ᓄᓇᑦᑕᐊ ᐊᕐᕌᒍᓕᒪᔪᖅᑕᒃ ᑎᒥᖅᓯᒪᔪᖅ
NUNATTA ENVIRONMENTAL SERVICES INC.

ᓴᓴᓗᒪᓂᖅ ᐅᑭᐅᖅᑕᕐᓂᒃ ᐊᕐᕌᒍᐊᓂ
PROTECTING OUR ARCTIC ENVIRONMENT

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:

Nunatta Environmental Services Inc.
P. O. Box 267
Iqaluit, Nunavut. X0A-0H0
Phone 1-867-979-1488
Fax 1-867-97-1478
Email: nunatta@northwestel.net

Dated: October, 2011

Table of Contents

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 NWB4NUN0511 "B"

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 braking 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.

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.

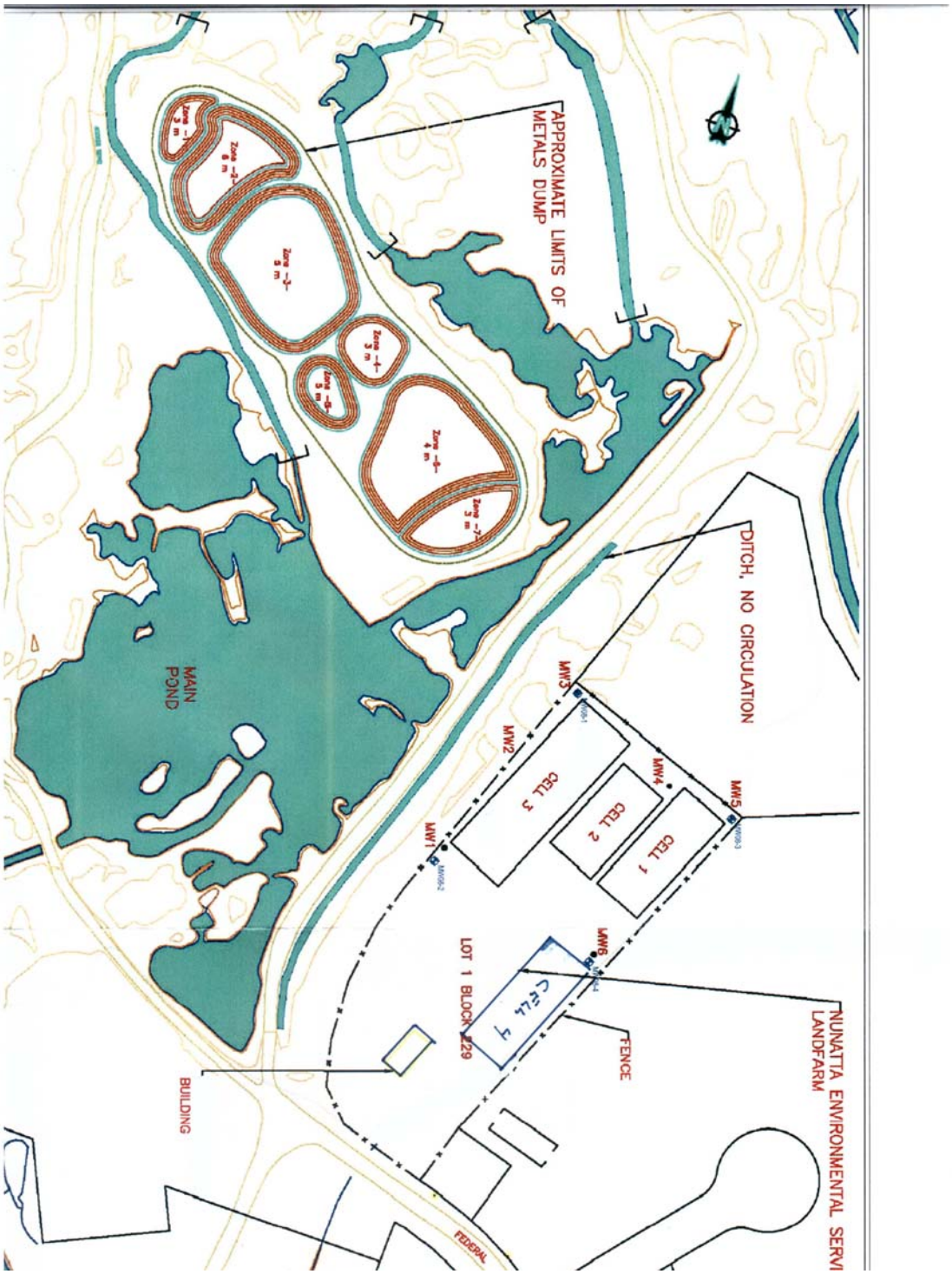
From an environmental standpoint, protection of groundwater is assured by geomembranes waterproofing the cells. Cells 1 and 3, and 4 were built with 30 mil thick HPDE geomembrane, whereas cell 2 was built using a 20 mil HDPE geomembrane. During summer 2005, Nunatta Environmental relocated the fuel impacted soils from Cell 2 into Cell 3 to replace the 20 mil geomembrane with a 30 mil HDPE geomembrane.

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.

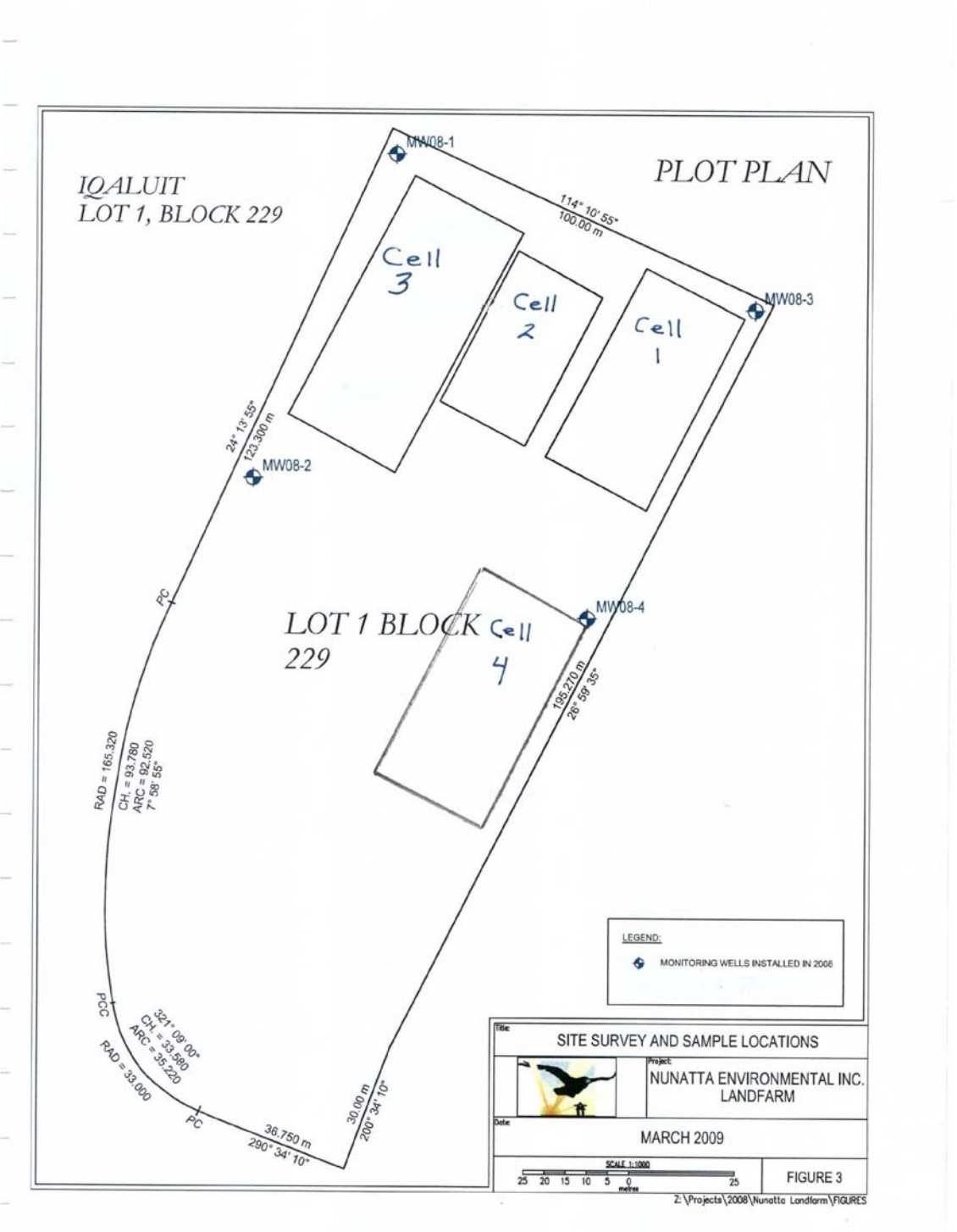
Quality assurance and quality control documents are supplied by the geomembrane manufacturers. Site Inspections

During operational periods, weekly inspections are completed on the berms and exposed geosynthetic liners. If leaks or failed berms are noticed, they are readily addressed using heavy equipment present on site.

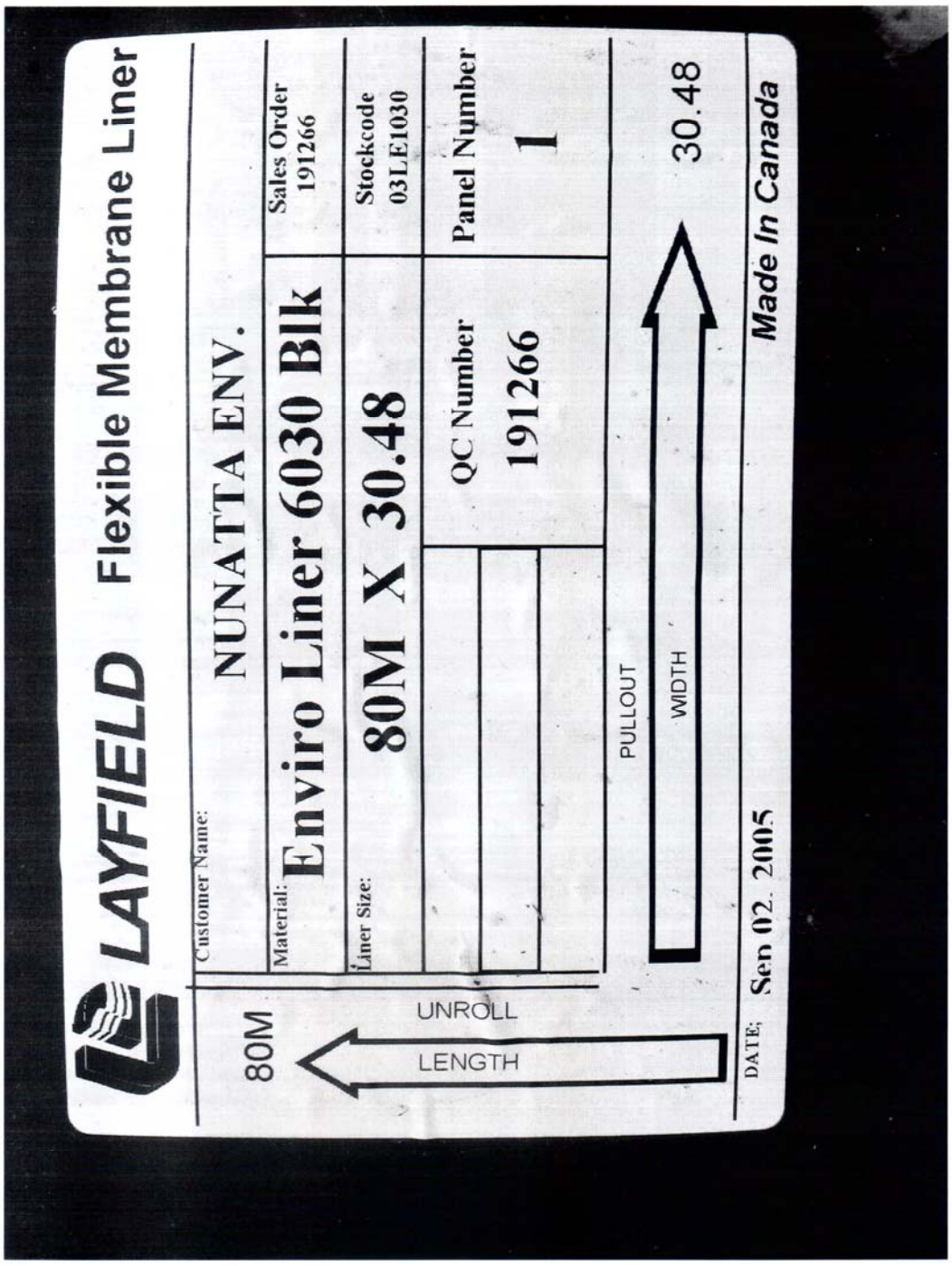
Landfarm Map



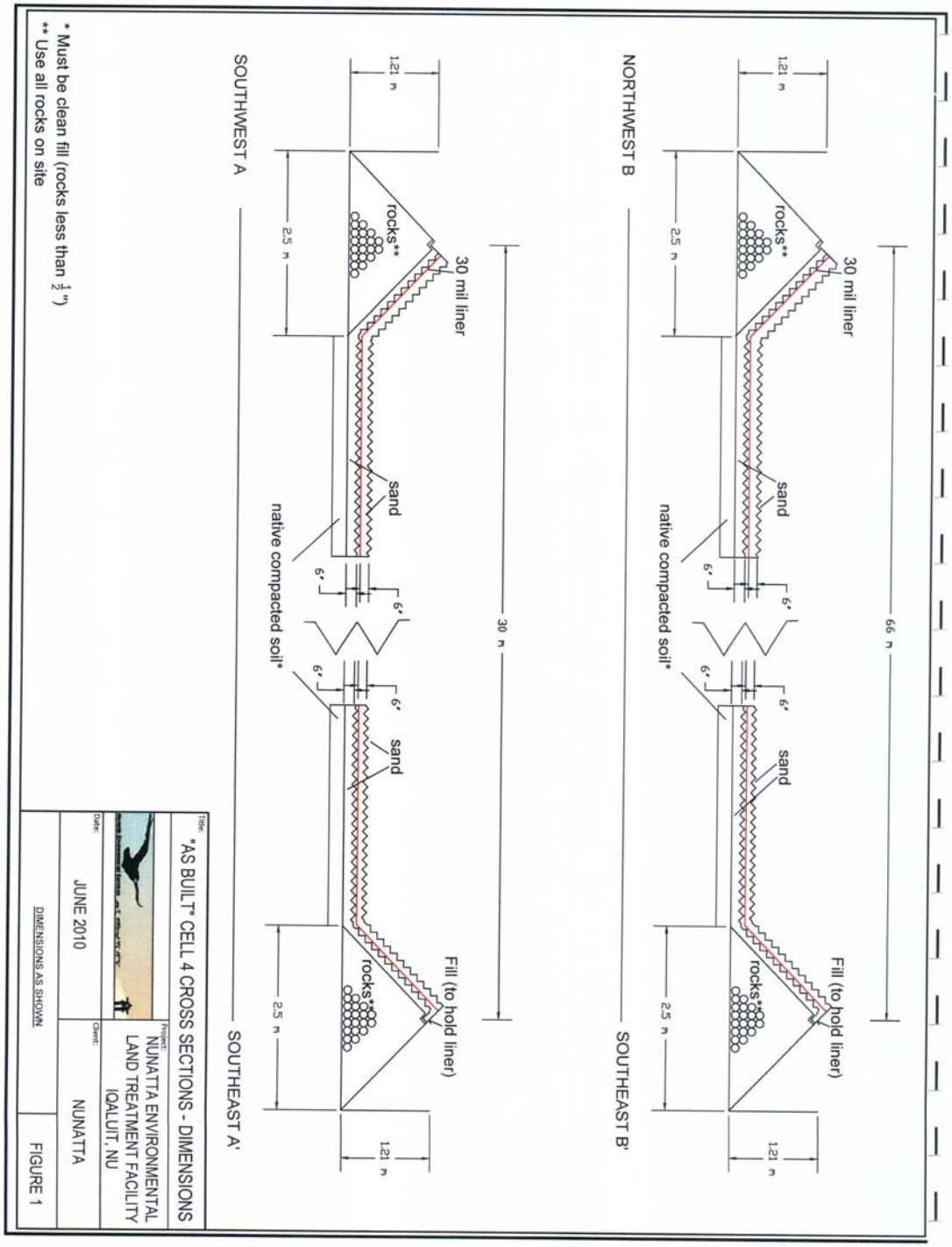
4.0 Cell Location



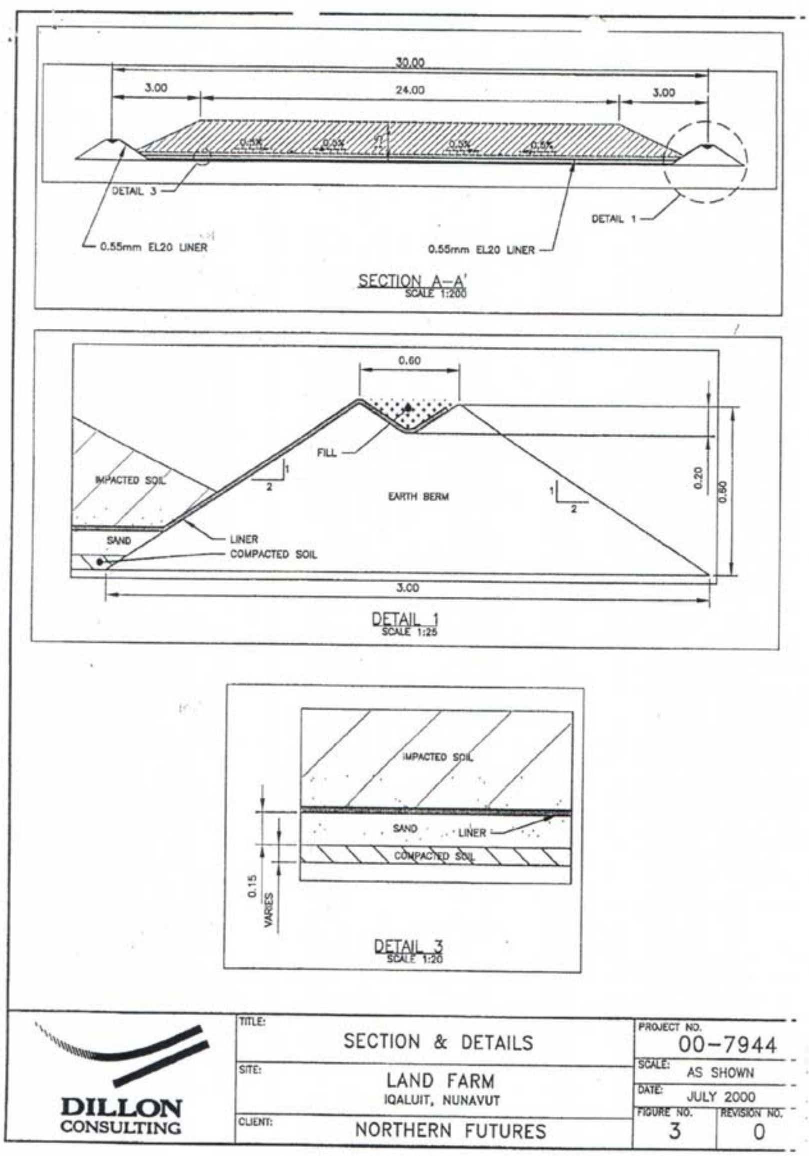
5.0 Liner Certificate



6.0 As Built Cross-section of Cells



7.0 Dillon Engineering Drawing for Cell Construction.



8.0 Cell 4 Construction Photos (Built in 2009)

Site levelled stones packed and sand layer in place and packed.

Prior to putting down liner floor of cell was hand raked to remove sharp stones and to smooth out the transition from walls to floor

During construction an opening was left in end wall to permit access.
This opening was filled in once liner was installed.
Soft sand put on berm walls restricted foot traffic.

New liner rolled out waiting to be unfolded and pulled into position.

Liner flipped back to allow opening to be closed. Soil was packed and liner returned to position.

**Liner in position and sand being put on walls to keep secure.
Ramp was later installed on both sides of berm at this location to allow equipment into and out of cell.**

Screened sand is used to cover liner. This sand is hand shovelled to form a packed layer which allowed equipment to deliver the full 20 inches of sand into cell bottom.

Cell #4 in summer of 2010.
It contains in excess of 600 cubic metres (130,000 gallons) of water collected from the other three cells and melt waters.

□□□□ □□□□□□□□ □□□□

NUNATTA ENVIRONMENTAL SERVICES INC.