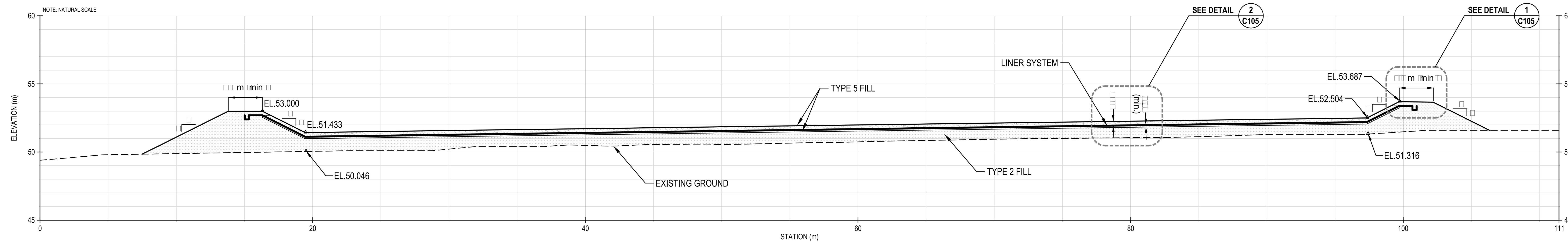
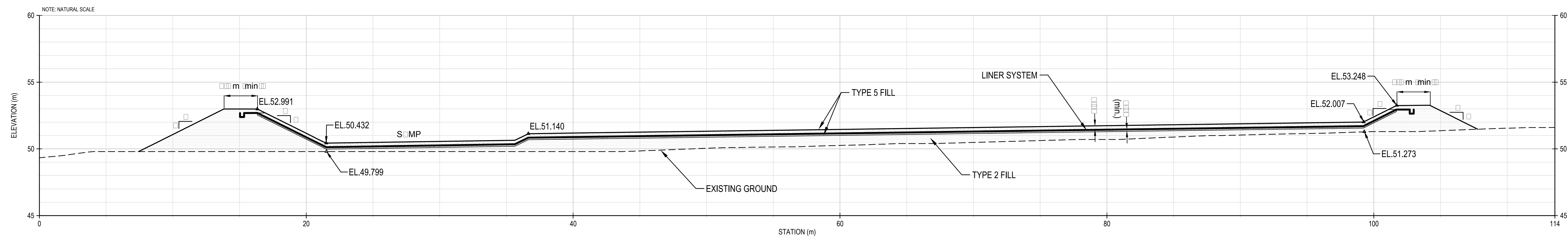
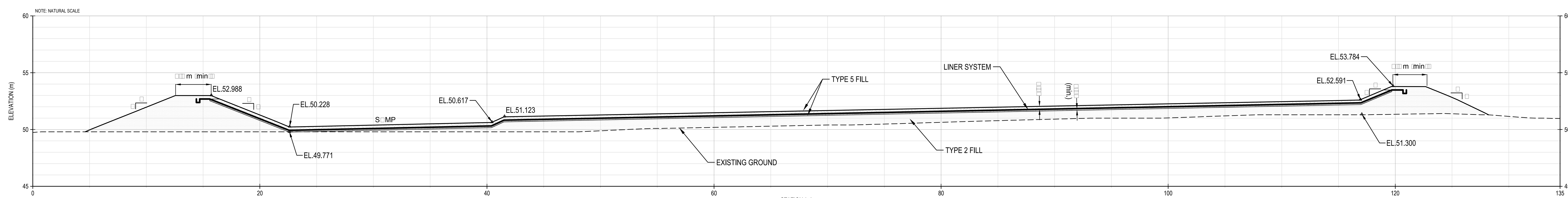


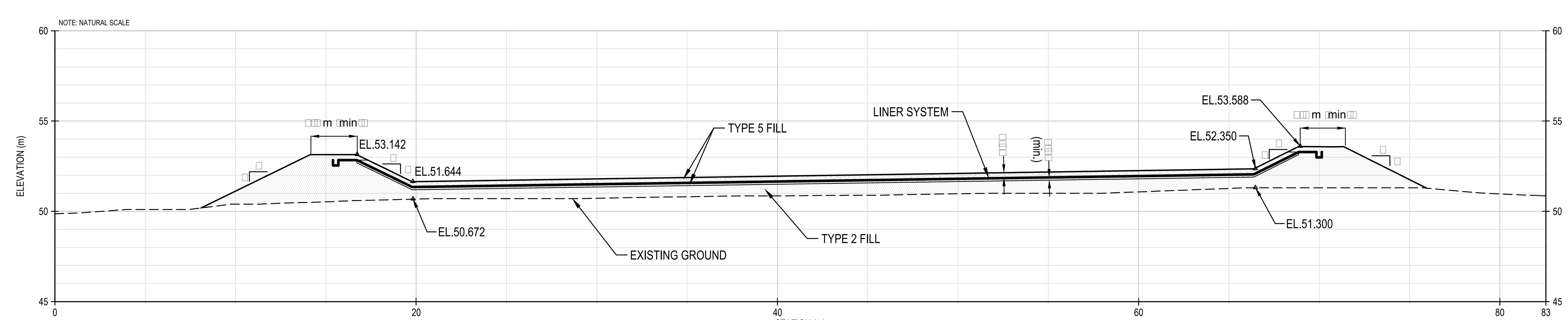
SECTION A / C102



SECTION B / C102



SECTION C / C102



SECTION D / C102

NOTES

DIMENSIONS AND ELEVATIONS IN METRES

Scale: 1: 200 (metres)

STATUS
ISSUED FOR CONSTRUCTION

REVISIONS

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	NOV 23/12	DRG	WTH	KWJ	ISSUED FOR CONSTRUCTION

DRAWING STATUS

NUM	DATE	APR	DESCRIPTION
A	MAR 23/12	WTH	ISSUED FOR REVIEW

PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.
Signature
Date NOV. 23, 2012
PERMIT NUMBER: P 018
NWT/NU Association of Professional Engineers and Geoscientists

PERMIT

REGISTERED PROFESSIONAL ENGINEER
W. T. HORNE
LICENSEE
N.W.T.

PROFESSIONAL SEAL

CLIENT

Baffinland Iron Mines Corporation

eba A TETRA TECH COMPANY

LANDFARM DESIGN
MILNE INLET, NU

LANDFARM CROSS-SECTIONS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
E14101174	EDM	DF/DRG	DF	0	C103
DATE: March 2012	SHEET No. 3 of 6	DWN MM/DRG	APP WTH	STATUS –	

LANDFARM ACCESS ROAD CENTRELINE LAYOUT TABLE			
STATION	NORTHING	EASTING	ELEVATION
0+000	7975452.81	503730.24	49.92
0+005	7975454.55	503734.92	50.05
0+010	7975456.29	503739.61	50.18
0+015	7975458.02	503744.30	50.32
0+020	7975459.76	503748.99	50.45
0+025	7975461.50	503753.68	50.58
0+030	7975463.24	503758.37	50.71
0+035	7975464.98	503763.05	50.85
0+040	7975466.71	503767.74	50.98
0+041	7975467.01	503768.54	51.00
0+045	7975468.57	503772.38	51.10
0+050	7975471.09	503776.70	51.23
0+055	7975474.28	503780.53	51.36
0+057	7975475.93	503782.08	51.41
0+060	7975478.08	503783.78	51.55

STATION	NORTHING	EASTING	ELEVATION
0+065	7975482.35	503786.36	51.81
0+070	7975487.00	503788.19	52.05
0+075	7975491.89	503789.22	51.90
0+080	7975496.88	503789.43	51.76
0+081	7975497.51	503789.40	51.74
0+085	7975501.84	503788.84	51.69
0+090	7975506.77	503788.02	51.64
0+094	7975510.37	503787.42	51.60
0+095	7975511.70	503787.20	51.87
0+100	7975516.63	503786.39	52.87
0+102	7975518.18	503786.13	53.18
0+104	7975520.65	503785.72	53.19
0+105	7975521.57	503785.57	53.00
0+110	7975526.50	503784.75	52.00

□□A□TIT□ □AL□□LATI□□S □A□□□SS □□A□□

TYPE 4 MATERIAL REQUIRED = 20 m³

TYPE 2 MATERIAL REQUIRED = 370 m³

0 5
Scale: 1: 150 (metres)

PLAN - ACCESS ROAD

LEGEND:

- AREA OF POOR DRAINAGE

NOTES

PROJECTION: UTM WITH NAD83 DATUM, ZONE 17, METER; CENTRAL MERIDIAN 81d W

CONTOUR INTERVAL: 0.5 m

DIMENSIONS IN METRES

STATUS
ISSUED FOR CONSTRUCTION

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	NOV 23/12	DRG	WTH	KWJ	ISSUED FOR CONSTRUCTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	MAR 23/12	WTH	ISSUED FOR REVIEW

DRAWING STATUS

PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.
Signature
Date Nov. 23/2012
PERMIT NUMBER: P 018
NWT/NU Association of Professional Engineers and Geoscientists

PERMIT

REGISTERED PROFESSIONAL ENGINEER
W.T. HORNE
LICENSEE
N.W.T.
Nov 23/2012

PROFESSIONAL SEAL

CLIENT

Baffinland Iron Mines Corporation

eba A TETRA TECH COMPANY

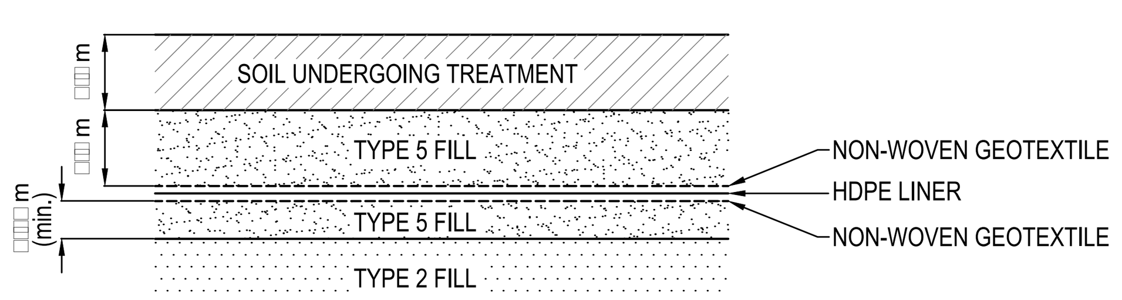
LANDFARM DESIGN
MILNE INLET, NU

LANDFARM ACCESS ROAD
PLAN AND LAYOUT

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
E14101174	EDM	DF/DRG	DF	0	C104
DATE:	SHEET No.	DWN	APP	STATUS	
March 2012	4 of 6	MM/DRG	WTH	--	

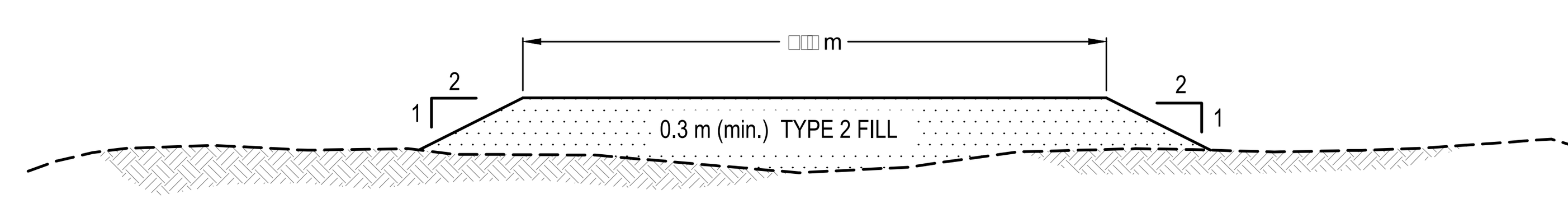
LANDFARM ACCESS ROAD PROFILE

N.T.S.



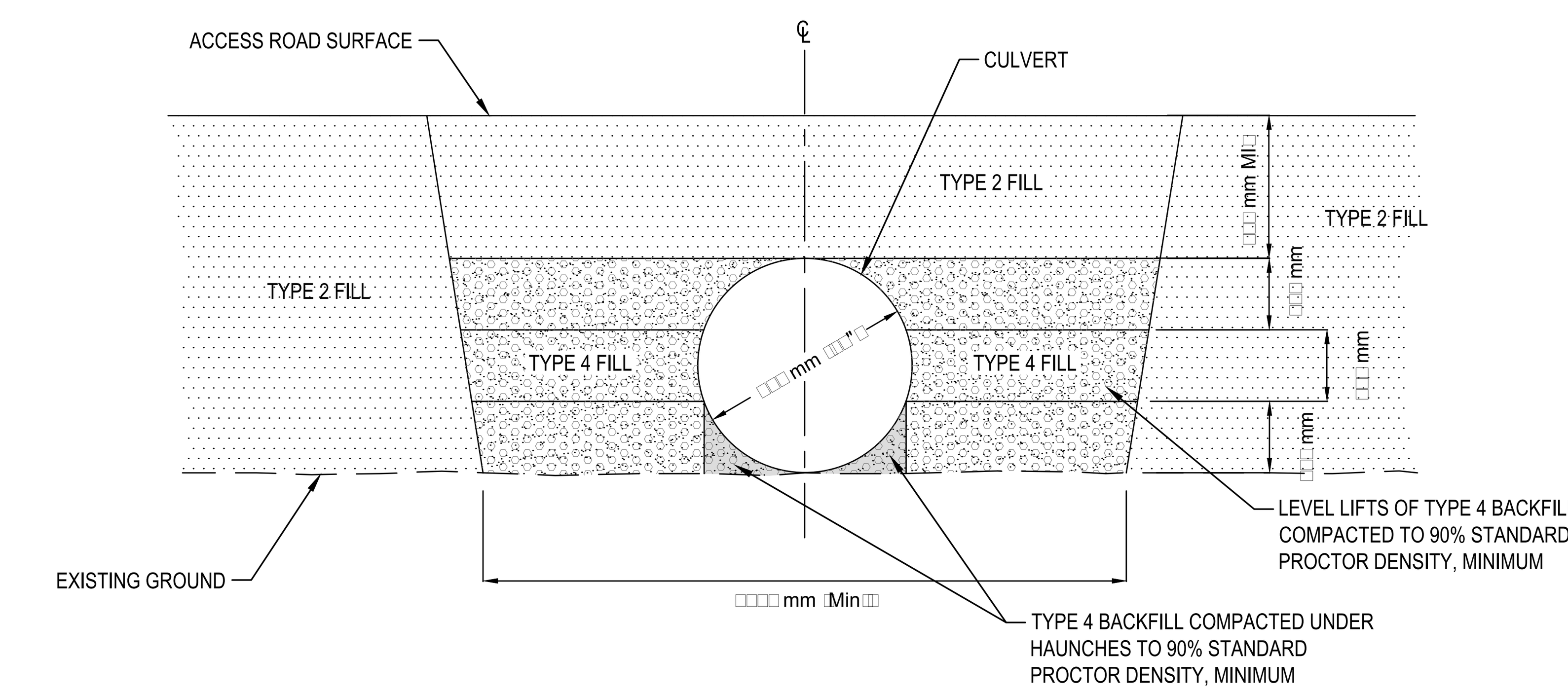
DETAIL - LINER SYSTEM

N.T.S. 1 / C103



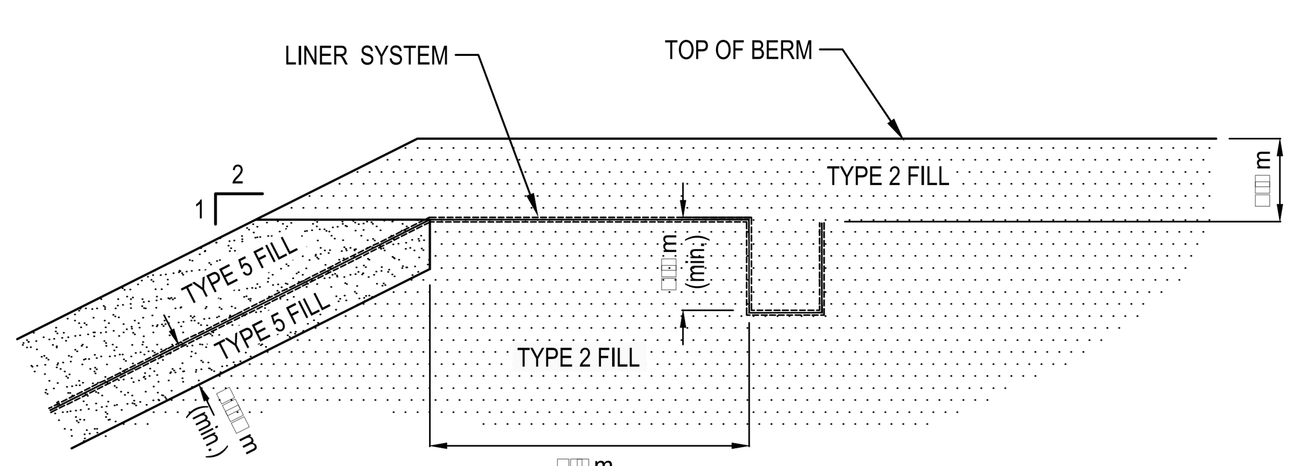
DETAIL - TYPICAL 6.0 m ACCESS ROAD (FILL)

N.T.S.



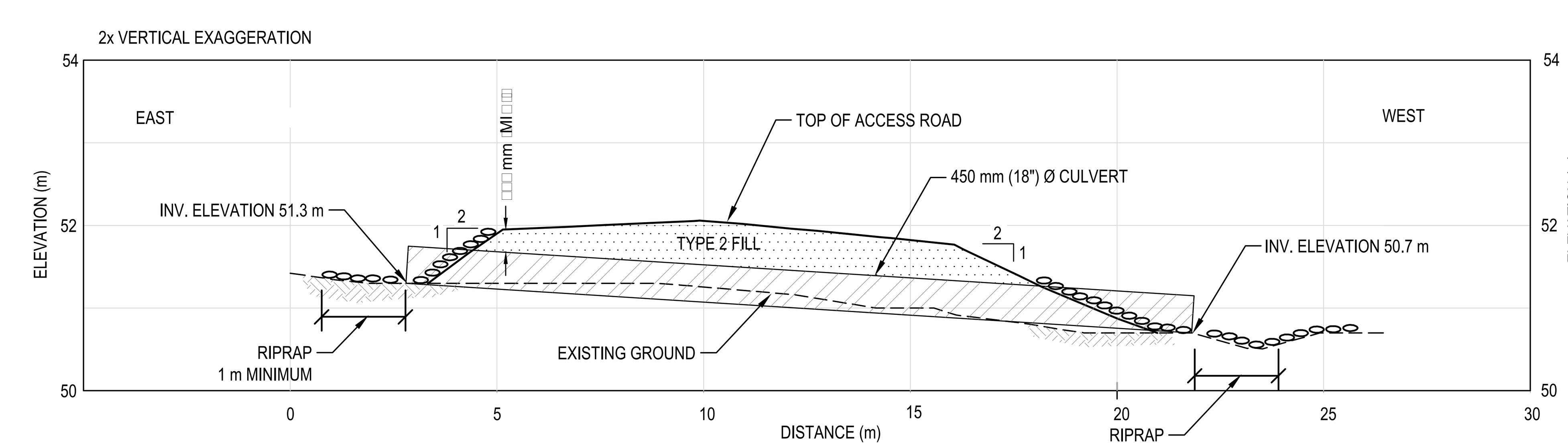
DETAIL - CULVERT SECTION

N.T.S. 3 / C104



DETAIL - LINER ANCHORING

N.T.S. 2 / C103



DETAIL - CULVERT PROFILE

N.T.S. 4 / C104

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	NOV 23/12	DRG	WTH	KWJ	ISSUED FOR CONSTRUCTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	MAR 23/12	WTH	ISSUED FOR REVIEW

DRAWING STATUS

STATUS: ISSUED FOR CONSTRUCTION

PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.
Signature
Date NOV. 23, 2012
PERMIT NUMBER: P 018
NWT/NU Association of Professional Engineers and Geoscientists

PERMIT

REGISTERED PROFESSIONAL ENGINEER W.T. HORNE LICENSEE N.W.T.

PROFESSIONAL SEAL

CLIENT: Baffinland Iron Mines Corporation

eba A TETRA TECH COMPANY

LANDFARM DESIGN
MILNE INLET, NU

LANDFARM ACCESS ROAD - PROFILE AND MISCELLANEOUS DETAILS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
E14101174	EDM	DF/DRG	DF	0	C105
DATE:	SHEET No.	DWN	APP	STATUS	
March 2012	5 of 6	MM/DRG	WTH	--	

APPENDIX D

CONSTRUCTIONS SPECIFICATIONS

PART 1 GENERAL

1.1 General

.1 The work shall consist of the installation corrugated metal pipe culverts in locations and in conformity with the lines and grades shown on the plans or designated by the Owner's Representative.

1.2 References

Where material properties are specified the following standards are applicable:

.1 CAN/CSA-G401 Corrugated Steel Pipe Products

PART 2 PRODUCTS

2.1 Corrugated Metal Pipe

.1 Use the following proven products:

.1 C.S.P. Corrugated Steel Pipe

.2 Corrugation profile: 68 x 13 mm (annular or helical)

.3 Minimum 2.0 mm (14 ga.) thickness.

2.2 Couplers

.1 Couplers shall meet specification CSA G401.

PART 3 EXECUTION

3.1 General

.1 Establish stable temporary survey control points for use in laying out work.

.2 The culvert foundation means the natural soil upon which the culvert is to be placed. The culvert foundation shall be prepared and compacted to the staked gradeline, and for a width sufficient to permit compaction of bedding under the culvert haunches. Unsuitable material from below the staked gradeline shall be removed to an approved depth and replaced with suitable bedding to provide uniform continuous support.

.3 The bedding line shall be shaped to fit the culvert.

.4 Slope the culvert using at least a 3% grade.

.5 The culvert shall be installed on the prepared base, true to the elevations lines and grades shown on the Drawings or established by the Owner's Representative in the field.

.6 Corrugated metal pipe culverts shall be placed with the inside circumferential laps pointing downgrade and with the longitudinal laps at the sides or quarter points.

.7 After the culvert has been installed and assembled on the loose bedding, the bedding on both sides of the culvert shall be compacted.

.8 The sections of the culvert shall be firmly joined with coupling bands as per the manufacturer's recommendations.

.9 Compact the earth backfill under the haunches of culverts to a minimum 95% maximum dry density as determined by ASTM D698.

.10 Culvert gravel for bedding shall be spread uniformly along the full length of the culvert foundation. The bedding shall be constructed so that after compacting, a depth of at least 150 mm of gravel remains under the full length of the culvert.

.11 After the haunch area has been backfilled and compacted, additional bedding material shall be placed adjacent to the pipe haunches in lifts not exceeding 150 mm. Compact to a minimum 90% maximum dry density as determined by ASTM D698. Bedding material shall be placed in this manner up to the level of the springline.

.12 If large equipment is used for compaction, do not over-compact so that the pipe begins to lift or is pushed laterally out of alignment.

.13 Backfill used above the springline of the culvert to the final access road elevation shall be culvert gravel or other suitable material. Backfilled in uniform layers not exceeding 200 mm and compact to a minimum 95% maximum dry density as determined by ASTM D698.

.14 After the earth backfill has been placed and compacted around the culvert, the remainder of the access road shall be constructed in accordance with the drawings.

.15 Place a hand-laid rock riprap apron at the inlet and outlet to prevent erosion, as shown on the Drawings.

PART 1 GENERAL

1.1 References

Where material properties are specified the following standards are applicable:

Materials International

.1 ASTM D698 [07e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft lbf/ft;) (600kN m/m3;)

.2 ASTM D422 Test Method for Particle-Size Analysis of Soils,

.3 ASTM D1140 Test Method for Amount of Material in Soils Finer than the No. 200 (75 µm) Sieve

.4 ASTM C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates

.5 ASTM D2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock

.6 ASTM D1556 Test Method for Density of Soil in Place by the Sand-Cone Method

.7 ASTM D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (shallow depths)

Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.2 Scope

.1 This Specification defines the requirements for furnishing of all labour, equipment and materials for earthworks required for site preparation as indicated on the Drawings and as specified herein for Baffinland Iron Mines Milne Inlet Landfarm, in Nunavut, Canada.

.2 All work shall conform to the lines, grades and cross sections indicated on the Drawings. Included is all site preparation, excavation, processing as necessary, stockpiling, loading, hauling, placing, compacting and finishing of all material classified as acceptable for fill material. Excavation and processing of this material shall include sorting or screening that may be necessary to produce the required gradations.

1.3 Protection of Existing Utilities

.1 If relevant, location and isolation and/or relocation of buried utilities shall be completed before any excavation commences.

1.4 Drawing Discrepancies

.1 Any discrepancies found on the drawings shall be brought to the immediate attention of the Owner's Representative.

.2 No deviations shall be permitted from the design drawings without written approval from the Owner's Representative.

.3 Contractor shall immediately submit in writing to the Owner's Representative any conflicts discovered within this Specification or between this Specification, the purchase order, the accompanying data sheets and drawings and any other supplemental information or Specifications. The Owner's Representative will then make a ruling and clarify the matter in writing.

1.5 Product Delivery And Storage

.1 Store separate from other materials, stockpile, and protect all materials from contamination prior to their use.

.2 Deliver, stockpile and handle materials using proper equipment. Reject and remove from site all materials contaminated with foreign matter, or in any way damaged or defective.

.3 Should any materials become segregated, remix the material to provide uniform gradation. Alternatively, remove and replace the segregated material.

1.6 Material Sources

.1 Use material sources and borrow pits shown on the Drawings or alternate borrow pits as designated by the Owner's Representative. Contractor shall use these sources, subject to the conditions of the Owner's quarry permits. Maintain haul and access roads to provide safe passage and control for traffic at all times.

.2 Before development of borrow pits, excavate test pits as and where necessary to assess the quality, composition and extent of the deposits as directed by the Owner's Representative. The

.3 The Contractor shall refer to the Borrow Site Reclamation Overview Milne Inlet Access Road, Mary River Project, Baffin Island, NU, file E14101074 (EBA 2009) for site-specific guidelines related to borrow pit development and reclamation.

.4 Leave unsuitable material in the borrow pit unless its removal is required for continued operation of the pit. Dispose of such material to areas designated by the Owner's Representative.

1.7 Survey Control

.1 The Contractor shall furnish all stakes, markers, tools and equipment required to lay out the work, and to lay out the work from the benchmarks. Markers that are lost or disturbed by the Contractor's operations shall be replaced at their expense.

1.8 Drainage

.1 Excavation, fill and backfill work areas shall be continually and effectively drained. Water shall not be permitted to accumulate in excavations or foundation areas for compacted fill. The Contractor shall provide pumping equipment to divert water flows away from work areas. The proposed point of discharge shall be approved by the Owner. The Contractor must also ensure that sediments contained in diverted water will not enter a natural watercourse.

.2 Backfill may not commence until all water has been drained or otherwise removed from the excavation, and the Owner's Representative approves the commencement of backfilling operations.

1.9 Inspection and Testing

.1 The Owner's Representative will witness excavation and backfilling operations, take samples, perform nuclear densometer testing to ensure compliance with contract and specification requirements.

1.10 Environmental Protection Plan

.1 The Contractor is to comply with all requirements of Baffinland's Environmental Protection Plan (2007-2009) or most recent version.

PART 2 PRODUCTS

2.1 General

.1 All backfill shall be free from clay lumps, organic matter, frozen material, refuse or other deleterious material.

.2 Gradations shall be within the limits specified when materials are tested to ASTM C136 and ASTM C117. Sieve sizes shall conform to CAN/CGSB-8.1-88.

2.2 Materials

.1 Representative bulk samples of any materials proposed shall be submitted to Owner's Representative for particle size analysis, laboratory compaction testing and evaluation prior to a final decision on the use of such materials.

.2 Rock Riprap: Hand-laid rock riprap material shall consist of sound, durable stones having a least minimum dimension of 200 mm.

.3 Type 2 and Type 5 granular fill: properties to the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.

.3 Oversize rocks in the pit run material shall be removed from the Work.

.4 Table

ASTM Sieve Size (mm)	Type 2	Type 5
Use	Berms, pad and road	Embedment of Geomembranes
100	100	
50	60 - 100	
25	40 - 100	100
12.5		75 - 100
4.75	20 - 70	50 - 100
2.0	10 - 60	30 - 100
0.63		10 - 95
0.075	0 □5	0 - 5

PART 3 EXECUTION

3.1 General

.1 Construction shall be performed in accordance with the best industry practices and with equipment best adapted to the work being performed. Material shall be placed so that each zone is homogenous, free of stratifications, ice chunks, lenses, pockets, ruts and layers of material of different texture and grading not conforming to the requirements specified herein.

.2 No fill material shall be placed on any part of the foundation until it has been prepared as specified herein and approved by the Owner's Representative. Placement of material shall conform to the lines; grades and elevations shown on the Construction Drawings or as specified herein and shall be performed in such a manner as to avoid mixing of materials in adjacent zones.

.3 Fill placement shall not proceed when the work cannot be performed in accordance with the requirements of the Specifications. Any part of the Project which has been damaged by the action of

rain and snow, or any other cause, shall be removed and replaced with material conforming to the requirements specified herein before succeeding layers are placed.

.4 Stockpiling, loading, transporting, dumping and spreading of all materials must be carried out in such a manner to avoid segregation or any other condition that does not meet the requirements stated herein. Segregated materials shall be removed and replaced with the materials meeting the requirements stated herein and receiving the Owner's Representative's approval.

.5 The Contractor shall remove all snow, debris, vegetation or any other material not conforming to the requirements stated herein prior to placing fill. The Contractor shall dispose of these materials in an area approved by the Owner.

.6 The Owner's Representative may, at their discretion, adjust the berm top width to account for site specific foundation conditions and construction equipment. The minimum top of berm width shall be 2.5 m.

3.2 Preparation

3.2.1 Protection of Permafrost

.1 In permafrost areas, initiating permafrost degradation by excavating trenches or ditches may occur if adequate thermal and erosion protection is not present.

.2 Ice-rich permafrost has been identified in areas west of the landfarm, and surface disturbance of these areas should be avoided or minimized.

.3 Avoid open excavations and areas of standing water near the project footprint. Promptly remove melt water accumulations in excavations.

.4 Access road is to be constructed on original ground to protect the permafrost.

3.2.2 Temporary Erosion and Sedimentation Control:

.1 Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during construction works.

3.2.3 Landfarm Footprint Preparation

.1 Remove open graded boulders and deleterious materials from the landfarm footprint area.

.2 Excavate to lines, grades, elevations and dimensions as indicated on the Drawings.

.3 Landfarm footprint must be approved by the Owner's Representative before fill is placed.

3.2.4 Fill Placement and Compaction

.1 Use types of fill as indicated on the Drawings. Compaction densities are percentages of maximum densities obtained from ASTM D698.

.1 Place Type 2 fill in lifts not exceeding 300 mm thickness using techniques to avoid segregation.

.2 Compact Type 2 fill to 95 % of corrected maximum dry density.

.3 Beneath the liner system, place 150 mm lift of Type 5 material and roll smooth. Angular particles larger than 75 mm must be removed. Only clean materials originating from designated borrow pits may be used beneath the liner.

3.2.5 Protective Layer over HDPE Geomembrane

.1 Place Type 5 materials over the HDPE geomembrane liner in a minimum lift thickness in accordance with the manufacturer's recommendations, depending on the type of equipment used to place the fill.

.2 Prevent damage to the liner during granular fill placement using the following guidelines:

Backfill Thickness over Liner	Allowable Ground Pressure
No backfill	Foot traffic or ATV only
150 mm or less	Hand placement
200 mm to 300 mm	28.7 kPa to 29.0 kPa (D3-D4 CAT Track Loaders B Low Ground Pressure)
300 mm to 600 mm	29.0 kPa to 59.9 kPa (D4 to D6 Style CAT or Equivalent)
600 mm to 900 mm	72.8 kPa to 109 kPa (D7 to D9 CAT or Equivalent)

.3 Type 5 soils originating from the protective layer of the Milne Inlet bulk fuel storage facility (bladderfarm) may be recycled within the contained area at the landfarm provided that the soils meet the particle size gradation requirements and also meet the Government of Nunavut Environmental Guideline for Contaminated Site Remediation (2009), for coarse-grained soils and industrial land use.

.4 If soils from the Milne Inlet bulk fuel facility are to be recycled in the landfarm protective layer, refer to the Summary Report on Assessment of Hydrocarbon-impacted Soils within the Bulk Fuel Storage Facility at Milne Inlet, NU, EBA letter-report dated November 2, 2011 (draft) for a plan view and delineation of sandy soils within the fuel storage facility petroleum hydrocarbon soil results suitable for recycling at the time of soil sampling (September 2011).