Arviat Bulk Fuel Storage Facility

Issue: Possible regulatory impact because a watercourse crosses the land parcel proposed for the storage facility.

Date: May 30, 2022, Rev 1.

Project Scope

Project scope is to construct a bulk fuel storage facility at a Hamlet approved area. The facility will include large vertical field erected storage tanks for LSDL, gasoline and aviation fuel, and a publicly accessible area where residents can purchase fuel and where delivery trucks load fuel to distribute throughout the Hamlet and to the airport. The tank storage area is surrounded by a granular berm and is underlain by an impervious membrane, all in accordance with codes, standards, and regulations. Refer to Attachment 6. The final site selection process included an assessment of the advantages and disadvantages of two options, one on the shore and one inland. The shore option was selected.

Constraints

The site as presented during community consultations and as approved by the Hamlet is near the shore, in proximity to some ponds (Ponds 1, 2, 3, 4), as far away as is practical from local residences and not in the direct line of sight between existing residences and the shore. The site overlays a watercourse which provides natural drainage from a small area northeast of the proposed site to Pond 4. Pond 4 in turn drains naturally to Hudson Bay further to the east. Installation of the granular pad will isolate this small area from draining to Pond 4. Refer to Attachment 1 and Attachment 2. Except for a slight ridge of land (estimated 0.4 meters high), after the installation of the pad, any water that collected in the isolated area would drain to the northeast, into the Pond2/Pond 3 area.

Options Considered

1. Option 1. Refer to Attachments 1 and 2. Excavate a small swale across the ridge to create drainage to the Pond2/Pond 3 area to prevent water from collecting in the isolated area. It is estimated that approximately 30 to 50 m^3 of material would need to be excavated.

   Option 1 is recommended. The amount of material to be excavated is minor and water is prevented from collecting adjacent to the facility pad.

2. Option 2. Refer to Attachments 1 and 2. Do nothing to re-direct drainage from the isolated area. Water level would build, spill over the small ridge, and enter the Pond 2/Pond 3 area. Rip rap would be placed at the toe of the tank farm berm to prevent erosion.

   Option 2 would also be a viable option. It would not require disturbance of the existing surface, but during spring run-off and rainfall, would create an area submersed in water which is not currently submersed in water.

3. Option 3. Refer to Attachment 3 and 4. Install a culvert from the isolated area along the natural watercourse to maintain the natural drainage to Pond 1. The culvert would be installed such that the top part of the culvert cross section would be above the current high water mark of Pond 1. This would prevent the culvert from completely freezing up at any time and blocking off drainage.

In general, the culvert would be installed in the bottom of the natural drainage course with minimal disturbance to existing ground. There may be a requirement to locally remove some poor quality native material and replace it with engineered fill. This would be done by approved construction methods.

The facility will be installed on a granular pad. Because of this, over time the permafrost may freeze back to a higher than original elevation under the pad. Construction will occur when the active layer is thawed, at least partially, so it is not anticipated that the permafrost will encroach to the elevation of the culvert, but, nevertheless, placing the culvert on top of insulation would be considered. It is not anticipated that permafrost will rise in the area directly under the tank.

The culvert would be specified to withstand the bearing force of the storage tank located above; this will not be an onerous requirement (Note: although not proposed for this project, some tank installation designs include culverts under tanks to preserve the underlying permafrost).

Rip rap would be placed in the area around the culvert inlet to prevent erosion and silt buildup in the culvert.

The storage tank area will be enclosed with a granular berm and underlain with an impervious membrane. A leak detection system will be in place. Refer to Attachment 6.

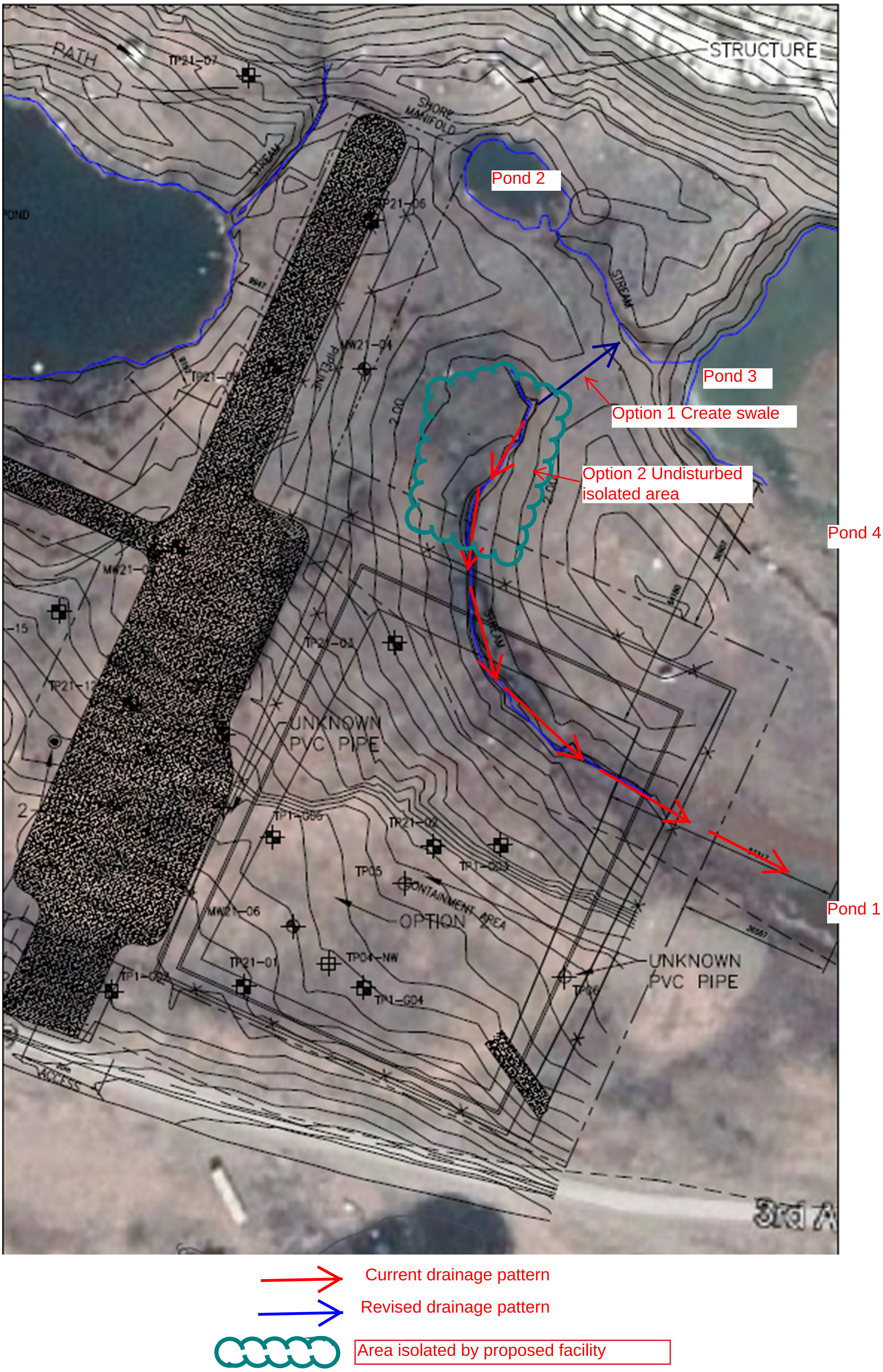
Option 3 would be a viable option but would be costly in terms of any additional benefit it would offer.

4. Option 4. See Attachment 5. Relocate and re-shape the site.

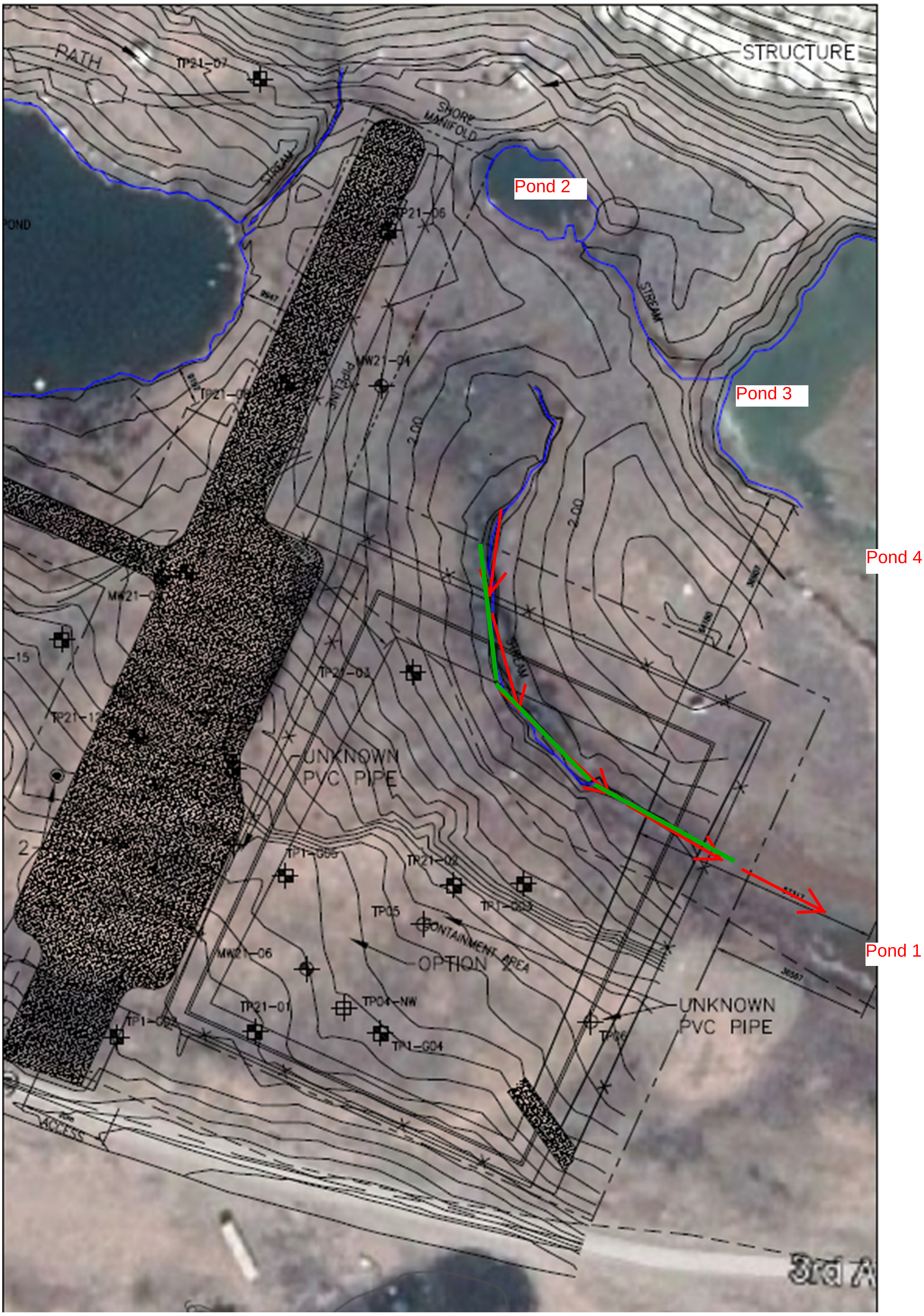
   Option 4 is not recommended:
   a) Option 4 would locate the facility within about 25 m of an existing residence.
   b) The facility would be in the direct line of site between residences and the shore.
   c) Both a) and b) were significant considerations in the selection of the site.
   d) This was not what was presented during community consultations or to the Hamlet Council. Transparency would suggest that community consultation would need to be re-done.

OPTIONS 1 AND 2

ATTACHMENT 1



OPTIONS 1 and 2
ATTACHMENT 2

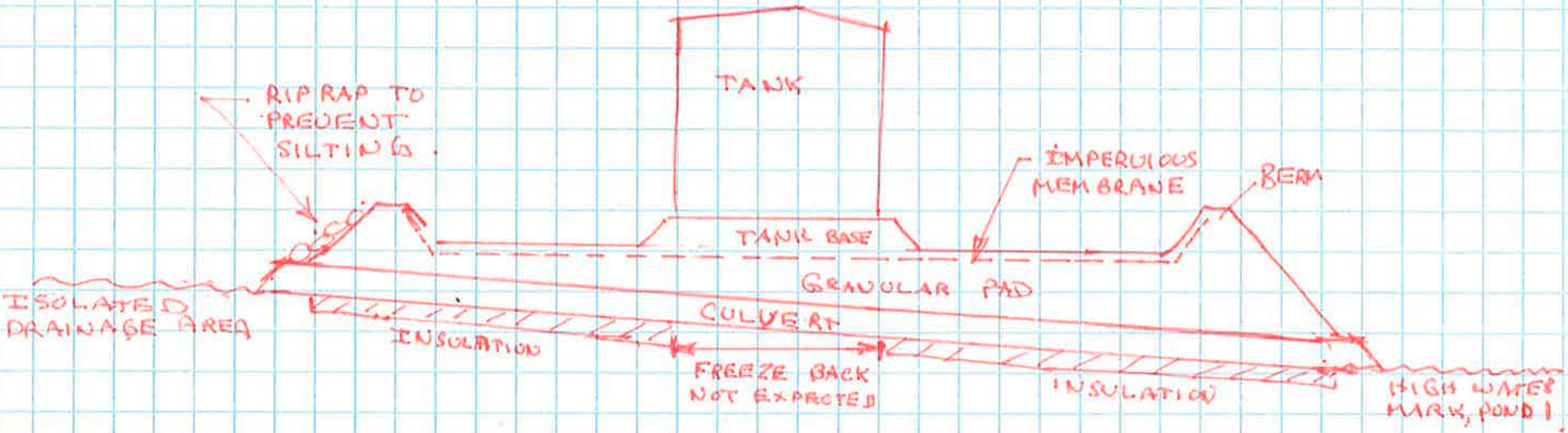


→ Current drainage pattern

— Culvert

OPTION 3

ATTACHMENT 3



NTS

OPTION 3 SCHEMATIC

ATTACHMENT 4

OPTION 1

AREA PLAN
N.T.S

LEGEND:

PROPERTY BOUNDARY	▬ · · ▬ · · ▬
DUMPSITE BOUNDARY	– – – – – – –
FENCE	——X——

NOTES:

1. TOPOGRAPHIC IMAGE IS FROM GOOGLE EARTH PRO VERSION 7.3.4.8248, 7/16/2021 IMAGERY DATE 6/21/2019.

OPTION 4

ATTACHMENT 5

NOTES	REFERENCE DRAWINGS NUMBER	REFERENCE DRAWINGS TITLE	REVISIONS NO.	ISSUE	DATE	BY	CHK'D	ENG	APP'D
			A	ISSUED FOR SCHEMATIC DESIGN REVIEW	2022APR26	SG	BHT		

PERMIT AND ENGINEER STAMP

CHECKED DATE APPROVED DATE

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THE GOVERNMENT OF NUNAVUT
DEPARTMENT OF COMMUNITY AND
GOVERNMENT SERVICES

BULK FUEL STORAGE FACILITY
ARVIAT, NUNAVUT
PLOT PLAN, CONTOURS

CADFILE	2343-PP-1204.DWG
PROJ. NO.	2343
SCALE	1:800
DRAWING NO.	2343-PP-1204
REV.	A

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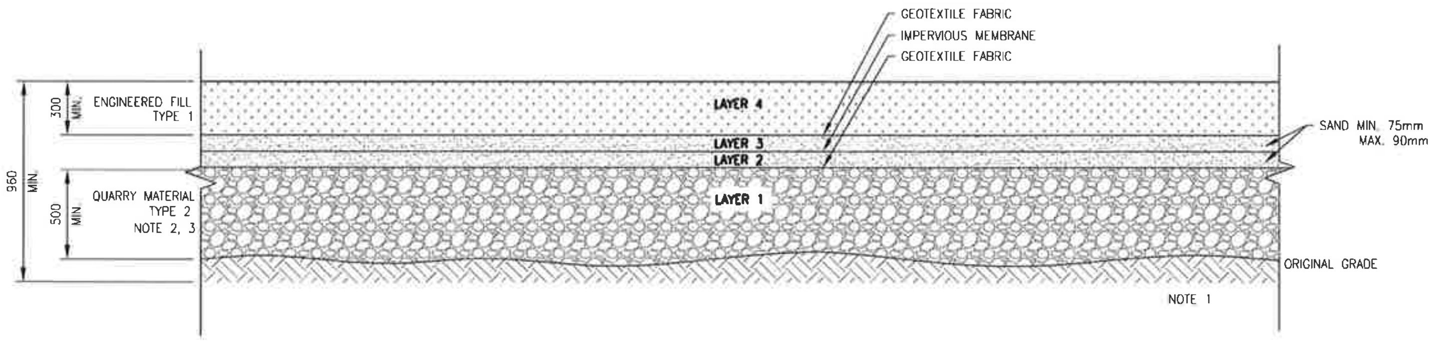
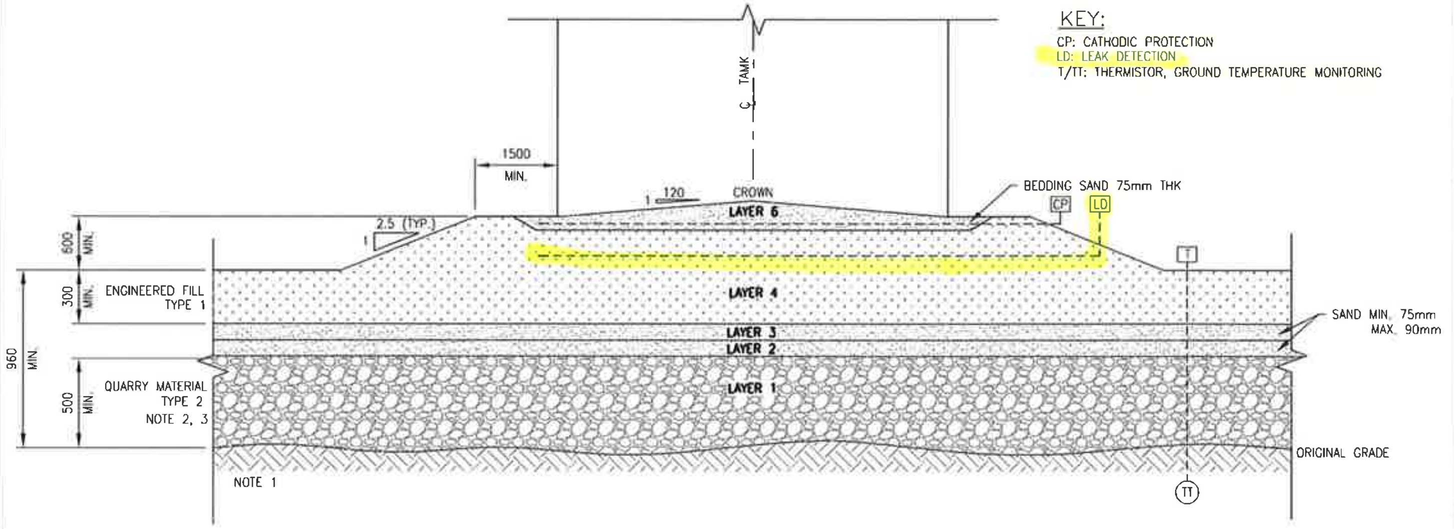
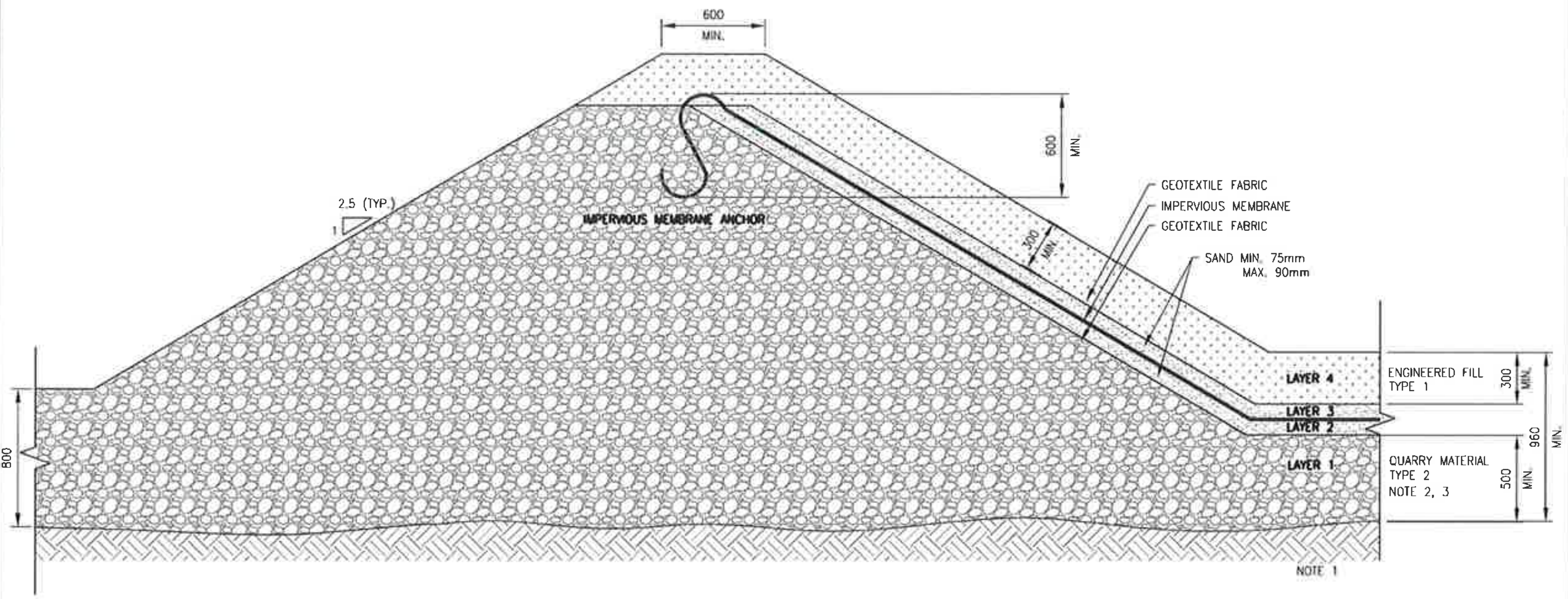


DETAIL 1
TYPICAL CROSS SECTION, INSIDE SECONDARY CONTAINMENT
NTS

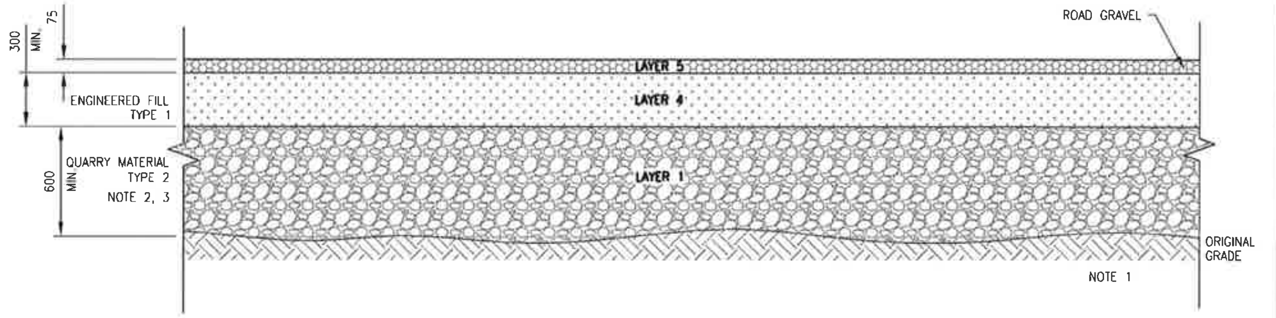


DETAIL 2
TYPICAL CROSS SECTION, TANK BASE
NTS



ATTACHMENT 6

DETAIL 3
TYPICAL CROSS SECTION, SECONDARY CONTAINMENT DIKE
NTS



DETAIL 4
TYPICAL CROSS SECTION, TRAVELLED AREA
NTS

NOTES
1. REFER TO DWG 2343-C-3402.

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

NO.	ISSUE	DATE	BY	CHK'D	ENG	APP'D
A	ISSUED FOR SCHEMATIC DESIGN REVIEW	2022APR25	SG	BHT		

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PROJ. NO.	2343
SCALE	NTS

THE GOVERNMENT OF NUNAVUT
DEPARTMENT OF COMMUNITY AND
GOVERNMENT SERVICES

BULK FUEL STORAGE FACILITY
ARVIAT, NUNAVUT
CIVIL DETAILS

CADFILE 2343-C-3401.DWG
DRAWING NO. 2343-C-3401
REV. A

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