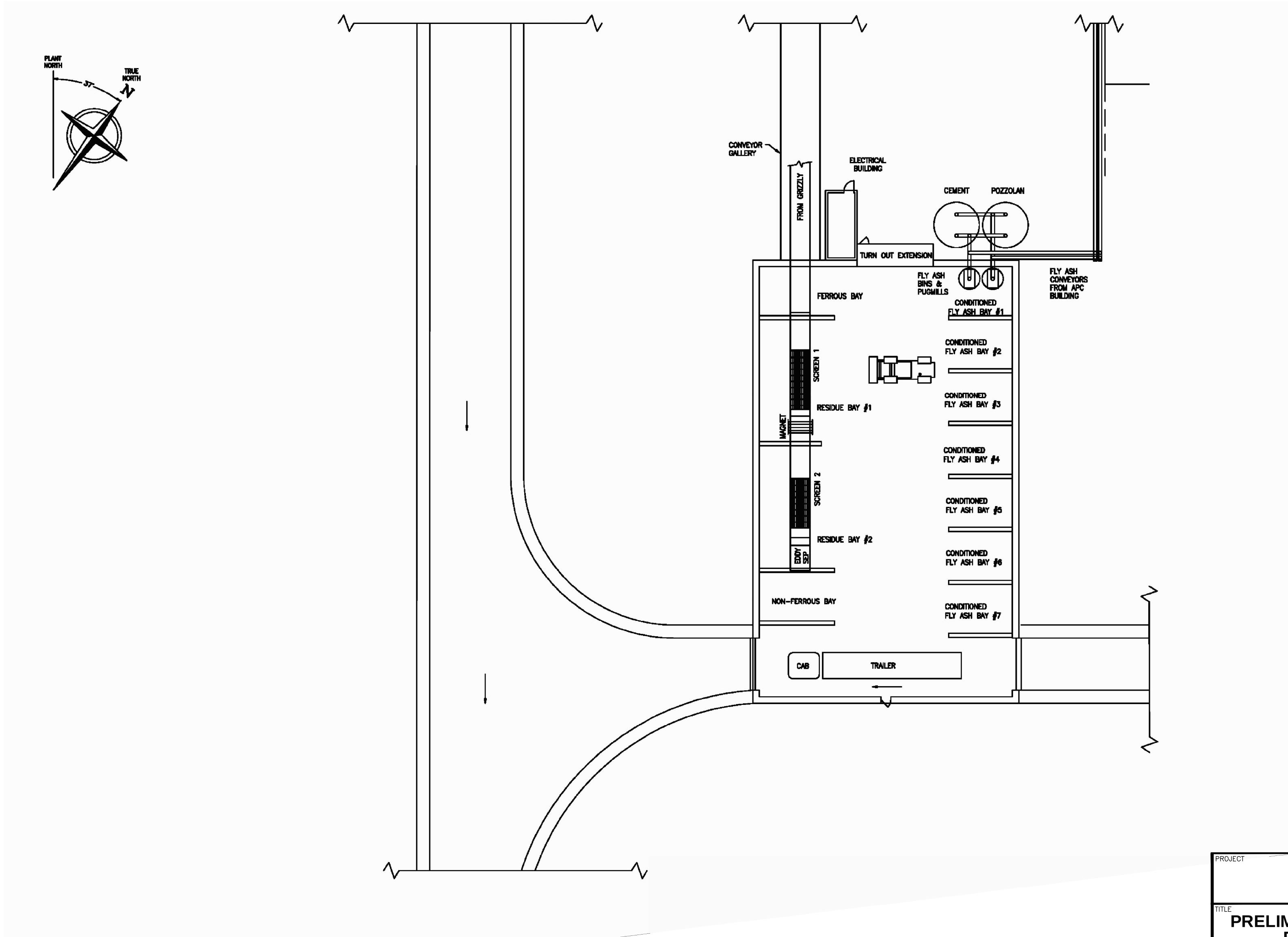
Durham York Energy Centre

TITLE

PRELIMINARY GENERAL ARRANGEMENT RESIDUE BUILDING LAYOUT (ROUTE 1 - OSBOURNE ROAD ENTRANCE)

Golder Associates

PROJECT No. 10-1151-0343			FILE No.	AA17
DESIGN			SCALE N.T.S.	REV.
CADD	PJV	Feb. 2011	**FIGURE 17**	
CHECK	MK	Feb. 2011		
REVIEW	MK	Feb. 2011		

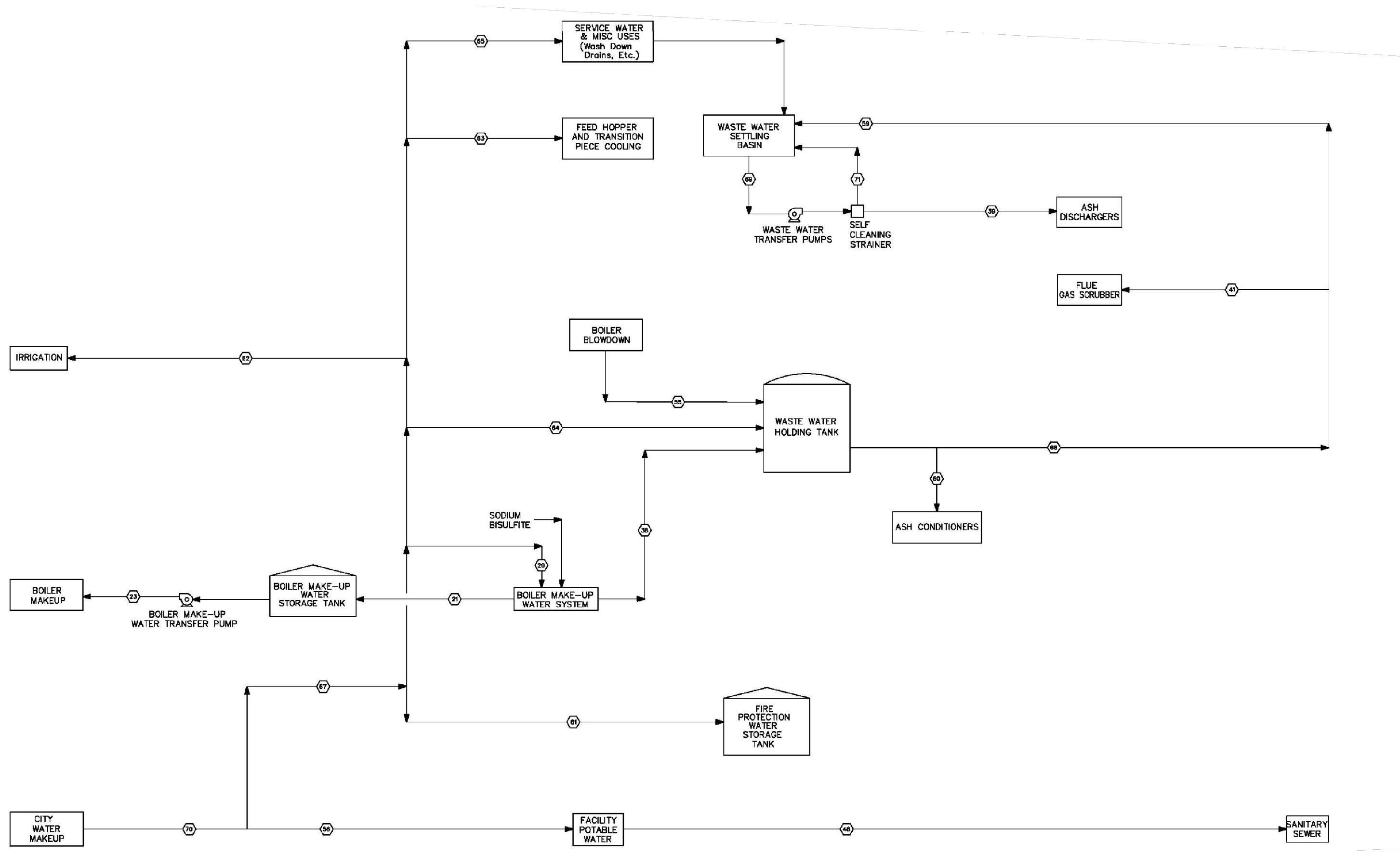


REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT	Durham York Energy Centre				
TITLE	PRELIMINARY GENERAL ARRANGEMENT RESIDUE BUILDING LAYOUT (ROUTE 2 - COURTICE ROAD ENTRANCE)				
Golder Associates	PROJECT No. 10-1151-0343			FILE No.	AA18
	DESIGN			SCALE N.T.S.	REV.
	CADD	PJV	Feb. 2011	FIGURE 18	
	CHECK	MK	Feb. 2011		
	REVIEW	MK	Feb. 2011		

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\10115103434AA18.dwg Feb 17, 2011 - 10:53am



REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT

Durham York Energy Centre

TITLE

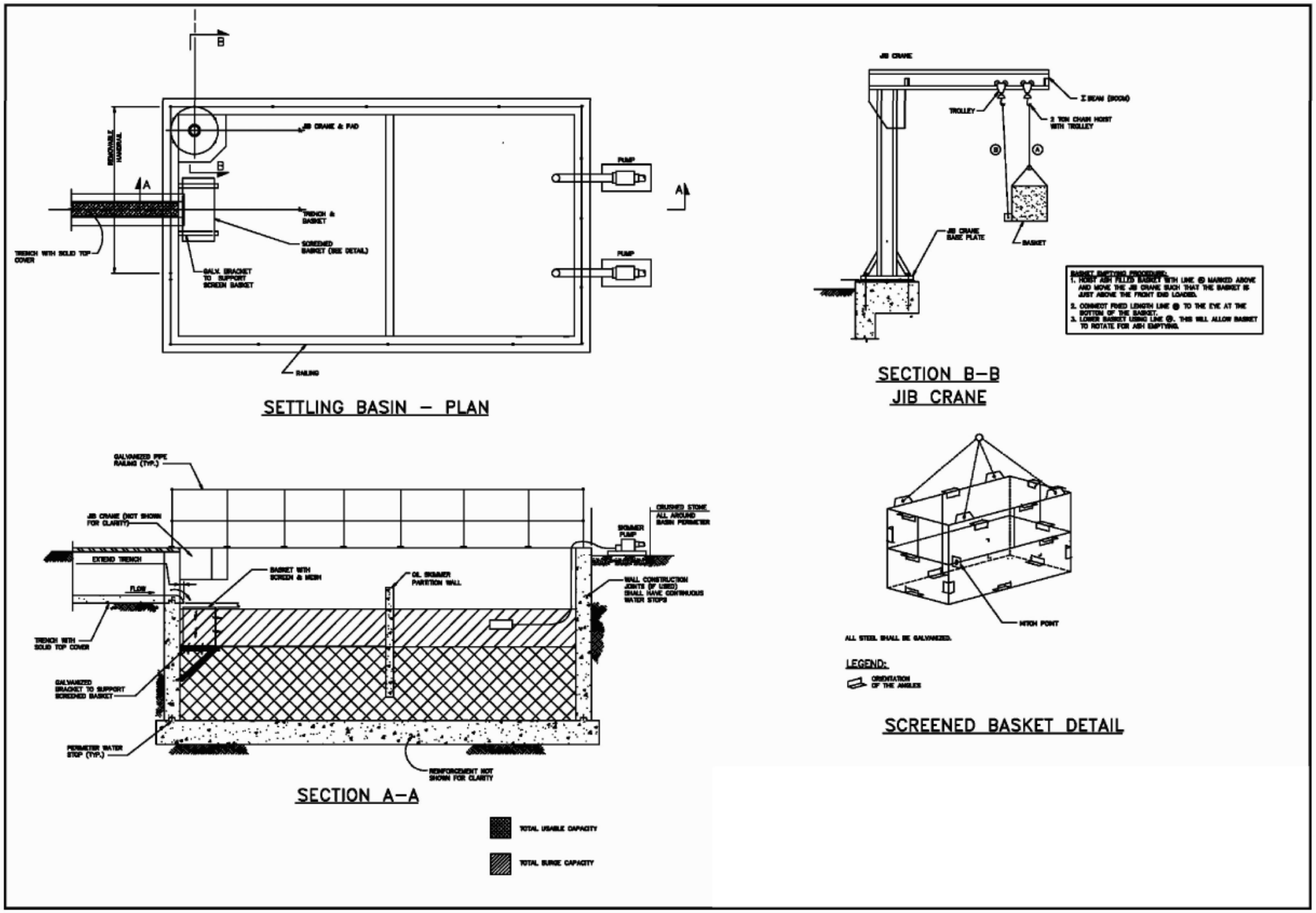
WATER BALANCE DIAGRAM

Golder Associates

PROJECT	No. 10-1151-0343		FILE No.	AA19
DESIGN			SCALE	NTS REV.
CADD	PJV	Jan. 2011		
CHECK	MK	Feb. 2011		
REVIEW	MK	Feb. 2011		

FIGURE 19

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA19.dwg Feb 18, 2011 - 9:55am



REFERENCE

Base plan provided by Covanta Energy Inc.

PROJECT

Durham York Energy Centre

TITLE

SETTLING BASIN SCHEMATIC

PROJECT No. 10-1151-0343			FILE No.	AA20
DESIGN			SCALE N.T.S.	REV.
CADD	PJV	Feb. 2011	**FIGURE 20**	
CHECK	MK	Feb. 2011		
REVIEW	MK	Feb. 2011		

Golder Associates

Drawing file: N:\CAD_PROJECTS\2010\10-1151-0343 (Covanta, Durham-York)\-AA-EFW Facility\1011510343AA20.dwg Feb 22, 2011 - 3:29pm