FSC File: 2005-2150

02, March, 2009

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Attn: Phyllis Beaulieu

Re: Water Licence 1BR-RAN0914 Landfarm Operation and Maintenance Plan

Dear Phyllis,

Please find enclosed the Operations and Maintenance Plan as required under water license 1BR-RAN0914, issued to the Government of Nunavut, Community and Government Services.

If you have any questions regarding this plan please don't hesitate to contact us

Sincerely,

FSC ARCHITECTS & ENGINEERS

Ron Kent, P. Eng

Environmental Engineering

Landfarm Operation and Maintenance Plan

Version 1.0

Created March 2009

Effective till November 2014

Project # 2005-2150

Prepared for:

Wayne Thistle
Government of Nunavut
Community and Government Services,
Box 490, Oomilik Building
Rankin Inlet, NU,
X0C 0G0

Prepared by:

FSC Architects & Engineers
4910 53 Street
Yellowknife, NT
X1A 2P4

LISTEN. DESIGN. MANAGE.

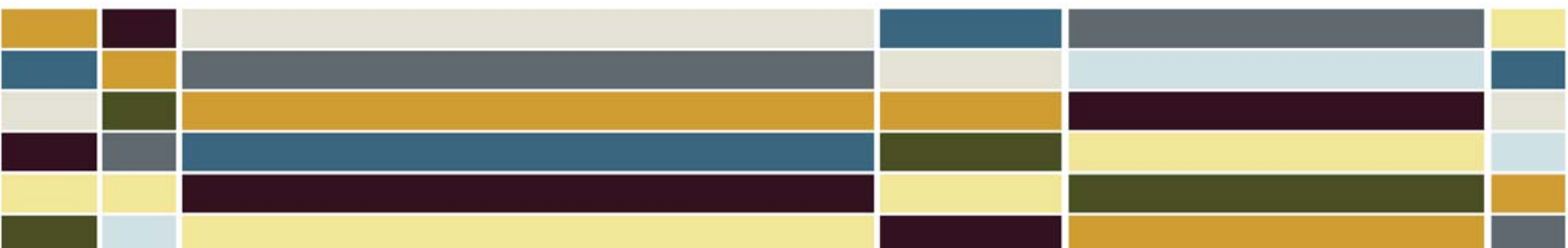


Table of Contents

1 Introduction

The community of Rankin Inlet is located within the Kivalliq Region, Nunavut, on the west coast of Hudson Bay. The community is located in a zone of continuous permafrost, which has an active layer of approximately one metre. The Rankin Inlet Fuel Facility is being upgraded. As part of the upgrade, approximately 5,000 cubic metres of hydrocarbon-contaminated soils must be removed from the site and remediated. Contaminated soils will be remediated in a lined engineered landfarm.

The landfarm will be located adjacent to the new Rankin Inlet Municipal Solid Waste Site. It will be accessed from the same road. The Government of Nunavut in consultation with the Hamlet of Rankin Inlet selected the site.

1.1 DETAILED DESCRIPTION OF FACILITY

The site for the landfarm is located in the area of (Lat/Long) 62º 49' 49.66" N, 92º 10' 28.15" W, (UTM) Easting 542,055.88, Northing 6,966,969.53. (Map sheet number 55K16) near the Hamlet of Rankin Inlet's municipal solid waste site. The landfarm is designed to hold 6450 CU.M. of contaminated soil.

1.2 OPERATION AND MAINTENANCE PROTOCOLS

- Generally, soil is to be deposited no deeper than 1 meter.
- When depositing contaminated soil trucks should not drive over existing contaminated soil as to not track contaminates out of the berm.
- When equipment is leaving the landfarm care should be taken not to track excess material out of the berm.
- Contaminated soil should be turned once a month during snow free seasons. Care should be taken not to rip the liner as this could cause contaminate leakage.
- No effluent discharge of contaminated material is permitted. Contaminated liquid collected within the treatment area will be dispersed within the containment area over the contaminated soil.
- Only Type B contaminates shall be stored within the landfarm. No Heavy Metals, glycols and or heavy oils will be placed in the landfarm.

1.3 RUNOFF MANAGEMENT

Our landfarm was designed to manage runoff and eliminate surface and subsurface contamination.

Surface water that appears outside the containment area will be routed around the berms and will have no chance to penetrate the contaminated soils. Water outside the landfarm will not be in contact with contaminated soils thus will have no chance to effect Iqalugaarjuup Nunanga or the two small located southwest of the landfarm.

Water that collects inside the containment area will have no chance to contaminate local groundwater sources because of the berm and the 60 mil HDPE textured impervious membrane.

The landfarm is built in an area where evaporation exceeds precipitation. Any water that does collect in the sump will not be discharged but rather pumped back over the contaminated soil to maximize remediation and evaporation.

Water monitoring wells have been designed into landfarm plan. These wells will be monitored to ensure no contamination of the local groundwater.

1.4 MITIGATION MEASURES TO PREVENT SEEPAGE

Our landform was designed to prevent seepage. The berm will have a 2 to 1 slope and will be lined with an impervious HDPE 60 mil textured membrane. On either side of the liner will be a 80mm lift of sand. This will accomplish two objectives.

1. Protect the liner from contacting the native ground that could have sharp edges, which in turn could cause wear and tearing of the liner.

2. Protect the equipment from contacting the liner. Over the lift of sand will be a geo-textile membrane with further gravel on top of that. This layer system will ensure containment of the contaminates.

Water monitoring wells have been designed into landfarm plan. These wells will be monitored to ensure no contamination of the local groundwater.

A trained equipment operator will also be an asset in the prevention of preventing seepage. A trained operator will minimize excessive equipment operation. The operator will also make sure the equipment will damage the liner and will leave a barrier of soil between the equipment and liner.

1.5 SOIL QUALITY REMEDIATION OBJECTIVES

The objective of our sample procedure is to obtain commercial levels of petroleum hydrocarbons in soil as a minimum. Based on the GN and CCME Guidelines.

GNWT COMMERCIAL STANDARDS FOR PETROLEUM HYDROCARBONS (PHCs) IN SOILS (mg/kg soil)

	Particle Size	Benzene	Toluene	Ethyl-benzene	Xylene	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	F3 (C_{16}-C_{34})	F4 (>C_{34})
Under building <1.5m	Coarse	5.0	20	0.8	17	310	1700	NA	NA
	Fine	5.0	20	0.8	17	4600	25000	NA	NA
Under building >1.5m	Coarse	5.0	20	0.8	17	340	1800	NA	NA
	Fine	5.0	20	0.8	17	4800	26000	NA	NA
Eco-soil <1.5m	Coarse	5.0	20	0.8	17	330	760	1700	3300
	Fine	5.0	20	0.8	17	660	1500	2500	6600
Eco-soil >1.5m	Coarse	5.0	20	0.8	17	700	2000	3500	10000
	Fine	5.0	20	0.8	17	1000	3000	5000	10000

1.6 MONITORING PROGRAM

PetroFlag samples will be taken once a month, during the snow free season, immediately after the contaminated soil is turned. This will be a good indicator of the progress of the remediation.

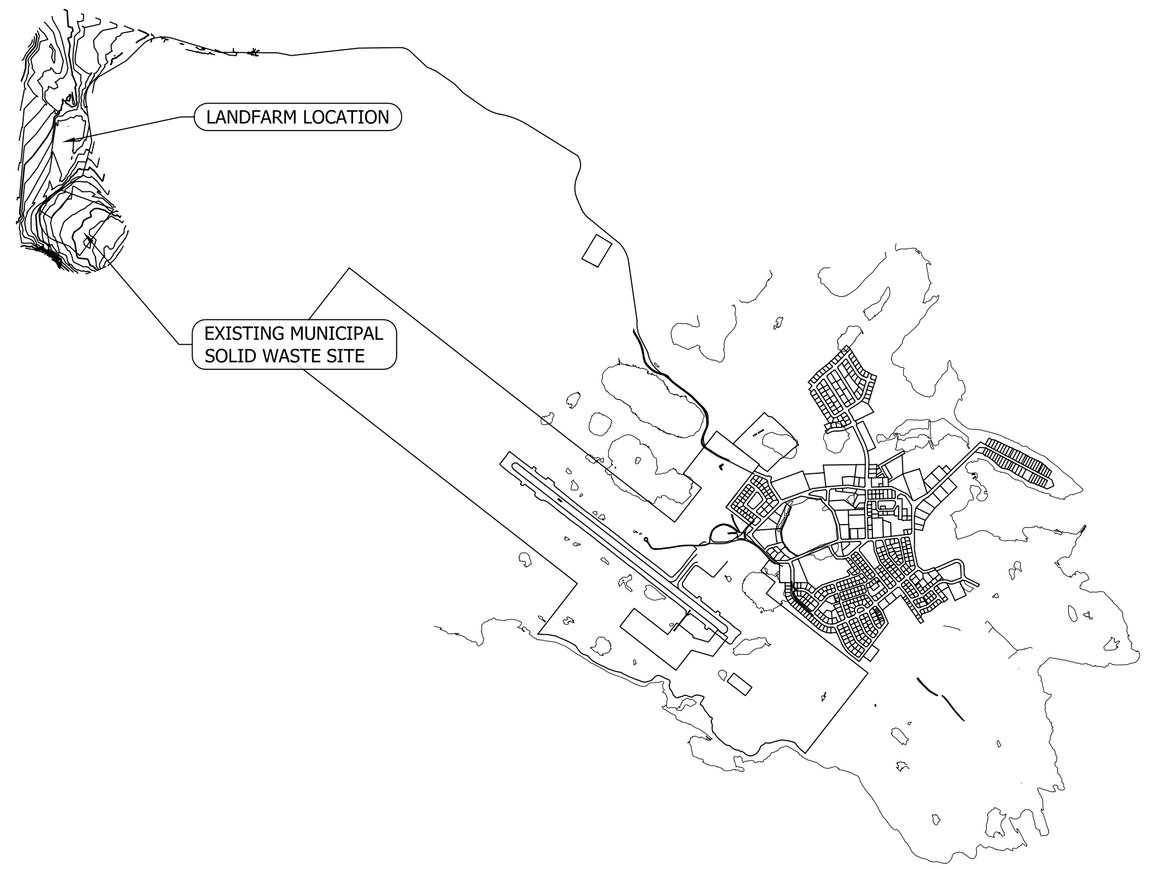
Petroflag samples will be taken on a 10 by 10 meter grid.

Piezometers will be checked monthly until freeze up. Any water collected in any piezometer will be tested for:

- PHC
- BTEX
- Total Metals

During construction of the landfarm, background groundwater parameters will be collected and tested for reference.

Appendix A: Maps



1/C1 RANKIN INLET REGION
N.T.S.

2/C1 AIR PHOTO OF RANKIN INLET REGION
N.T.S.

Nunavut

GENERAL NOTES:

1. DO NOT SCALE FROM DRAWINGS.
2. CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE BEFORE PROCEEDING WITH THIS WORK.
3. REFER TO RULER IN BINDING MARGIN TO VERIFY IF SHEET HAS BEEN REDUCED OR ENLARGED.
4. ACTUAL DIMENSIONS TO BE ADJUSTED IN FIELD

NO.	REVISION DESCRIPTION	DATE ISSUED
00	ISSUED FOR REVIEW	2008-03-25

PROFESSIONAL SEAL / PERMIT TO PRACTICE

REGISTERED PROFESSIONAL ENGINEER N.W.T. 21 MAR 2008

PERMIT TO PRACTICE
FSC ARCHITECTS AND ENGINEERS
(S10) (NWT LTD.)
Signature
Date 25 MAR 2008
PERMIT NUMBER: P0457
The Association of Professional Engineers, Geologists and Geophysicists of the NWT/NU

FSC ARCHITECTS & ENGINEERS
4910 - 53RD STREET, P.O. BOX 1777,
YELLOWKNIFE, NT, X1A 2P4, CANADA
TEL: (867) 920-2882 FAX: 920-4319

PROJECT TITLE

FUEL STORAGE FACILITY UPGRADE AND EXPANSION

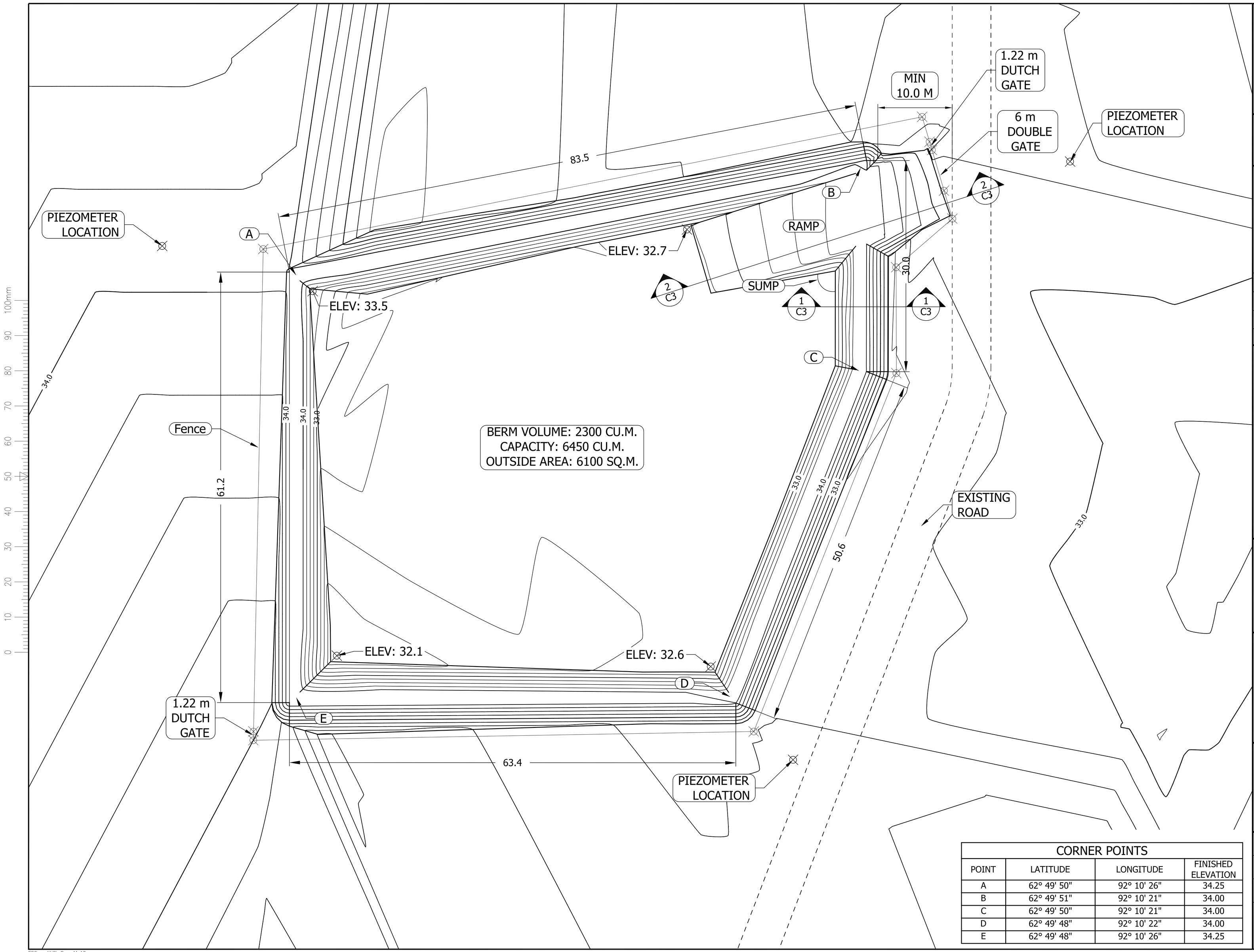
LOCATION
RANKIN INLET, NU

DRAWING TITLE
LAND FARM
EXISTING SITE LAYOUT

DRAWN BY	SCALE
AJ	1: 2500
CHECKED BY	CLIENT PROJECT NO.
RK	-

FSC PROJECT NO.
2005-2150

DRAWING NO.
C8



CORNER POINTS			
POINT	LATITUDE	LONGITUDE	FINISHED ELEVATION
A	62° 49' 50"	92° 10' 26"	34.25
B	62° 49' 51"	92° 10' 21"	34.00
C	62° 49' 50"	92° 10' 21"	34.00
D	62° 49' 48"	92° 10' 22"	34.00
E	62° 49' 48"	92° 10' 26"	34.25

Nunavut

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4. ACTUAL DIMENSIONS TO BE ADJUSTED IN FIELD

NO.	REVISION DESCRIPTION	DATE ISSUED
00	ISSUED FOR REVIEW	2008-03-25

PROFESSIONAL SEAL / PERMIT TO PRACTICE

REGISTERED PROFESSIONAL ENGINEER NWT

PERMIT TO PRACTICE
FSC ARCHITECTS AND ENGINEERS (51078 NWT LTD)
Signature
Date 27/MAR/08
PERMIT NUMBER: P0457
The Association of Professional Engineers, Geologists and Geophysicists of the NWT/NU

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TEL: (867) 920-2882 FAX: 920-4319

PROJECT TITLE

FUEL STORAGE FACILITY UPGRADE AND EXPANSION

LOCATION
RANKIN INLET, NU

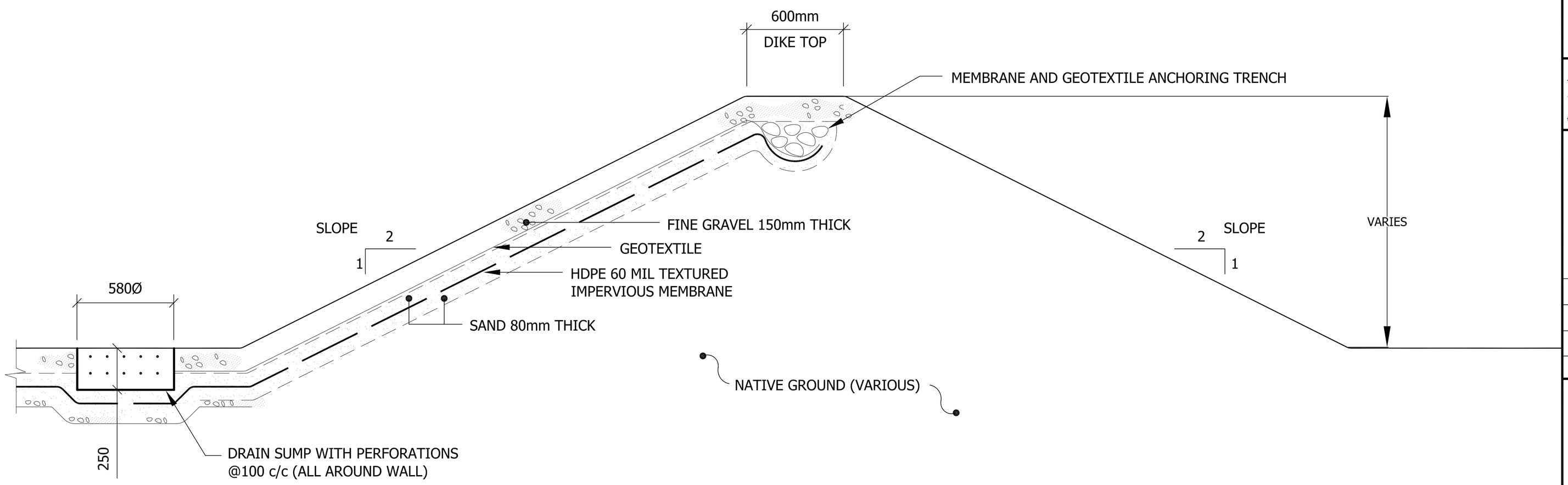
DRAWING TITLE
LAND FARM DESIGN

DRAWN BY	SCALE
AJ/CP	1: 500
CHECKED BY	CLIENT PROJECT NO.
RK	-

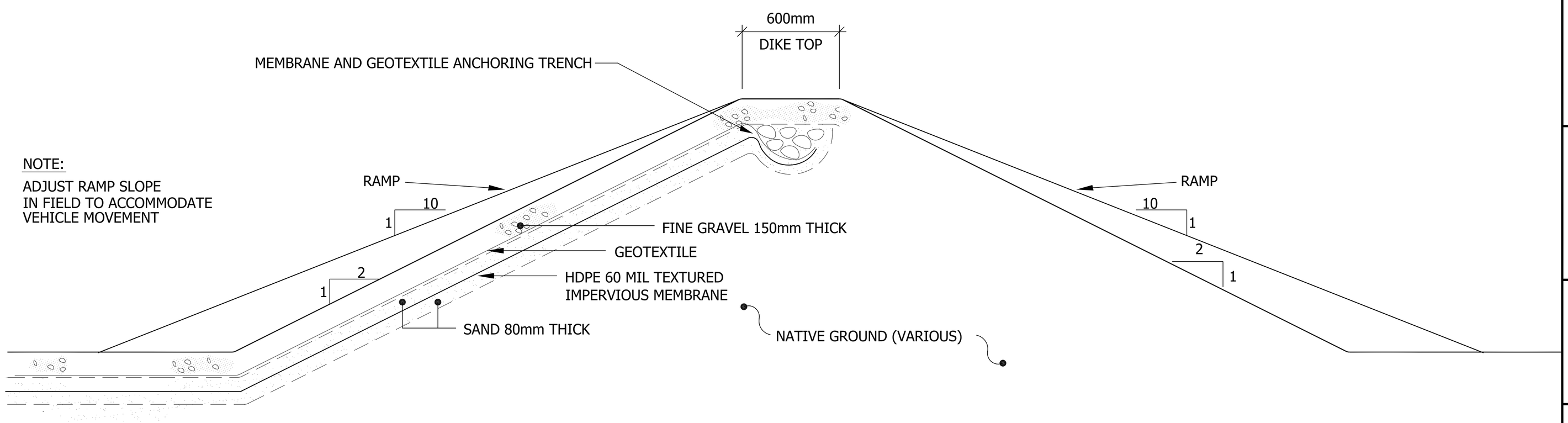
FSC PROJECT NO.
2005-2150

DRAWING NO.
C9

FSC – ANSI-B – 11x17



1 / C3 BERM CROSS SECTION (TYPICAL)
N.T.S.



2 / C3 ENTRANCE RAMP
N.T.S.

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FSC ARCHITECTS AND ENGINEERS
(5107)NWT LTD
Signature
Date 27/MAR/2008
PERMIT NUMBER: P0457
The Association of Professional Engineers, Geologists and Geophysicists of the NWT/NU

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4910 - 53RD STREET, P.O. BOX 1777,
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PROJECT TITLE

FUEL STORAGE FACILITY UPGRADE AND EXPANSION

LOCATION
RANKIN INLET, NU

DRAWING TITLE
LAND FARM
TYPICAL CROSS SECTION
DETAILS

DRAWN BY	SCALE
AJ	NTS
CHECKED BY	CLIENT PROJECT NO.
RK	-

FSC PROJECT NO.
2005-2150

DRAWING NO.
C10

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