

# Hydrogeological Assessment Report

Grimsby Energy Inc. Anaerobic digester

April, 2012



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## Contents

1.0	Introduction.....	3
1.1	Purpose.....	3
1.2	The Project.....	3
1.3	Project Location .....	3
1.4	Geotechnical and Environmental Investigations .....	4
2.0	Geological and Hydrogeological Conditions.....	4
3.0	Plant Assessment.....	4
3.1	Site Conditions.....	4
3.2	Plant Design.....	5
3.2.1	Bunkers.....	5
3.2.2	Digesters.....	5
3.2.3	Spills.....	5
3.3	Monitoring and Mitigation.....	5
3.3.1	Bunker Seepage Control .....	5
3.3.2	Monitoring Well .....	5
3.3.3	Spill Protocol .....	5

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## Grimsby Energy Inc. Anaerobic Digester Project

### 1.0 Introduction

#### 1.1 Purpose

This report is prepared in partial fulfillment of the Renewable Energy Approval requirements as set out in Ontario Regulations 359/09 and 521/10. The project has received a FIT contract F-000610-BIG-130-302.

Table 1 of the Regulation mandates the preparation of this report to: “Set out the following information in respect of the renewable energy project:

- i. Plans, specifications and descriptions of the geological and hydrogeological conditions of the land within 300 metres of any biomass storage areas, source separated organics storage areas, farm material storage areas, storage tanks and digester tanks.
- ii. An assessment of the suitability of the project location for the handling, storage and processing of biomass, taking into account,
  - A. the design of the facility, including existing features and features that are proposed to be implemented to control the expected production of leachate,
  - B. the ability to identify, through monitoring, any negative environmental effects that may result on ground water from leachate production, and
  - C. the feasibility of contingency plans that could be implemented to control leachate produced in a quantity greater than expected or with a quality worse than expected

#### 1.2 The Project

The project is a Class 3 anaerobic digester as defined in the regulations. The facility will produce 1MW of electricity to be constructed in two phases of 500kW each and is designed to operate primarily on farm sourced materials. A complete project description of the proposal is provided in the Project Description Report as well as the Design and Operations Report.

No electricity will be generated from non-renewable resources. Non-farm organic materials, as available, may also form part of the feedstock for the plant.

#### 1.3 Project Location

The project will be constructed on lands owned by Grimsby Energy Inc. at 442 Sobie Road in the Town of Grimsby. The project will be located on the northwestern 2.5ha of a 10.5 ha property located on the south side of Sobie Road approximately 300m east of Park Road. The legal description of the property is part of Lots 1 and 2, Concession 6, Former Township of North Grimsby being Part 1 on Plan 30R-13677. The site location is shown on Figures 1

and 2 and the site design is on Figure 3. There are no potable water wells within 300 meters of the site.

## **1.4 Geotechnical and Environmental Investigations**

Two geotechnical reports have been prepared with respect to the subject property:

1. Geotechnical Investigation, Proposed 1MW Bioreactor Project by Landtek Limited November 24, 2010 (See also Tab A)
2. Environmental Investigation, 442 Sobie Road by Associated Brownfield Services Ltd. , June 2011 (See also Tab B)

## **2.0 Geological and Hydrogeological Conditions**

Geological map data in an area of 300m from the proposed plant indicates that the native soil is identified as glaciolacustrine clay and silt overlying dolostone bedrock. The drift thickness data indicates that the bedrock contact depths are variable and predominately less than 8 meters in the area of the site. Subsurface conditions found were consistent with this information.

Soils in the area are firm, stiff, heavy silty clay and bedrock is some 3 to 11 meters below ground surface. Ground water was observed in boreholes at 1.3 and 7.6 meters below ground surface. The ground surface at Sobie Road is approximately 2 meters higher than at the south limit of the property. The property slopes gently down to the south and east.

Bedrock at Sobie road is approximately 11 meters below ground surface and only 3 meters below ground surface at the southerly property line. Bedrock slopes more steeply down to the north. Groundwater was encountered at a depth of 8 meters at midpoint in the property and at 3.5 meters at the south limit.

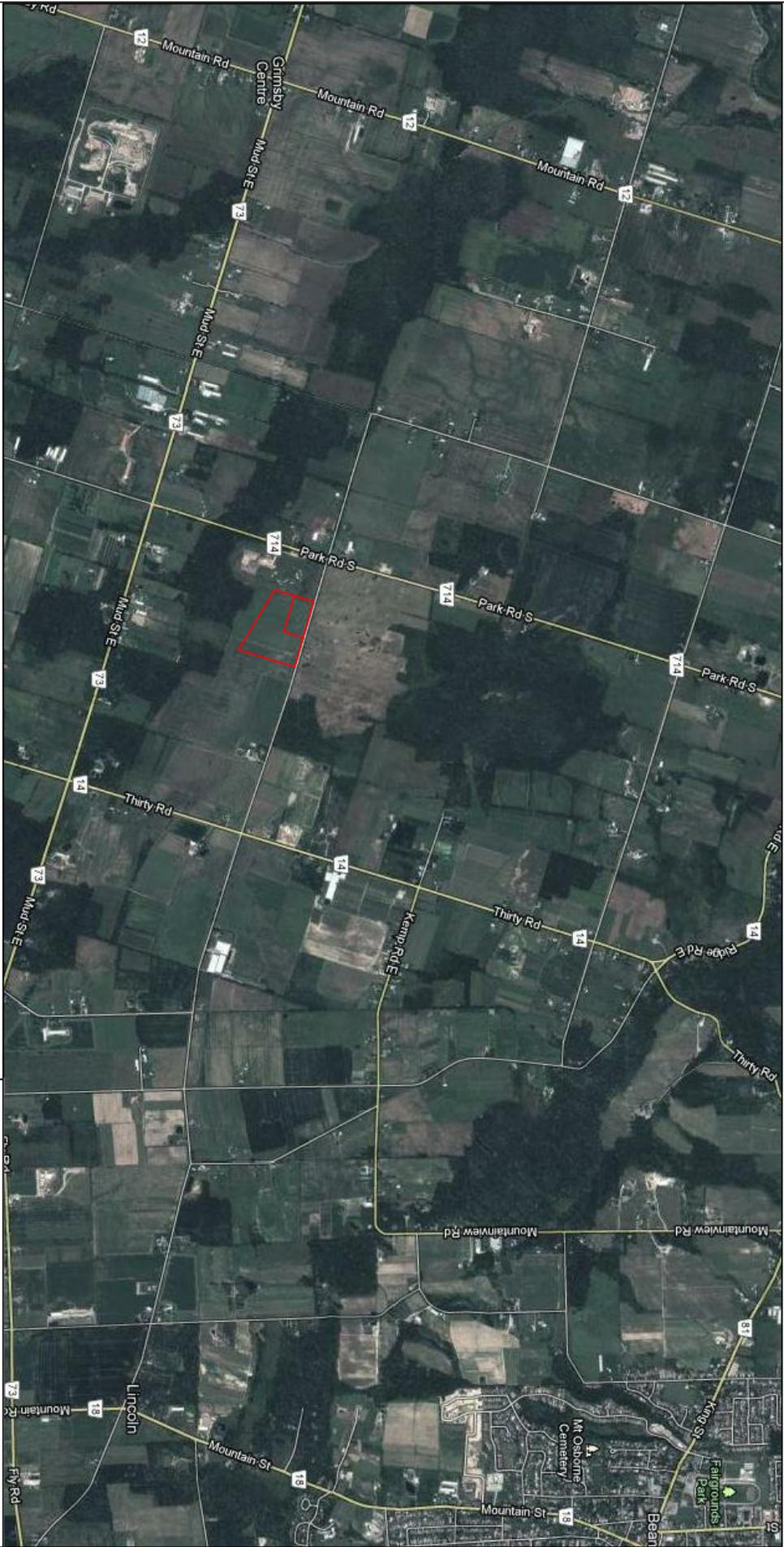
As the soils are heavy silty clays, ground water movement will be extremely limited. Generally ground water flow direction will be in a northerly direction, following the bedrock contour. Surface drainage is in the opposite direction to the south east and the watercourse some 500 meters south of the project site. The soils in the area are highly impermeable. As a result, infiltration is very limited.

## **3.0 Plant Assessment**

### **3.1 Site Conditions**

The soil conditions are favourable for the construction of the plant and because of the heavy silty clay soils in the area, the potential for ground water impacts are negligible. Surface water flow follows the gentle slope to the southeast towards the woodland and the small watercourse beyond.

A small intermittent drainage swale is located along the westerly boundary of the site. This drainage feature currently serves to drain the eastern portion of the landfill site, a small area of land to the north of Sobie Road as well as the project site. The swale terminates at



GRIMSBY ENERGY INC.  
442 SOBIE RD.

FIGURE 1  
SITE LOCATION



**Riepma**  
CONSULTANTS  
INC.  
R R 1, Georgetown, Ontario L7G 4S4



GRIMSBY ENERGY INC.  
 442 SOBIE RD.

FIGURE 2  
 SITE AREA



**Riepma**  
 CONSULTANTS INC.  
 R R 1, Georgetown, Ontario L7G 4S4



the bush area, some 200 meters south of the project site, and eventually the surface water flows overland to a watercourse located 500 meters south of the project site.

## **3.2 Plant Design**

### **3.2.1 Bunkers**

The bunker design includes a seepage collection system that ensures that all seepage generated is collected and is pumped into the digester. As a result seepage from this source is prevented from entering the ground water or surface water system.

### **3.2.2 Digesters**

All of the digesters and storage tanks are equipped with a leak detection system connected to a monitoring well. The well is checked daily to ensure that no leakage has occurred. Should a leak be detected, the well can be pumped immediately and the damaged vessel can be emptied and repaired. As a result, vessel failure would not result in an impact on the ground water regime.

### **3.2.3 Spills**

Due to the impermeable heavy silty clay soils in the entire area and in the area of the plant construction, the ground water regime will not be impacted by accidental spills should they occur.

## **3.3 Monitoring and Mitigation**

### **3.3.1 Bunker Seepage Control**

The bunker seepage control system should be constructed.

### **3.3.2 Monitoring Well**

The monitoring well should be installed to provide a leak detection system for the digesters and should be checked on a daily basis

### **3.3.3 Spill Protocol**

A cleanup protocol must be developed to manage any accidental spills on site. The MOE Spills Action Centre must be notified of any spills.