



DESIGN DRAWINGS AND CELL CONSTRUCTION

**Hydrocarbon-Impacted Soil Landfarm Facility
1575 Federal Road.
City of Iqaluit, Nunavut**

Water Licence Number - NWB4NUN0511-Type “B”

Prepared by:

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1.0 Introduction

Nunatta Environmental Services Inc. (Nunatta) owns and operates a Hydrocarbon-Impacted Soil Landfarm Facility within the City of Iqaluit, Nunavut.

The facility is located at 1575 Federal Road, Industrial Park, within the limits of the City of Iqaluit on Lot 1, Block 229.

The NWB License number for the Hydrocarbon-Impacted Soil Landfarm Facility is 1BR-NUN1217

This treatment facility is commonly referred to as the 'landfarm'. Nunatta's operations consist of accepting soils impacted with petroleum products at various concentrations at the landfarm's geosynthetic lined platform (Cells) and with addition of fertilizers, aeration, and moisture control, allow indigenous soil microorganisms to degrade petroleum products to breaking them down into compounds such as water, carbon dioxide and hydrogen sulfide. Soils accepted at the landfarm are contaminated with diesel, gasoline and various automotive and construction/mining oils. For the biggest part Diesel fuel (P50) is the major contaminate, making up over 90% of total intake.

The site where the land farm is located is in the industrial part adjacent the old metal dump where all old equipment and cars and trucks were junked. Many rotting barrels of unknown products are still visible on adjacent properties around the landfarm and through out the dump site to the west of our fences. Records show the landfarm site was used as crushing grounds for any old waste barrels and storage of unclaimed products.

Nunatta has 4 bermed cells at the landfarm location.

2.0 Landfarm Treatment Cells and Construction

Currently, there are 4 treatment platforms at the landfarm, identified as Cells 1, 2, 3 and 4. Cell 1 is 60 meters by 30 meters wide, Cell 2 is 50 meters by 25 meters and Cell 3 is 90 meters by 30 meters. Cell 4 is 60 meters by 25 meters. Each cell is 1.5 meters deep (below adjacent ground level).

The 4 Cells are lined by a geosynthetic material (High Density Poly Ethylene – HDPE material) covering the Cells bottoms. During the construction of the landfarm, a 30 cm layer of screened non-contaminated sand was placed below the 30 mil HPDE geomembrane and packed. A second layer of clean and screened soil was placed above the 30 mil liner to prevent membrane puncture (soil screened for rocks smaller than 1/2"). These liners were purchased from Layfield Plastics and were welded and tested at the manufacturing plant and their purpose is to prevent petroleum products mixed in soils from seeping into the ground. The first two cells were built in 1999. The third cell was started in 2003 and was completed in 2004. The fourth cell was constructed in 2009. The same stamped blueprints were used for the construction of all Cells at the Landfarm and have over time proven to be a very good design for Arctic conditions. IN 2014 Nunatta requested permission to replace the liner in cell #2.

The existing liner is only 20 Mil below the new standards of 30 Mil. Nunatta requested and received permission from Water board to remove the old liner and replace it with a new 40 Mil liner and to extend the size of the cell by approximately 20 meters. As it was built there was room behind the cell which cannot be utilized and is wasted space. As of 2017 the liner has not been replaced due to cold summers keeping the rocks stored in the cell frozen into the soil which has washed off the rocks over time. Late summer 2017 we were able to remove most of the rocks and most of the soil exposing much of the liner but the area where machines drove on it remain frozen. The plan is to dig this out over the summer and install the 40 Mil liner in the late summer of 2018 if weather permits.

The landfarm layout sits on relatively flat land. The cells are slightly sloped (1%) so that running surface water accumulates along the eastern and southern edges of the cells.

The height of the fuel-impacted soil placed in the treatment cells will vary with volume and method of treatment. Windrows of aerated soil could be as high as 4 meters above ground level. The perimeter of Cells 3 & 4 is bermed with compacted granular material. The perimeter berms were built using granular material obtained from the landfarm and sand from Iqaluit's sand quarry (Road to Nowhere). The previous owner built Cells 1 and 2 whereas Cell 3 and 4 were built by Nunatta.

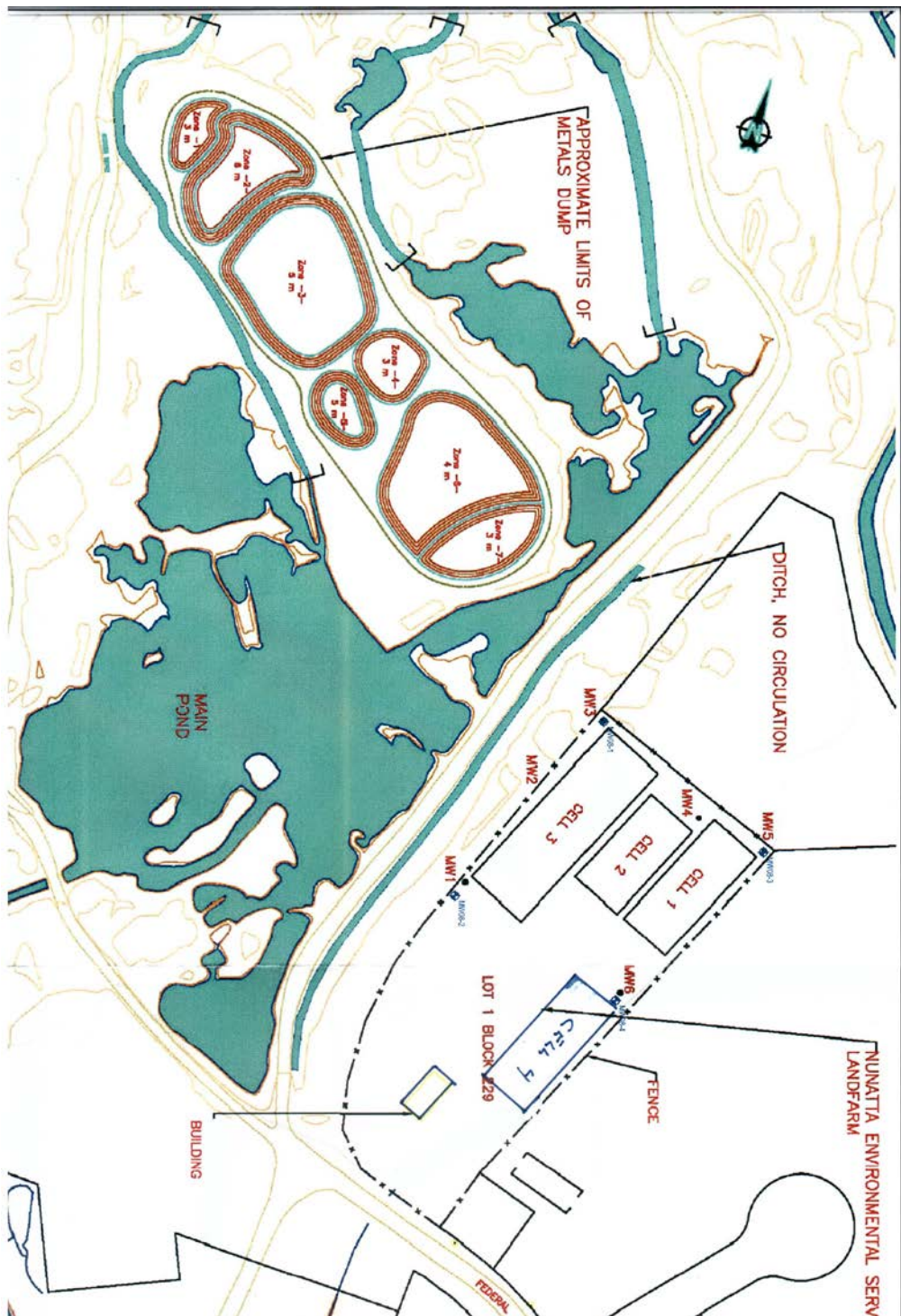
From an environmental standpoint, protection of groundwater is assured by geomembranes waterproofing the cells. Cells 1 and 3, and 4 were built with 30 mil thick HPDE geomembrane, whereas cell 2 was built using a 20 mil HDPE geomembrane. During summer 2013, Nunatta Environmental relocated the fuel impacted soils from Cell 2 into Cell 3 with plans to someday replace the 20 mil geomembrane and since then it has been used as storage for rocks removed from soil being treated in other cells.

The geomembranes used for the 4 Cells were assembled at the manufacturer's plant (Layfield Plastics, Alberta) to the exact specified dimensions. Layfield plastics fusion welded 5 meter wide geomembrane strips to the required cell widths and lengths, folded, packaged and shipped the geomembranes to Nunatta.

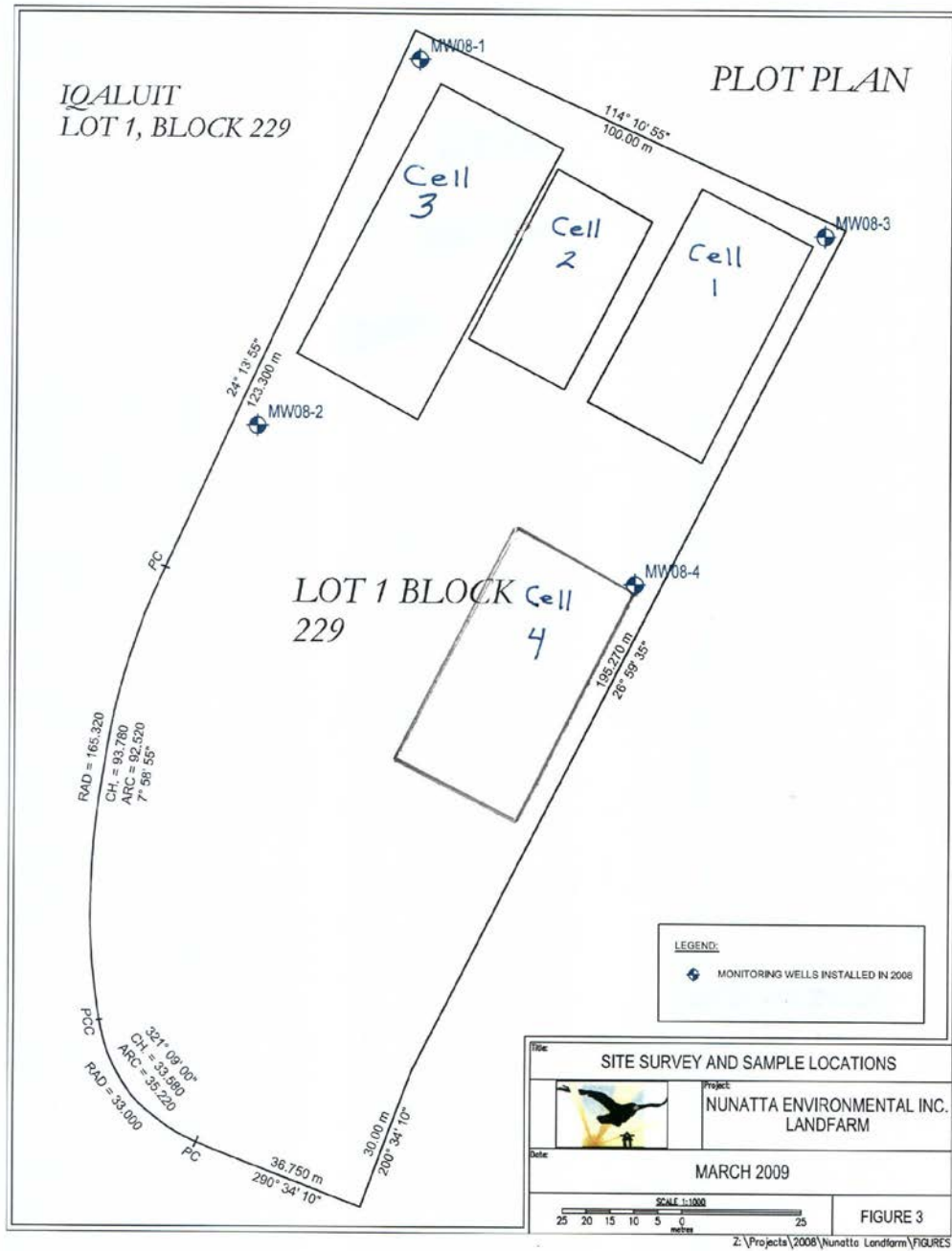
Quality assurance and quality control documents are supplied by the geomembrane manufacturers. Site Inspections

During operational periods, weekly inspections are completed on the berms and exposed geosynthetic liners. If one should leak or fail they will be addressed immediately. Nunatta has a plastic welding machine on site to repair tears in liner.


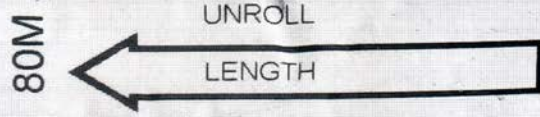

Landfarm Map



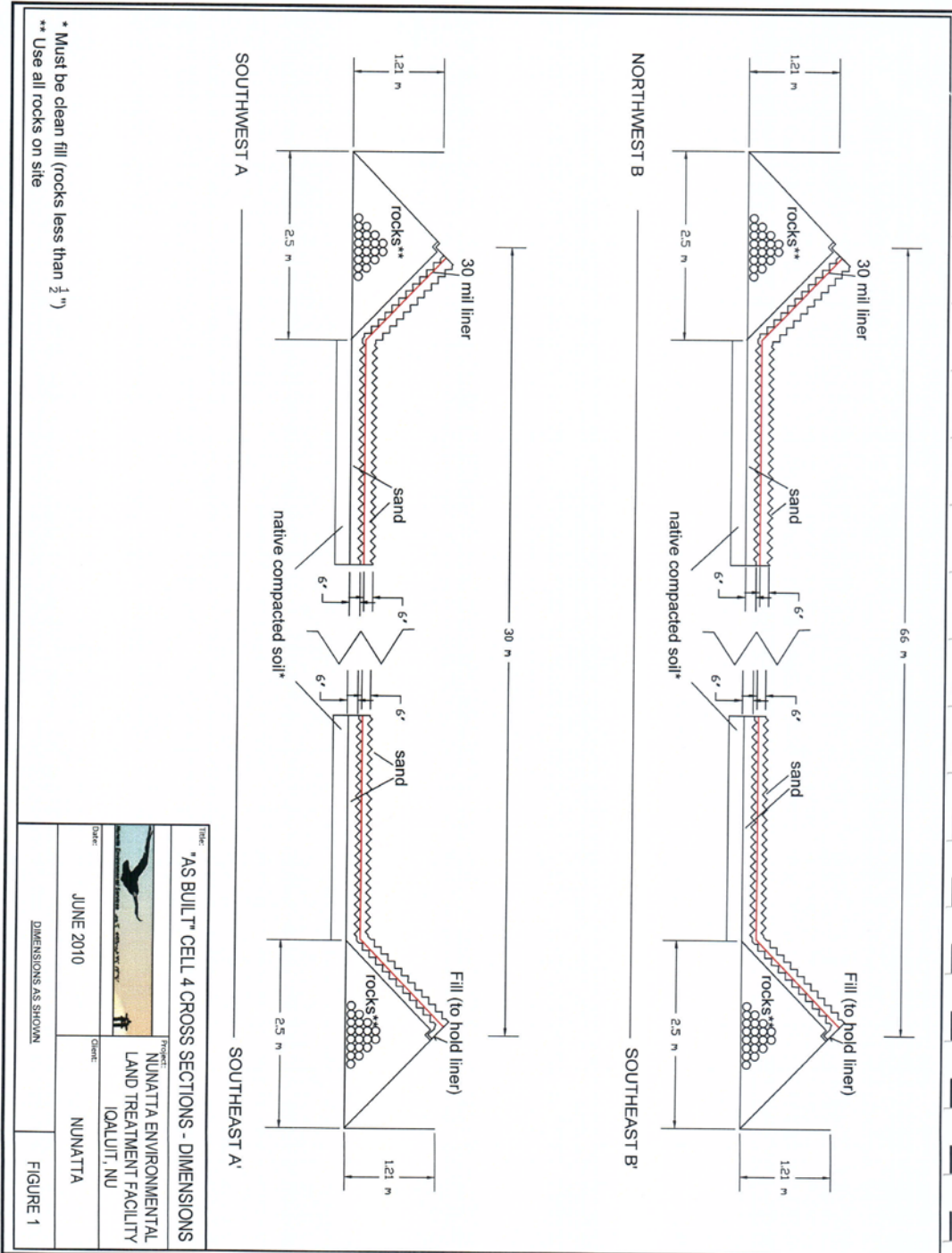
4.0 Cell Location



5.0 Liner Certificate

 LAYFIELD Flexible Membrane Liner	
Customer Name: NUNATTA ENV.	
Material: Enviro Liner 6030 Blk	Sales Order 191266
Liner Size: 80M X 30.48	Stockcode 03LE1030
QC Number 191266	Panel Number 1
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	
DATE: Sen 02. 2005 Made In Canada	

6.0 As Built Cross-section of Cells



7.0 Dillon Engineering Drawing for Cell Construction.

