SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2

T: +1.604.681.4196
F: +1.604.687.5532
vancouver@srk.com
www.srk.com

Memo

To:	Oliver Curran, Vice President Environmental Affairs	**Client:**	TMAC Resources Inc.
From:	Jasur Umarov Cameron Hore, PEng	**Project No:**	1CT022.026
Reviewed By:	Maritz Rykaart, PhD PEng	**Date:**	September 18, 2018
Subject:	Doris North Construction Summary Report		

1 Introduction

This memo provides a summary of formal documentation related to the engineering and construction support of the following three facilities at TMAC Resources Inc's Hope Bay site:

- Doris North Tailings Catchment Basin
- Doris North Reagent Pad
- Doris North Airstrip De-icing Apron

SRK Consulting (Canada) Inc. provided Issue for Construction (IFC) drawings. HDPE liner installation was performed by Blomberg Building Group. Earthworks were completed by Nuna Logistics Ltd. and as-built surveys were conducted by Sub-Arctic Surveys Ltd. SRK has produced the as-built drawings based on the survey data provided by Sub-Arctic.

2 Summary of Attachments

The Blomberg Building Group Projects Reports are provided in Attachment 1 – BBG Project Reports.

Attachment 2 is separated into two sections. Attachment 2.1 contains the Issued for Construction (IFC) drawing sets for each facility and Attachment 2.2 contains the As-built drawings for each facility.

Quality Assurance/Quality Control (QA/QC) Reports, prepared by Blomberg Building Group, are provided in Attachment 3 – QA/QC Reports.

Blomberg Building Group also collected HDPE Seam samples to perform Same Day Peel and Shear Tests. Some of the tests were conducted on site and the reminder were sent to an independent laboratory, TRI/Environmental Inc. (TRI). The results of on site test are summarised with the QA/QC Reports in Attachment 3. The geosynthetic testing results conducted by TRI and

the corresponding test request forms are found in Attachment 4 – QA/QC Data. These test results are arranged into sub-appendices by the facility location.

The contents of all attachments are summarized in Table 1.

Table 1: Contents of Attachments

Attachment		Topic	Contents
1		BBG Project Reports	Project Reports organised by facility location
2	2.1	Issued for Construction Drawings	Doris North Tailings Catchment Basin
			Doris North Reagent Pad
			Doris North Airstrip De-icing Apron
	2.2	As-built Drawings	
3		QA/QC Reports	QA/QC Reports organised by facility location
4	4.1	QA/QC Data	Doris North Tailings Catchment Basin QA/QC Data
	4.2		Doris North Reagent Pad QA/QC Data
	4.3		Doris North Airstrip De-icing Apron QA/QC Data

Attachment 1
Project Reports

BLOMBERG BUILDING

Blomberg Building Group

TRL Catch Basin Project Report

Earthworks:

The foundation for the TLR Catch Basin was prepared for Geosynthetics by Nuna Logistics Ltd. Elevations and parameters were surveyed by Sub-Arctic Surveys Ltd. The same was done for the backfill of the TLR Catch Basin.

Base Layer Geotextile:

Non-woven geotextile was used for the base layer. It was installed in a north-south direction covering the entire TLR Catch Basin footprint.

The first row began on the east side of the apron and each successive piece was laid out with a minimum overlap of 200mm, until the west edge of the reagent pad was reached. Geotextile rolls were rolled out by hand and heat welded with a tiger torch as it was unrolled.

Sandbags were used to hold down the geotextile until the HDPE could be rolled out on top.

The surface of the Geotextile was cleared of all sandbags and debris before the HDPE was rolled out on top.

HDPE Liner Installation:

The HDPE was transported to Hope Bay site by TMac and to the TLR catchment basin by BBG. A visual inspection of the HDPE rolls was conducted before seaming. Rolls with excessive amounts of damage as a resulted of transportation had the effected sections removed before seaming.

HDPE pieces were rolled out to length prior to being transported. Once pieces were at the catchment basin they were rolled out by hand and inspected. Sandbags were used to secure the edges of the HDPE to prevent wind uplift.

The HDPE was placed in a north to south orientation when installed on top of the geomembrane. The HDPE extends a minimum of 2m past the top of the berm in all directions. Before welding, the seams were wiped clean and dry. A total of 3 HDPE seams were welded to cover the footprint of the catch basin.

HDPE Seaming and Welding:

Extrusion welds were carried out over sample cut-outs and all other holes in the HDPE liner. In total, there are 5 extrusion welds on TLR catch basin liner. All welds were carried out in accordance with SRK Consulting's Technical Specification- Revision G on Geosynthetics. All weld test results are documented in the TLR Catch Basin QAQC.

HDPE Testing:

<u>Seam Welds:</u>

Samples were removed, and their locations labelled. From these samples on site destructive tests were performed. There were also samples sent off site for third party destructive testing as well.

Air channel testing was performed on all seams with results documented in the QAQC. Air channel tests were performed in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

Extrusion Welds:

Non-destructive vacuum testing was performed on all extrusion welds in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

Samples were removed, and their locations labelled, and were sent off site for third party destructive testing.

BLOMBERG BUILDING

Blomberg Building Group

Doris North Reagent Pad Project Report

Earthworks:

The foundation for the Doris North Reagent Pad was prepared for Geosynthetics by Nuna Logistics Ltd. Elevations and parameters were surveyed by Sub-Arctic Surveys Ltd. The same was done for the backfill of the Doris North Reagent pad.

Base Layer Geotextile:

Non-woven geotextile was used for the base layer. It was installed in a north-south direction covering the entire reagent pad footprint.

The first row began on the east side of the apron and each successive piece was laid out with a minimum overlap of 200mm, until the west edge of the reagent pad was reached. Geotextile rolls were rolled out by hand and heat welded together with a tiger torch as it was unrolled.

Sandbags were used to hold down the geotextile until the HDPE could be rolled out on top.

The surface of the Geotextile was cleared of all debris before the HDPE was rolled out on top.

HDPE Installation:

The HDPE was transported to Hope Bay site by TMac and to the Doris North Reagent Pad by Nuna Logistics Ltd. A visual inspection of the HDPE rolls was conducted before seaming after each roll had been laid out. Rolls with excessive amounts of damage as a resulted of transportation had the effected layers removed before seaming.

The HDPE was suspended from a spreader bar attached to a telehandler for the unrolling process. This limited the amount of damage that could be caused to the underlying surface.

The HDPE was placed in a north to south orientation when installed on top of the geomembrane. The HDPE extends a minimum of 2000mm across the top of the berm in all directions. Before welding, the seams were wiped clean and dry.

Due to high winds at the time of installation 1500kg cement bags were used to hold down the edges of HDPE to prevent wind uplift. The HDPE in the middle of the Reagent Pad was held down with sand bags to prevent wind from getting underneath and causing wrinkles.

HDPE Seaming and Welding:

A total of 7 HDPE seams were welded to cover the footprint of the reagent pad. Before seaming the HDPE, the area before the wedge welder was wiped dry, and cleaned of all debris.

Extrusion welds were carried out over sample cut-outs and other holes in the HDPE liner. In total, there are 34 extrusion welds on the Doris North Reagent Pad liner. All welds were

carried out in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics. All weld test results are documented in the Doris North Project QAQC.

HDPE Testing:

Seam Welds:

Samples were removed, and their locations labelled. From these samples on site destructive tests were performed. There were also samples sent off site for third party destructive testing as well.

Air channel testing was performed on all seams with results documented in the QAQC. Air channel tests were performed in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

Extrusion Welds:

Non-destructive vacuum testing was performed on all extrusion welds in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

Top Layer Geotextile:

Non-woven geotextile was used for the top-layer. It was installed in a north-south direction covering the entire reagent pad footprint. The first row began on the east side of the apron and each successive piece was overlapped a minimum of 200mm, until the west edge of the reagent pad was reached. All seams were heat bonded together using a tiger torch. The HDPE was swept clear of any debris and inspected for defects/holes prior to being covered by the top-layer of geotextile.

Sump Installation:

Sump was provided by Sandale and approved by SRK before installation. Sumps were installed as per engineered specifications provided.

Blomberg Building Group

Airstrip De-icing Apron Containment Liner

Earthworks:

The foundation for the Airstrip De-icing Apron was prepared for Geosynthetics by Nuna Logistics Ltd. Elevations and parameters were surveyed by Sub-Arctic Surveys Ltd. The same was done for the backfill of the Airstrip De-icing Apron.

Snow Removal:

Due to a delay between final date of earthworks and the start date of Geosynthetics, snow had to be removed from the area. Snow was removed with small pieces of machinery as to not disturb the existing earthworks.

Base Layer Geotextile:

Non-woven geotextile was used for the base layer. It was installed in a north-south direction covering the Airstrip De-icing Apron footprint.

The first row began on the east side of the apron and each successive piece was laid out with a minimum overlap of 200mm, until the west edge of the reagent pad was reached. Geotextile rolls were rolled out by hand and heat welded together with a tiger torch as it was unrolled.

Sandbags were used to hold down the geotextile until the HDPE could be rolled out on top.

The surface of the Geotextile was cleared of all snow build-up and debris before the HDPE was rolled out on top.

HDPE Liner Installation:

The HDPE was transported to Hope Bay site by TMac and to the Airstrip De-icing Apron by Blomberg Building Group Ltd. A visual inspection of the HDPE rolls was conducted before seaming after each roll had been rolled out. Rolls with excessive amounts of damage as a resulted of transportation had the effected sections removed or marked for repair before seaming.

The HDPE was suspended from a reach stacker with the rolling pins inserted for the unrolling process. This limited the amount of damage that could be caused to the underlying surface.

The HDPE was placed in a north to south orientation when installed on top of the geomembrane. The HDPE extends a minimum of 2m across the top of the berm in all directions. Before welding, the seams were wiped clean and dry.

Due to high winds at the time of installation 1500kg cement bags were used to hold down the edges of HDPE to prevent wind uplift. The HDPE in the middle of the Reagent Pad was held down with sand bags to prevent wind from getting underneath and causing wrinkles.

HDPE Seaming and Welding:

A total of 9 seams were welded to cover the entire basin and 2m past the end of the berm. Before seaming the HDPE, the area before the wedge welder was wiped dry, and cleaned of all debris.

Extrusion welds were carried out over sample cut-outs and other holes in the HDPE liner. In total, there are 6 extrusion welds on the De-icing Apron HDPE liner. All welds were carried out in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics. Locations of welds are available on QAQC.

HDPE Testing:

Seam Welds:
Samples were removed, and their locations labelled. From these samples on site destructive tests were performed. There were also samples sent off site for third party destructive testing as well. Air channel testing was performed on all seams with results documented in the QAQC. Air channel tests were performed in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

Extrusion Welds:
Non-destructive vacuum testing was performed on all extrusion welds in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

Top Layer Geotextile:

Non-woven geotextile was used for the top-layer. It was installed in a north-south direction covering the entire reagent pad footprint. The first row began on the east side of the apron and each successive piece was overlapped a minimum of 200mm, until the west edge of the reagent pad was reached. All seams were heat bonded together using a tiger torch. The HDPE was swept clear of all snow build up, debris and inspected for defects/holes prior to being covered by the top-layer of geotextile.

Sump Installation:

Backfill:

The Airstrip De-icing Apron was backfilled as per SRK Consulting's *Technical Specification- Revision G* on Geosynthetics. *Section 6.3.3 Liner Cover* specifications.

Sub Arctic Surveys shot elevations after the transition material was laid down to ensure the grade was still correct and sloping towards the sump.

Blomberg Building Group

Airstrip De-icing Apron Containment Liner

Grade & Earthworks:

The containment pond and berm were excavated and built by Nuna according to drawing DN-AE-00. Transition material (3" minus) was used as a subgrade, followed by a minimum of 0.15m of bedding material to protect the liner. Sub Arctic Surveys surveyed the work area and constructed it with a 1% grade into the sump located on the north side of the containment basin. The basin, berms, and surrounding areas were compacted by Nuna using a CAT roller.

Snow Removal:

Snow was removed from the worksite using a Skid-steer before any geotextile was laid down. Blowing snow and the build up of snow drifts were an ongoing issue for the duration of the project. At every stage of the project, snow was removed either by hand or by machine as necessary. Some small amounts of loose snow did end up on the geotextile/HDPE but this was deemed acceptable by the engineer. All snow drifts were dug out and removed whenever they formed.

Base Layer Geotextile:

The non-woven geotextile was oriented north-south when rolled out over the bedding material. The first row began on the east side of the apron and each successive piece was overlapped a minimum of 200mm. All seams were heat bonded together using a tiger torch.

HDPE Liner Installation:

The HDPE was oriented north to south when rolled out over the geotextile. The HDPE extends a minimum of 2m across the top of the berm in all directions. Before welding, the seams were heated, hoarded, and wiped down with a dry cloth. A total of 9 seams were welded to cover the entire basin and the first 2m of the berm. After all the panels had been seamed together, an additional two layers of HDPE were placed along the inside edge of the berm as added protection.

Extrusion Welding:

Extrusion welds were carried out over sample cut-outs and other holes in the HDPE liner. In total, there are 6 extrusion welds on the De-icing Apron HDPE liner. All welds were carried out in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics.

HDPE Testing:

Non-destructive vacuum testing, and air channel testing were performed on all extrusion welds and seams in accordance with SRK Consulting's *Technical Specification- Revision G* on Geosynthetics. On site destructive testing was performed once every 450m of welded seam. Samples were removed, and their locations labelled, to be sent off site for third party destructive testing.

Top Layer Geotextile:

The non-woven geotextile was oriented north-south when rolled out over the HDPE membrane. The first row began on the east side of the apron and each successive piece was overlapped a minimum of 200mm. All seams were heat bonded together using a tiger torch. The HDPE was swept, cleared of excess snow, and inspected for defects/holes prior to being covered by geotextile.

Sump Installation:

The sump was installed after the containment area had been backfilled. A plywood box was made around the area where the sump was located, and a hoarding structure was fabricated, once the sump was in place the structure was heated melting all ice and warmed the HDPE. The Sump was welded to the liner using an extrusion welder with a ¾" fillet weld between the base plate and HDPE. The geotextile layer was then heat bonded to cover the flange and an additional layer of Geotextile was heat bonded which connected the flange Geo to the geo which wrapped around the sump. We had a minimum overlap of 150mm for geotextile, because of this the area was thoroughly inspected before any fill was placed.

Backfill:

The basin was backfilled using the IT-28 Loader and a Skid-steer. 150mm of ¾ crush was used as bedding, as well as in all areas around the berm and sump. The equipment never drove directly on the HDPE liner while backfilling. Following the bedding, a minimum of 300mm of 3" crush was laid down in the de-icing basin as transition material. The 3" crush was not used on the berms or in the area around the sump. Only ¾" crush was used in these areas. The 3" crush was spread out by Nuna using a dozer, before being compacted by a CAT roller. Mark Doucette from Sub Arctic Surveys shot elevations after the transition material was laid down to make sure the grade was still correct and sloping towards the sump.

Attachment 2
Issued Drawings

Attachment 2.1
Drawings Issued for Construction

Engineering Drawings for the Tailings Catch Basin, Hope Bay Project, Nunavut, Canada

ACTIVE DRAWING STATUS

DWG NUMBER	DRAWING TITLE	REVISION	DATE	STATUS
CB-01	Engineering Drawings for the Tailings Catch Basin, Hope Bay Project, Nunavut, Canada	0	Mar. 21, 2017	Issued for Construction
CB-02	Typical Tailings Catch Basin Layout	0	Mar. 21, 2017	Issued for Construction
CB-03	Typical Tailings Catch Basin Sections	0	Mar. 21, 2017	Issued for Construction

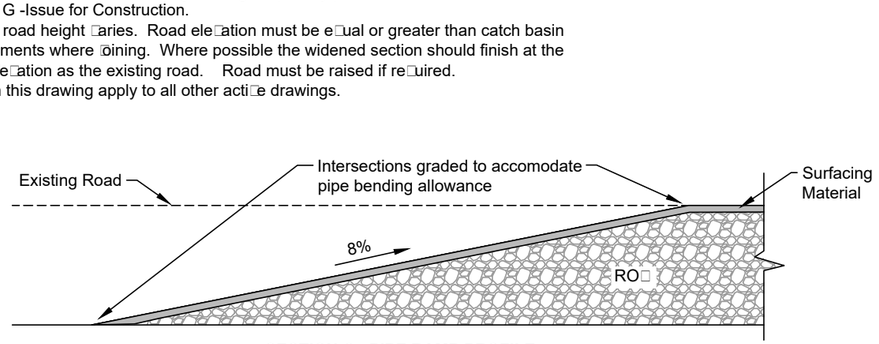
TMAC RESOURCES

srk consulting

PROJECT NO: 1CT022.020
Revision 0
March 21, 2017
Drawing CB-01

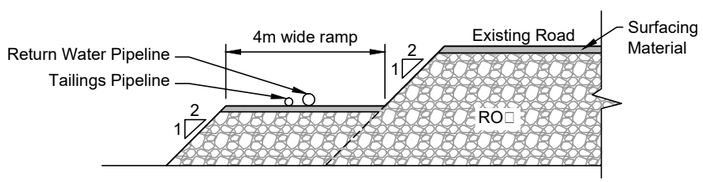
NOTES

1. All dimensions are in metric units, unless specifically mentioned.
2. All drawings are scaled appropriately for D-Si□e construction drawings. Scales may not be correct if these drawings are reproduced and presented in any other si□e format.
3. The Contractor and Construction Manager shall familiari□e themsel□es with all appropriate Licenses and□or Permits pertaining to execution of the Works. The Engineer will not be responsible for any infringements.
4. The Contractor is to take due care that no wildlife or birds□nest are disturbed during construction. The Construction Manager is to be immediately notified if such sites are found.
5. The Contractor will employ best practices to identify archaelogical sites, and maintain archaelogical site exclusion boundaries of 30m minimum radius from any of these works.
6. These works must be executed in accordance with the standard TMAC health and safety, and en□ironmental standards and protocols. It is the Contractors responsibility to familiari□e himself with these documents.
7. The final locations of the Tailings Catch Basins will be confirmed by the site engineer.
8. Tailings Catch Basins are to be located on the downstream side of the existing road within TIA catchment area.
9. The road will be widened at catch basin locations, to pro□ide space for the tailings pipeline and traffic protection boulders.
10. The final constructed containment □olume of the Tailings Catch Basins will be minimum of 120 m^3 to liner crest ele□ation.
11. The Contractor shall be responsible to maintain and clear snow from the roadway with out damaging□mo□ing the boulders or the tailings pipeline.
12. Snow shall ne□er be remo□ed from the Tailings Catch Basin to pre□ent damaging the geomembrane lining.
13. Sur□ey to be undertaken at placement of each material layer to enable □erification of layer thicknesses.
14. Construction shall be in accordance with the following Technical Specifications: Earthworks and Geotechnical Engineering, Hope Bay pro□ect, Nuna□ut, Canada, re□ision G -Issue for Construction.
15. Existing road height □aries. Road ele□ation must be e□ual or greater than catch basin embankments where □oining. Where possible the widened section should finish at the same ele□ation as the existing road. Road must be raised if re□uired.
16. Notes in this drawing apply to all other acti□e drawings.



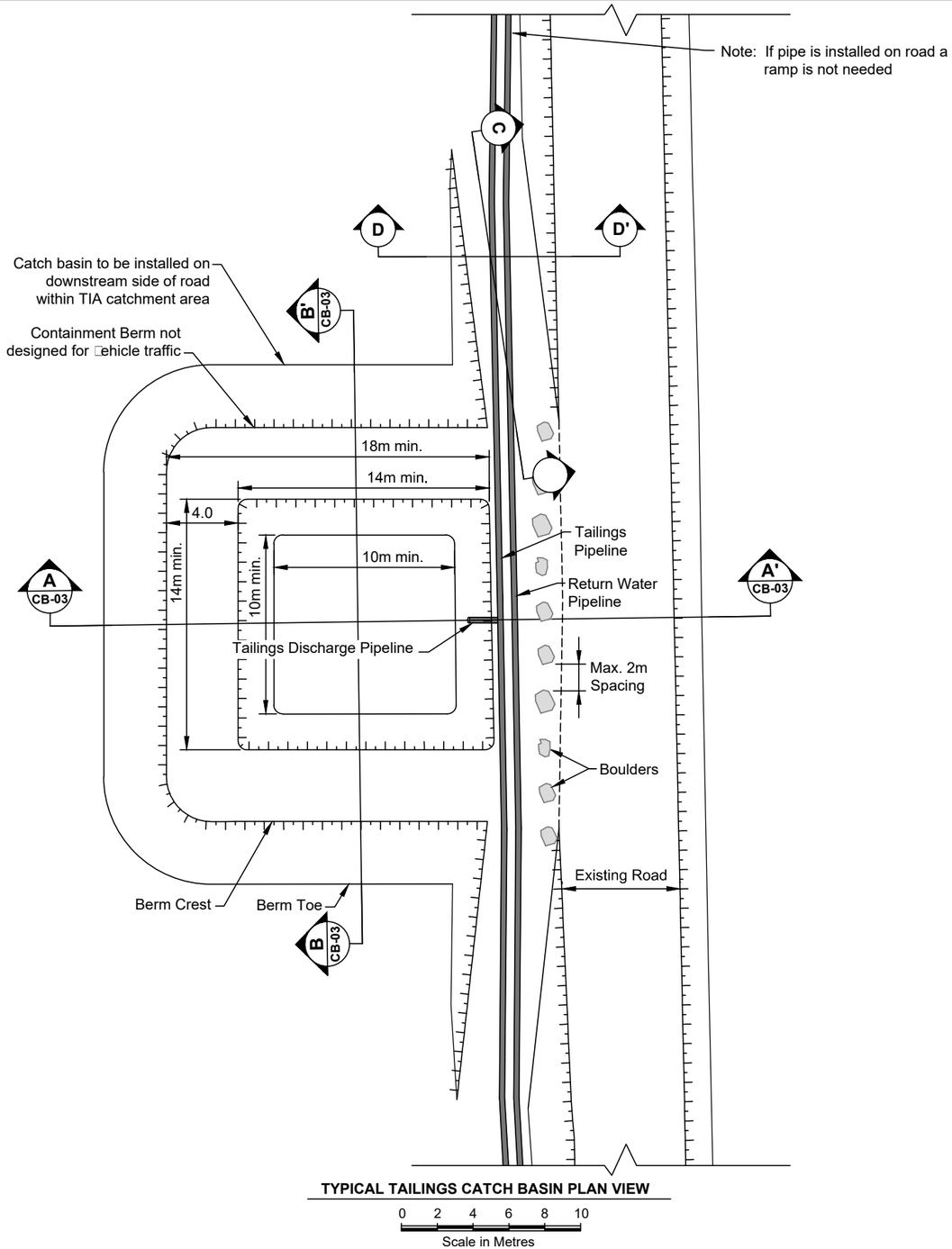
SECTION C - PIPE RAMP PROFILE

Not to Scale



SECTION D - PIPE RAMP CROSS SECTION

Not to Scale



TYPICAL TAILINGS CATCH BASIN PLAN VIEW

0 2 4 6 8 10

Scale in Metres

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CH'K'D	APP'D	DATE
0	Issued for Construction	CH	EMR	21Mar17

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
CH	NV	CH
CHECKED:	APPROVED:	DATE:
CH	EMR	Mar. 21, 2017

FILE NAME: 1CT022.020-1_Catch Basin.dwg

TMAC RESOURCES

HOPE BAY PROJECT

SRK JOB NO.: 1CT022.020

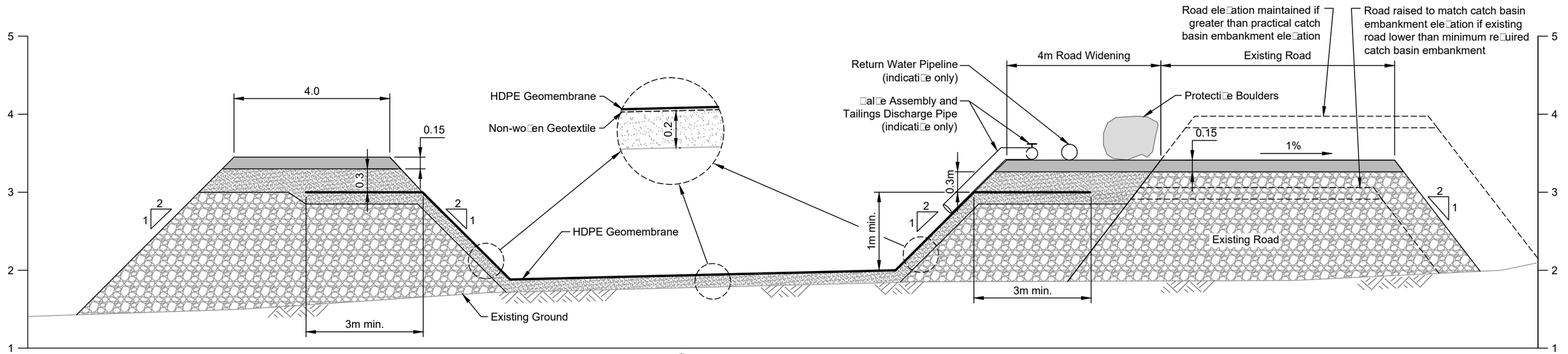
Tailings Catch Basin

DRAWING TITLE:

Typical Tailings Catch Basin Layout

DRAWING NO.	SHEET	REVISION NO.
CB-02	2 OF 3	0

\\ars-s-fs\Projects\01_SITES\Hope Bay\1CT022.004_Phase 2 DEIS - Engineering Support\040_AutoCAD\Madrid\N-TIA Road\1CT022.005-4_MN-TIA RD.dwg

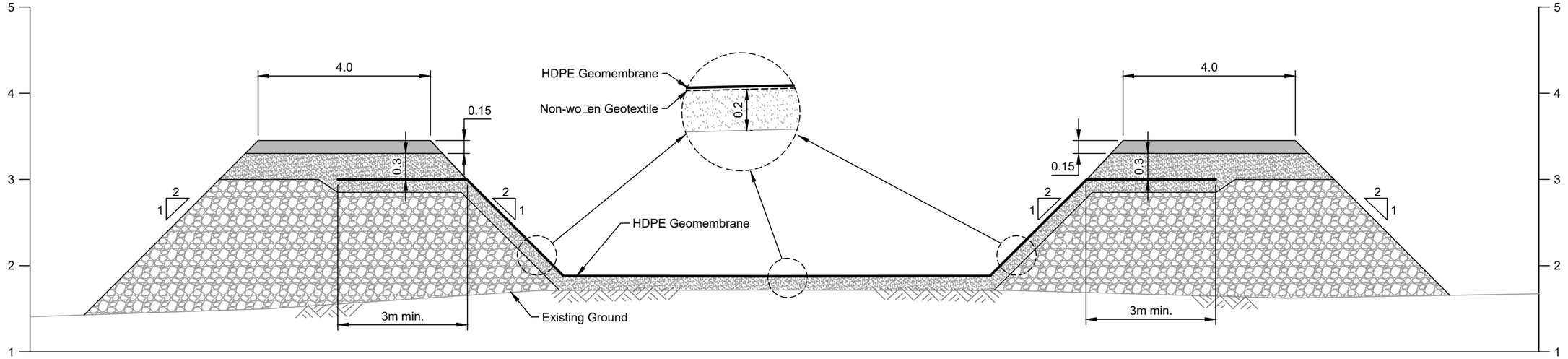


A
CB-02

SECTION A

0 1 2 3 4 5

Horizontal Scale in Metres
Vertical Exaggeration 2X



B
CB-02

SECTION B

0 1 2 3 4 5

Horizontal Scale in Metres
Vertical Exaggeration 2X

LEGEND

- Surfacing Material
- Bedding Material
- Run-of-Quarry Material
- 60 mil HDPE Geomembrane
- 12 oz Non-woven Geotextile

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS			

NO.	DESCRIPTION	CH'K'D	APP'D	DATE
0	Issued for Construction	CH	EMR	21Mar17

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
CH	NV	CH
CHECKED:	APPROVED:	DATE:
CH	EMR	Mar. 21, 2017

FILE NAME: 1CT022.020-1_Catch Basin.dwg

TMAC RESOURCES

HOPE BAY PROJECT

SRK JOB NO.: 1CT022.020

Tailings Catch Basin

DRAWING TITLE:

Typical Tailings Catch Basin Sections

DRAWING NO.	SHEET	REVISION NO.
CB-03	3 OF 3	0

\\ans-rd\Projects\01_SITES\Hope Bay\1CT022.004_Phase 2 DEIS - Engineering Support\040_AutoCAD\Madrid\N-TIA Road\1CT022.005-4_MN-TIA RD.dwg

Engineering Drawings for the Doris North Reagent Pad, Doris North Project, Nunavut, Canada

ACTIVE DRAWING STATUS

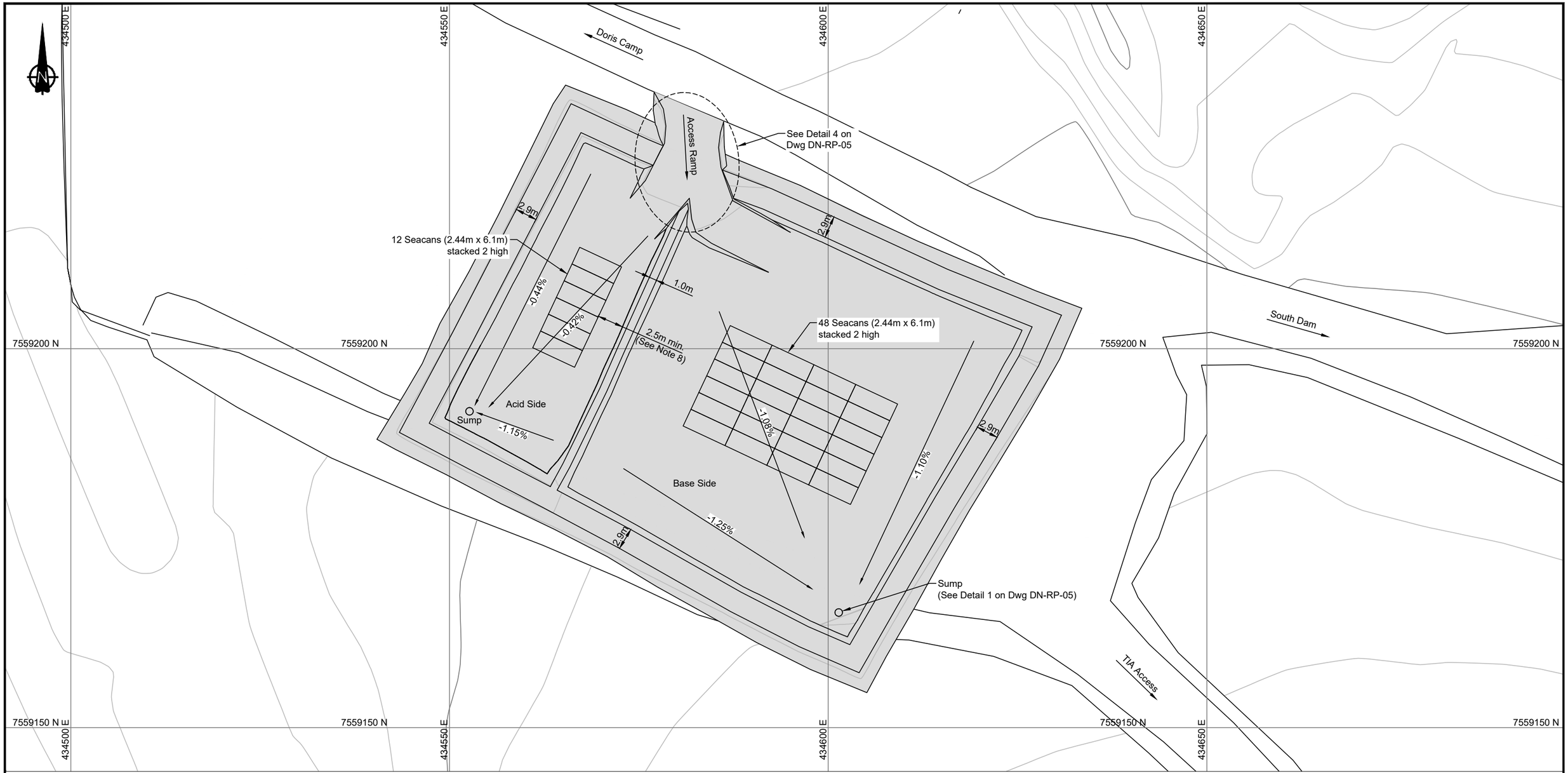
DWG NUMBER	DRAWING TITLE	REVISION	DATE	STATUS	PREVIOUS REVISION HISTORY		
DN-RP-00	Engineering Drawings for the Doris North Reagent Pad, Doris North Project, Nunavut, Canada	A	Oct. 13, 2016	Issued for Discussion			
DN-RP-01	Final Layout Design	A	Oct. 13, 2016	Issued for Discussion			
DN-RP-02	Reagent Pad Berms and Top of Bedding Material/Liner Plan Views	A	Oct. 13, 2016	Issued for Discussion			
DN-RP-03	Liner Protection Layer and Final Pad Floor Layout	A	Oct. 13, 2016	Issued for Discussion			
DN-RP-04	Sections	A	Oct. 13, 2016	Issued for Discussion			
DN-RP-05	Details	A	Oct. 13, 2016	Issued for Discussion			

TMAC RESOURCES

srk consulting

PROJECT NO: 1CT022.005
Revision A
October 13, 2016
Drawing DN-RP-00

C:\01_SITES\Hope Bay\Doris North\North Dom. Reagent Pad\1CT022.005.DN-RP-00.dwg



NOTES

1. The co-ordinate system is □TM NAD 83, Zone 13
2. All dimensions are in metric units, unless specifically mentioned.
3. Construction shall be in accordance with the following Technical Specifications: Earthworks and Geotechnical Engineering, Hope Bay Project, Nunavut, Canada, Revision G – Issued for Construction.
4. The design □ehicle for the facility is the Hyster HR45-40LS reach stacker.
5. Secans are to be placed two high.
6. Liner shall be deployed, seamed and repaired by a certified liner installer in accordance with the manufacturers specifications.
7. As-built pad surface pro□ided by TMAC.
8. Seacans should be placed a minimum of 2.5m from the toe of the containment berms to allow for snow clearing.

0 2 4 6 8 10
Scale in Metres

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
A	ISSUED FOR DISCUSSION	MMM	EMR	13Oct16

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
MMM	NV	MMM
CHECKED:	APPROVED:	DATE:
MMM	EMR	Oct. 13, 2016

FILE NAME: 1CT022.005-DN-RP-01-03.dwg

TMAC RESOURCES

DORIS NORTH PROJECT

SRK JOB NO.: 1CH022.005.300

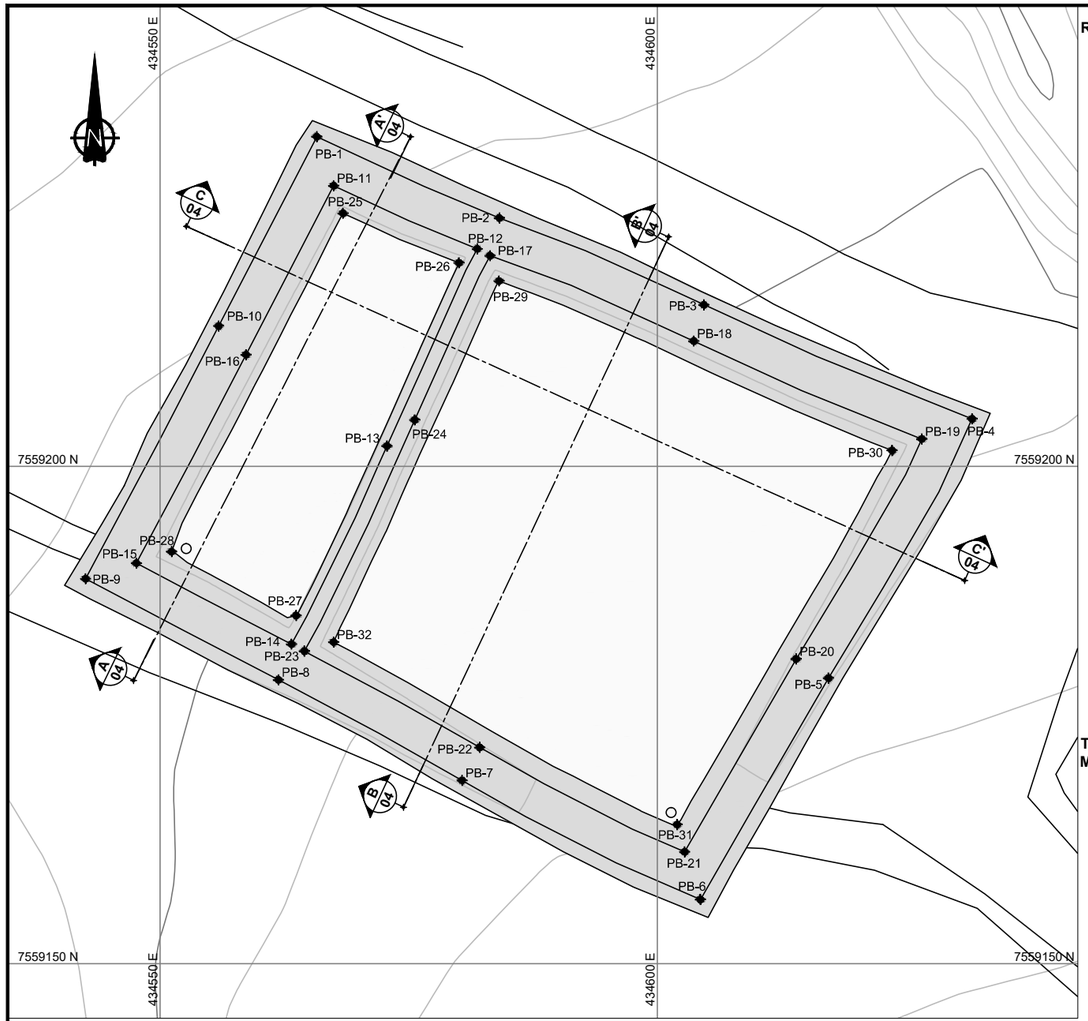
North Dam Reagent Pad

DRAWING TITLE:

Final Layout Design

DRAWING NO.	SHEET	REVISION NO.
DN-RP-01	2 of 6	A

C:\01_SITES\Hope Bay\Doris North\North Dam Reagent Pad\1CT022.005-DN-RP-01-03.dwg



REAGENT PAD BERMS

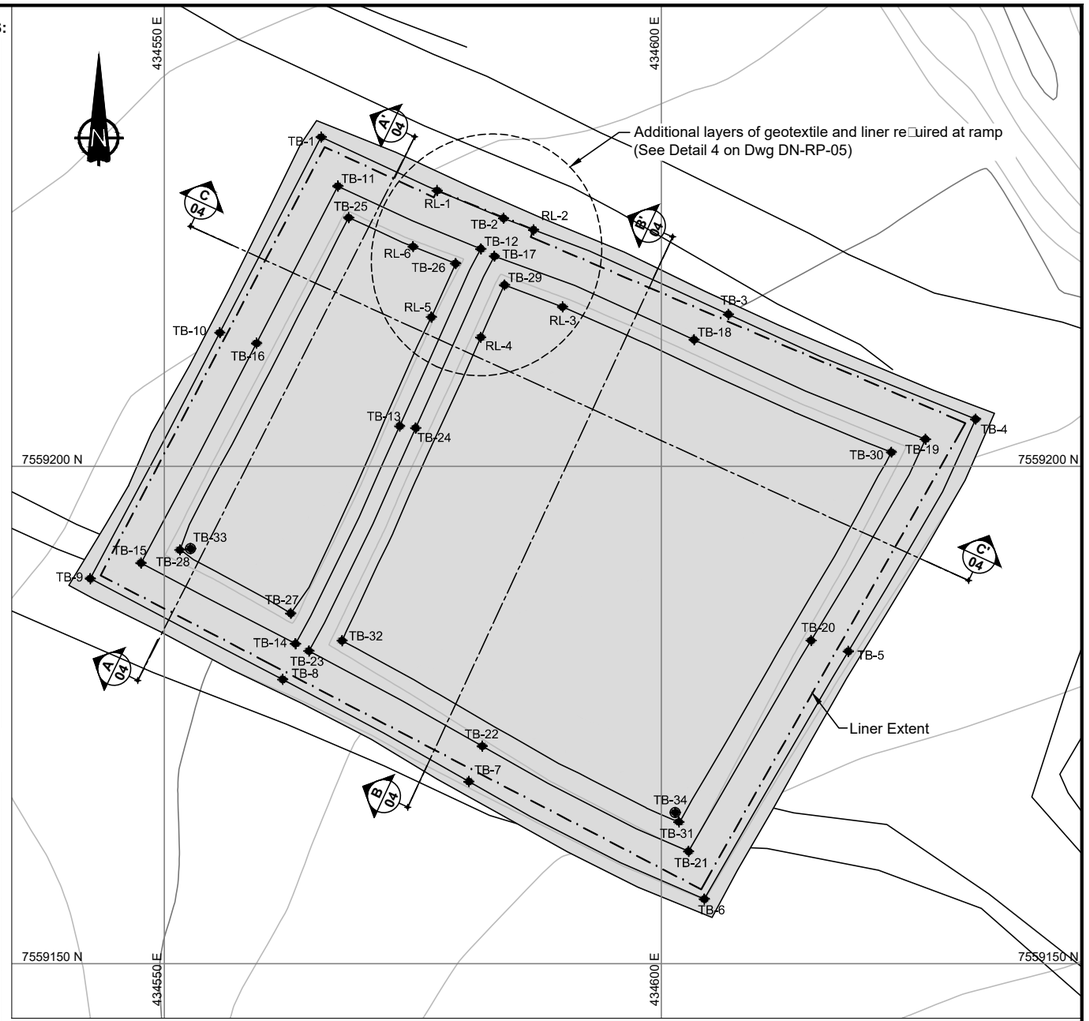
0 2 4 6 8 10
Scale in Metres

REAGENT PAD BERM STAKEOUT POINTS:

ID	Northing (m)	Easting (m)	Elevation (m)
PB-1	7,559,233.15	434,565.77	43.74
PB-2	7,559,224.97	434,584.13	43.64
PB-3	7,559,216.24	434,604.68	43.51
PB-4	7,559,204.77	434,631.66	43.52
PB-5	7,559,178.71	434,617.21	43.19
PB-6	7,559,156.45	434,604.34	42.88
PB-7	7,559,168.42	434,580.38	43.12
PB-8	7,559,178.54	434,561.91	43.59
PB-9	7,559,188.70	434,542.52	43.68
PB-10	7,559,214.11	434,555.90	43.62
PB-11	7,559,228.21	434,567.46	43.72
PB-12	7,559,221.87	434,581.90	43.54
PB-13	7,559,202.04	434,572.82	43.43
PB-14	7,559,182.12	434,563.22	43.59
PB-15	7,559,190.26	434,547.62	43.69
PB-16	7,559,211.22	434,558.65	43.61
PB-17	7,559,221.18	434,583.19	43.54
PB-18	7,559,212.59	434,603.67	43.47
PB-19	7,559,202.75	434,626.60	43.51
PB-20	7,559,180.63	434,613.97	43.19
PB-21	7,559,161.24	434,602.75	42.90
PB-22	7,559,171.74	434,582.15	43.13
PB-23	7,559,181.42	434,564.52	43.57
PB-24	7,559,204.67	434,575.62	43.45
PB-25	7,559,225.44	434,568.40	42.75
PB-26	7,559,220.47	434,580.06	42.70
PB-27	7,559,185.00	434,563.69	43.00
PB-28	7,559,191.43	434,551.17	42.47
PB-29	7,559,218.64	434,584.09	42.60
PB-30	7,559,201.59	434,623.61	42.51
PB-31	7,559,163.98	434,602.00	42.01
PB-32	7,559,182.32	434,567.46	42.53

TOP OF BEDDING MATERIAL STAKEOUT POINTS:

ID	Northing (m)	Easting (m)	Elevation (m)
TB-1	7,559,233.10	434,565.79	43.89
TB-2	7,559,224.94	434,584.12	43.79
TB-3	7,559,215.28	434,606.74	43.62
TB-4	7,559,204.75	434,631.61	43.67
TB-5	7,559,181.40	434,618.80	43.38
TB-6	7,559,156.49	434,604.32	43.03
TB-7	7,559,168.31	434,580.64	43.27
TB-8	7,559,178.57	434,561.92	43.74
TB-9	7,559,188.71	434,542.57	43.83
TB-10	7,559,213.44	434,555.60	43.77
TB-11	7,559,228.17	434,567.47	43.87
TB-12	7,559,221.86	434,581.85	43.69
TB-13	7,559,204.04	434,573.68	43.59
TB-14	7,559,182.16	434,563.21	43.74
TB-15	7,559,190.28	434,547.67	43.84
TB-16	7,559,212.37	434,559.29	43.77
TB-17	7,559,221.13	434,583.21	43.69
TB-18	7,559,212.73	434,603.30	43.62
TB-19	7,559,202.73	434,626.56	43.66
TB-20	7,559,182.49	434,615.06	43.37
TB-21	7,559,161.28	434,602.74	43.05
TB-22	7,559,171.87	434,581.99	43.28
TB-23	7,559,181.43	434,564.56	43.72
TB-24	7,559,203.85	434,575.29	43.59
TB-25	7,559,225.00	434,568.55	42.75
TB-26	7,559,220.39	434,579.31	42.70
TB-27	7,559,185.22	434,562.73	42.64
TB-28	7,559,191.59	434,551.58	42.55
TB-29	7,559,218.23	434,584.23	42.60
TB-30	7,559,201.42	434,623.14	42.51
TB-31	7,559,164.24	434,601.77	42.05
TB-32	7,559,182.47	434,567.89	42.53
TB-33	7,559,191.72	434,552.66	42.50
TB-34	7,559,165.19	434,601.40	42.02



RAMP LINER STAKEOUT POINTS:

ID	Northing (m)	Easting (m)	Elevation (m)
RL-1	7,559,227.73	434,577.45	43.83
RL-2	7,559,223.78	434,587.15	43.75
RL-3	7,559,216.03	434,590.07	42.58
RL-4	7,559,212.98	434,581.84	42.61
RL-5	7,559,215.00	434,576.87	42.86
RL-6	7,559,222.10	434,575.03	42.73

TOP OF BEDDING MATERIAL/LINER

0 2 4 6 8 10
Scale in Metres

NOTES

1. The co-ordinate system is □TM NAD 83, Zone 13.
2. All dimensions are in metric units, unless specifically mentioned.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
A	ISSUED FOR DISCUSSION	MMM	EMR	13Oct16

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
MMM	NV	MMM
CHECKED:	APPROVED:	DATE:
MMM	EMR	Oct. 13, 2016

FILE NAME: 1CT022.005-DN-RP-01-03.dwg

TMAC RESOURCES

DORIS NORTH PROJECT

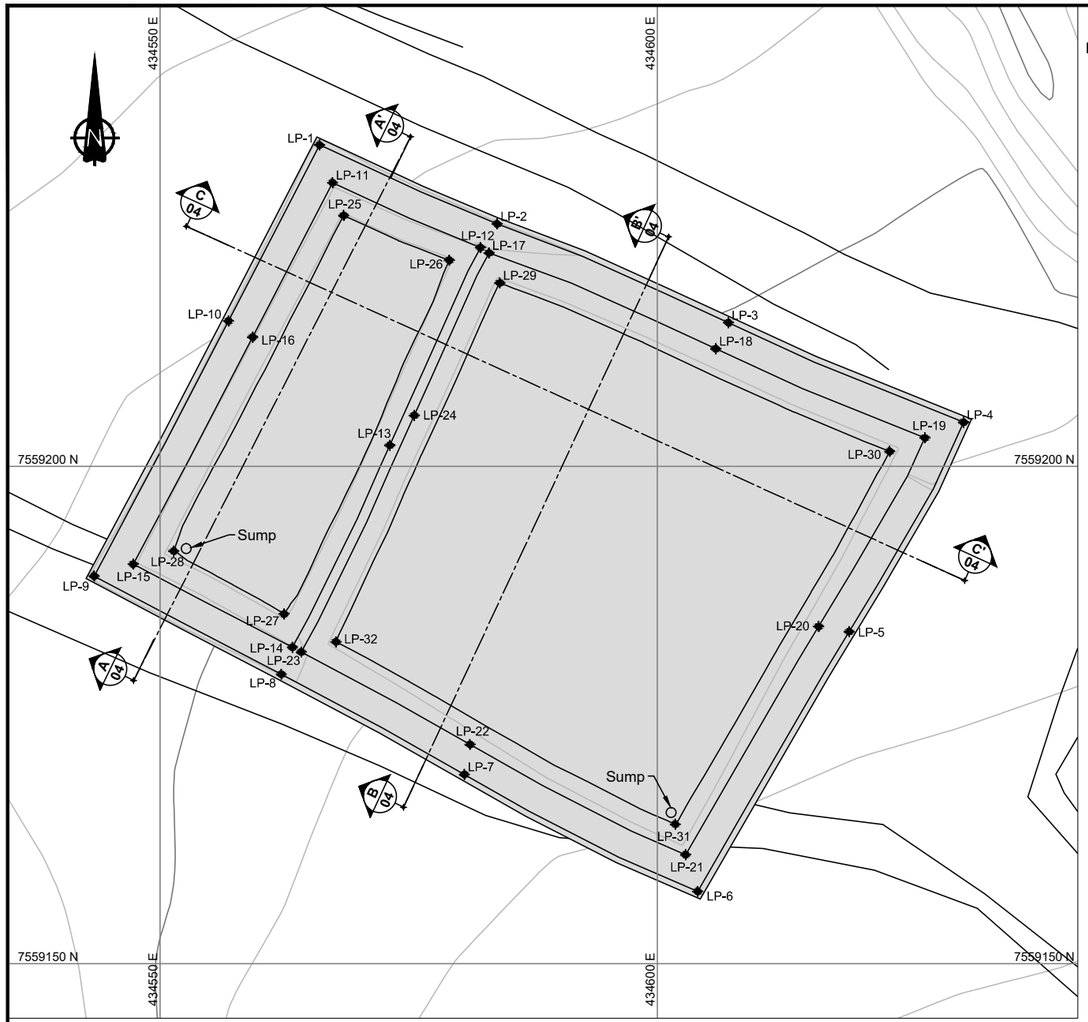
SRK JOB NO.: 1CH022.005.300

North Dam Reagent Pad

DRAWING TITLE:
Reagent Pad Berms and Top of Bedding Material□Liner Plan □iews

DRAWING NO.	SHEET	REVISION NO.
DN-RP-02	3 of 6	A

C:\01 - SITES\Hope Bay\Doris North\North Dam Reagent Pad\1CT022.005-DN-RP-01-03.dwg



LINER PROTECTION LAYER

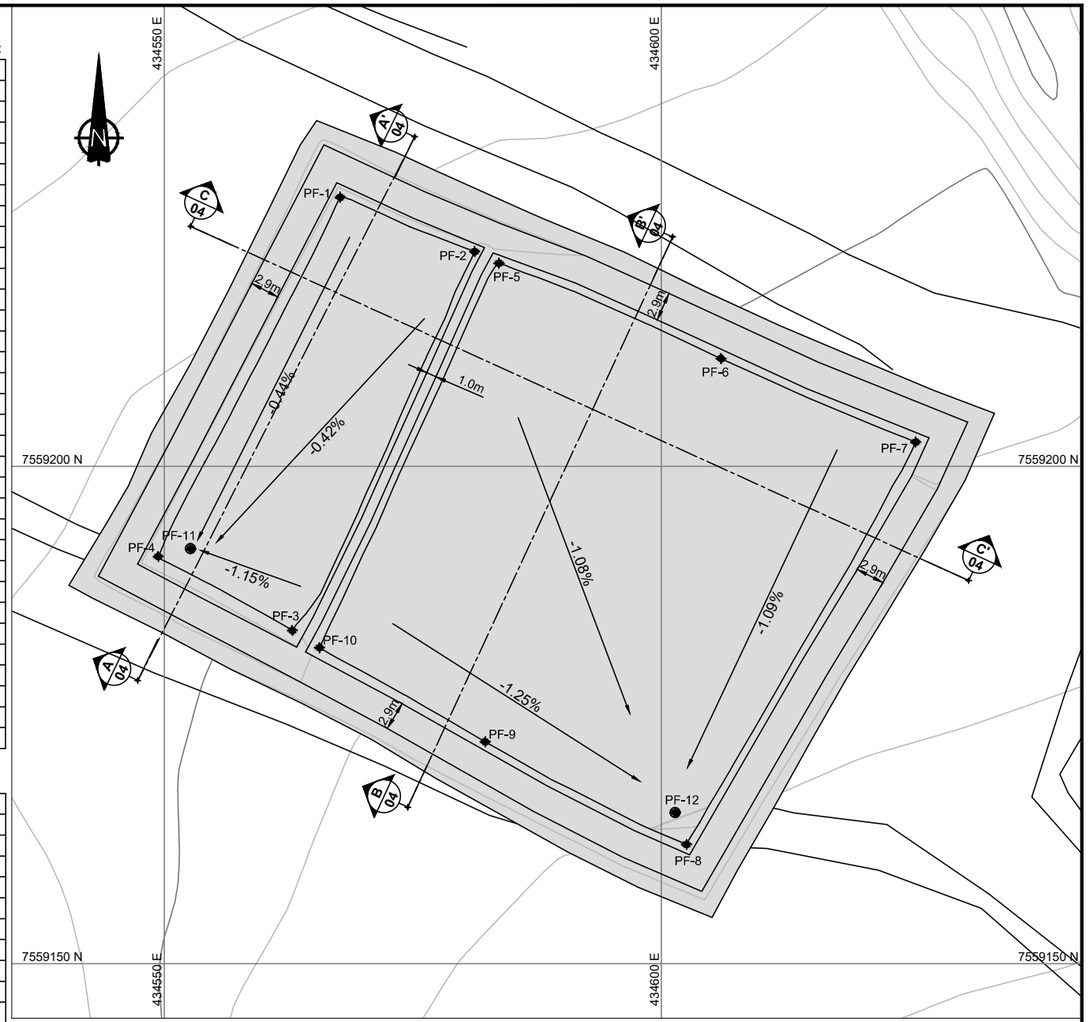
0 2 4 6 8 10
Scale in Metres

LINER PROTECTION STAKEOUT POINTS:

ID	Northing (m)	Easting (m)	Elevation (m)
LP-1	7,559,232.31	434,566.05	44.19
LP-2	7,559,224.38	434,583.90	44.09
LP-3	7,559,214.44	434,607.15	43.92
LP-4	7,559,204.43	434,630.80	43.97
LP-5	7,559,183.38	434,619.30	43.70
LP-6	7,559,157.26	434,604.07	43.33
LP-7	7,559,169.02	434,580.61	43.58
LP-8	7,559,179.10	434,562.20	44.04
LP-9	7,559,188.96	434,543.38	44.13
LP-10	7,559,214.62	434,556.89	44.07
LP-11	7,559,228.52	434,567.35	44.17
LP-12	7,559,221.99	434,582.22	43.99
LP-13	7,559,202.12	434,573.11	43.88
LP-14	7,559,181.81	434,563.31	44.04
LP-15	7,559,190.17	434,547.31	44.14
LP-16	7,559,212.99	434,559.31	44.07
LP-17	7,559,221.46	434,583.08	43.99
LP-18	7,559,211.82	434,605.89	43.92
LP-19	7,559,202.87	434,626.91	43.96
LP-20	7,559,183.90	434,616.22	43.69
LP-21	7,559,160.95	434,602.85	43.35
LP-22	7,559,172.04	434,581.17	43.60
LP-23	7,559,181.33	434,564.20	44.02
LP-24	7,559,205.12	434,575.57	43.90
LP-25	7,559,225.22	434,568.47	42.93
LP-26	7,559,220.72	434,579.09	42.88
LP-27	7,559,185.16	434,562.47	42.81
LP-28	7,559,191.48	434,551.38	42.67
LP-29	7,559,218.44	434,584.17	42.78
LP-30	7,559,201.50	434,623.37	42.68
LP-31	7,559,164.02	434,601.81	42.20
LP-32	7,559,182.35	434,567.69	42.70

FINAL PAD FLOOR STAKEOUT POINTS:

ID	Northing (m)	Easting (m)	Elevation (m)
PF-1	7,559,227.05	434,567.70	43.68
PF-2	7,559,221.59	434,581.23	43.64
PF-3	7,559,183.49	434,562.89	43.42
PF-4	7,559,190.93	434,549.40	43.45
PF-5	7,559,220.42	434,583.67	43.61
PF-6	7,559,210.83	434,606.00	43.50
PF-7	7,559,202.44	434,625.58	43.52
PF-8	7,559,161.98	434,602.53	43.05
PF-9	7,559,172.30	434,582.29	43.20
PF-10	7,559,181.76	434,565.62	43.48
PF-11	7,559,191.72	434,552.66	43.40
PF-12	7,559,165.19	434,601.40	42.95



FINAL PAD FLOOR LAYOUT

0 2 4 6 8 10
Scale in Metres

NOTES

1. The co-ordinate system is □TM NAD 83, Zone 13.
2. All dimensions are in metric units, unless specifically mentioned.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
A	ISSUED FOR DISCUSSION	MMM	EMR	13Oct16

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
MMM	NV	MMM
CHECKED:	APPROVED:	DATE:
MMM	EMR	Oct. 13, 2016

FILE NAME: 1CT022.005-DN-RP-01-03.dwg

TMAC RESOURCES

DORIS NORTH PROJECT

SRK JOB NO.: 1CH022.005.300

North Dam Reagent Pad

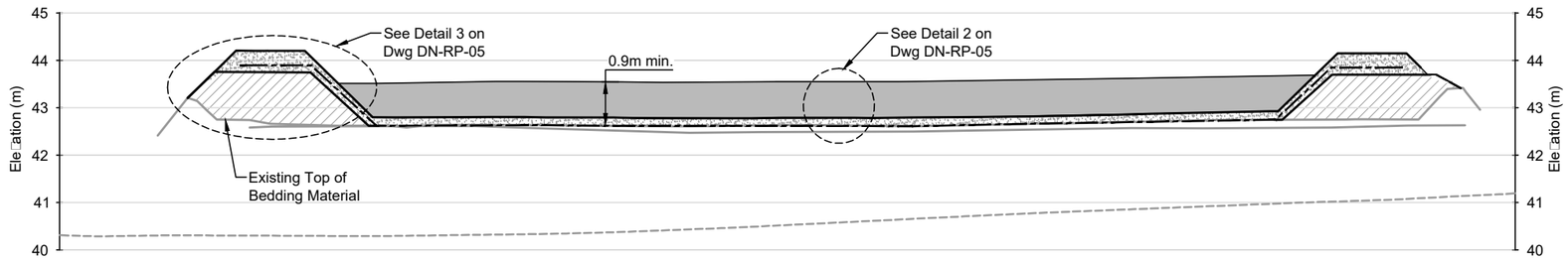
DRAWING TITLE:
Liner Protection Layer
and Final Pad Floor Layout

DRAWING NO.	SHEET	REVISION NO.
DN-RP-03	2 of 6	A

C:\01_SITES\Hope Bay\Doris North\North Dam Reagent Pad\1CT022.005-DN-RP-01-03.dwg

LEGEND

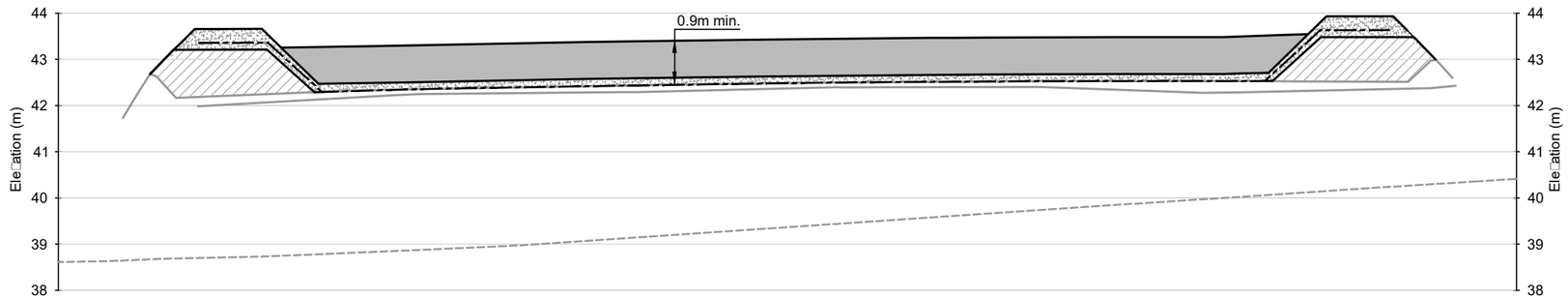
- Surfacing Material
- Bedding Material
- Transition Material
- HDPE Liner
- Reagent Pad Design
- Existing Ground
- Original Ground



A/02 **SECTION A**

0 1 2 3 4 5

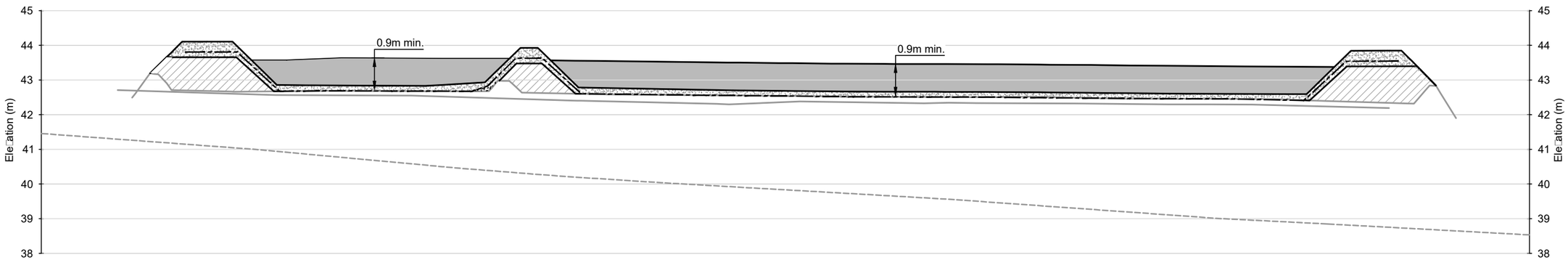
Horizontal Scale in Metres
Vertical Exaggeration 2X



B/02 **SECTION B**

0 1 2 3 4 5

Horizontal Scale in Metres
Vertical Exaggeration 2X



C/02 **SECTION C**

0 1 2 3 4 5

Horizontal Scale in Metres
Vertical Exaggeration 2X

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
A	ISSUED FOR DISCUSSION	MMM	EMR	13Oct16

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
MMM	NV	MMM
CHECKED:	APPROVED:	DATE:
MMM	EMR	Oct. 13, 2016

FILE NAME: 1CT022.005-DN-RP-01-03.dwg

TMAC RESOURCES

DORIS NORTH PROJECT

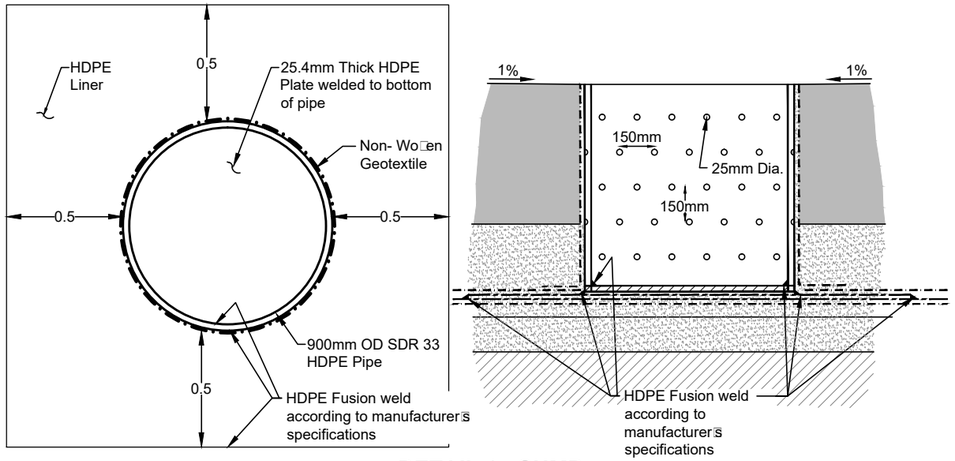
SRK JOB NO.: 1CH022.005.300

North Dam Reagent Pad

DRAWING TITLE: Sections

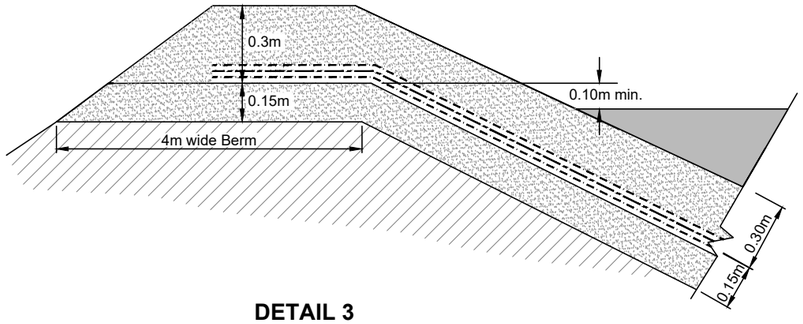
DRAWING NO.	SHEET	REVISION NO.
DN-RP-04	5 of 6	A

C:\01_SITES\Hope Bay\Doris North\North Dam Reagent Pad\1CT022.005-DN-RP-01-03.dwg



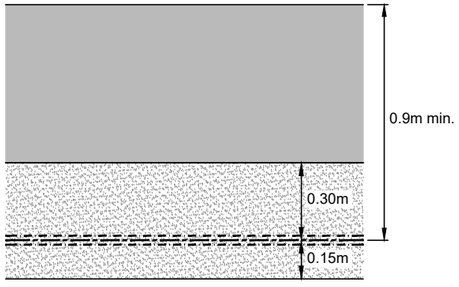
DETAIL 1 - SUMP

NTS



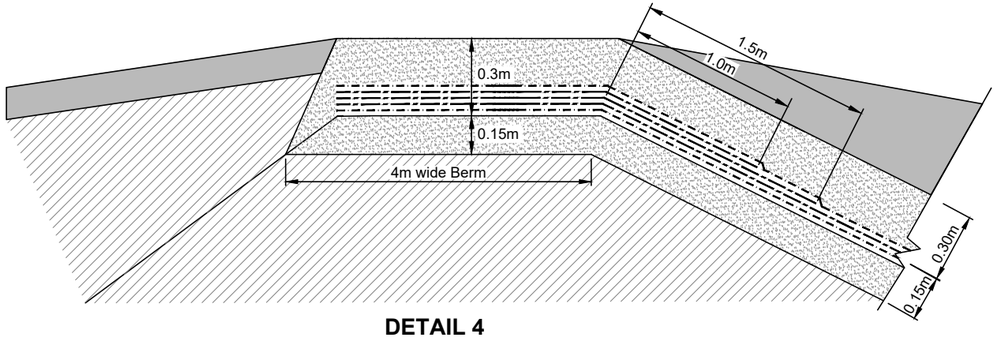
DETAIL 3
TYPICAL LINER SYSTEM AT CONTAINMENT BERM

NTS



DETAIL 2
TYPICAL LINER SYSTEM

NTS



DETAIL 4
TYPICAL LINER SYSTEM AT ACCESS RAMP

NTS

LEGEND

- Surfacing Material
- Bedding Material
- Transition Material
- Run of □uarry Material
- Rip Rap
- Non-wo□en Geotextile (385g□m^2)
- 60 mil HDPE Liner

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
A	ISSUED FOR DISCUSSION	MMM	EMR	13Oct16

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
MMM	NV	MMM
CHECKED:	APPROVED:	DATE:
MMM	EMR	Oct. 13, 2016

FILE NAME: 1CT022.005-DN-RP-01-03.dwg

TMAC RESOURCES

DORIS NORTH PROJECT

SRK JOB NO.: 1CH022.005.300

North Dam Reagent Pad

DRAWING TITLE: Details

DRAWING NO.	SHEET	REVISION NO.
DN-RP-05	6 of 6	A

C:\01_SITES\Hope Bay\Doris North\North Dam Reagent Pad\1CT022.005-DN-RP-01-03.dwg

Engineering Drawings for the Doris North Airstrip Expansion, Doris North Project, Nunavut, Canada

ACTIVE DRAWING STATUS

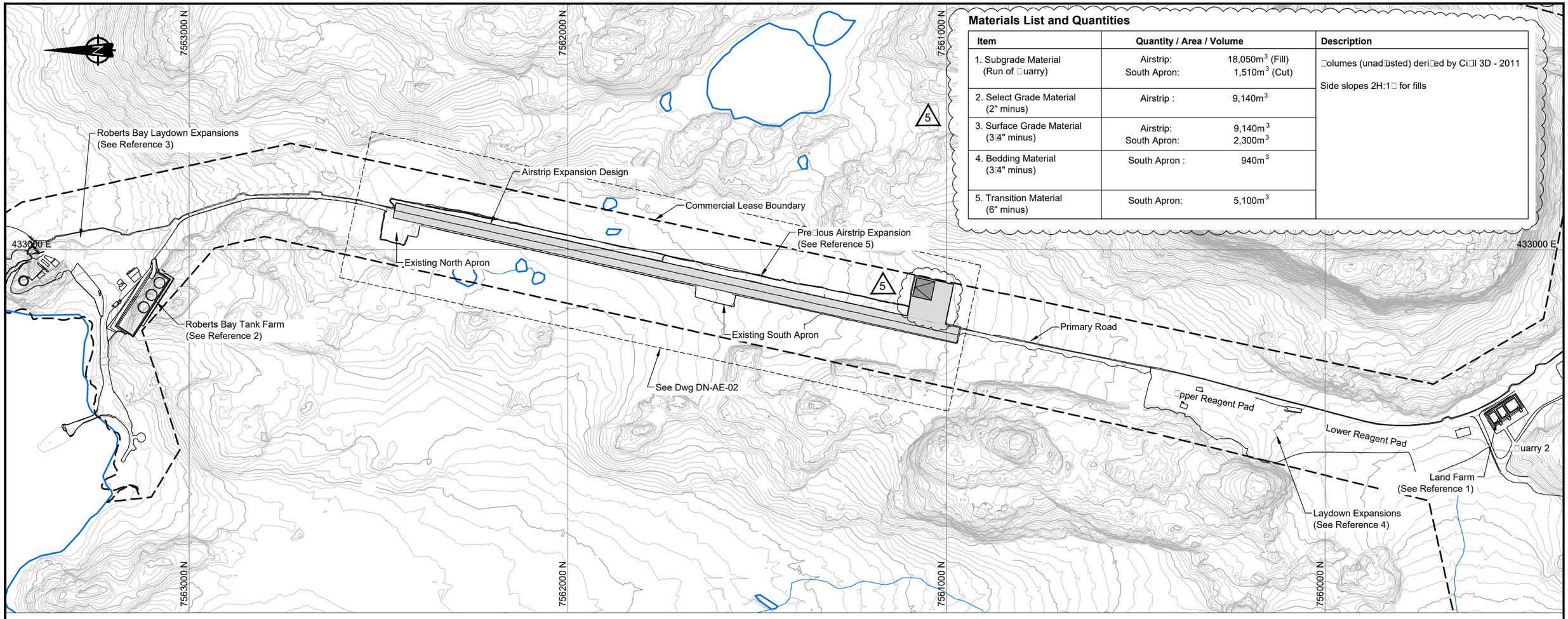
DWG NUMBER	DRAWING TITLE	REVISION	DATE	STATUS	PREVIOUS REVISION HISTORY			
DN-AE-00	Engineering Drawings for the Doris North Airstrip Expansion, Doris North Project, Nunavut, Canada	5	Oct. 7, 2016	South Apron Updates	Rev. 4, Oct. 4, 2016	Rev. 3, June 24, 2016	Rev. 2, Feb. 10, 2016	Rev. 1, Oct. 22, 2015
DN-AE-01	General Arrangement	5	Oct. 7, 2016	South Apron Updates	Rev. 4, Oct. 4, 2016	Rev. 3, June 24, 2016	Rev. 2, Feb. 10, 2016	Rev. 1, Oct. 22, 2015
DN-AE-02	Airstrip Expansion - Plan and Centerline Profile	5	Oct. 7, 2016	South Apron Updates	Rev. 4, Oct. 4, 2016	Rev. 3, June 24, 2016	Rev. 2, Feb. 10, 2016	Rev. 1, Oct. 22, 2015
DN-AE-03	Airstrip Expansion - Sections	1	Oct. 22, 2015	Runway Crowned	Rev. 0, Oct. 19, 2015	Rev. A, Oct. 14, 2015		
DN-AE-04	Obstacle Limitation Surfaces	3	June 24, 2016	South Apron Addition	Rev. 2, Feb. 10, 2016	Rev. 1, Oct. 22, 2015		
DN-AE-05	Airstrip Expansion South Apron - Plan, Sections and Details	2	Oct. 7, 2016	South Apron Updates	Rev. 1, Oct. 4, 2016	Rev. 0, June 24, 2016		
DN-AE-06	Airstrip Expansion South Apron Stakeout Point Plans	2	Oct. 7, 2016	South Apron Updates	Rev. 1, Oct. 4, 2016	Rev. 0, June 24, 2016		
DN-AE-07	Airstrip Expansion South Apron Final Layout and Stakeout Points	1	Oct. 7, 2016	South Apron Updates	Rev. 0, Oct. 4, 2016			

TMAC RESOURCES

srk consulting

PROJECT NO: 1CT022.005.300
Re□ision 5
October 7, 2016
Drawing DN-AE-00

C:\01_SITES\Hope Bay\Doris North\Airstrip Expanded\1CT022.005.300_ND-AE-00 Rev5.dwg



Materials List and Quantities

Item	Quantity / Area / Volume		Description
1. Subgrade Material (Run of □uarry)	Airstrip: South Apron:	18,050m^3 (Fill) 1,510m^3 (Cut)	□olumes (unad□usted) deri□ed by Ci□il 3D - 2011 Side slopes 2H:1□ for fills
2. Select Grade Material (2" minus)	Airstrip :	9,140m^3	
3. Surface Grade Material (3⁄4" minus)	Airstrip: South Apron:	9,140m^3 2,300m^3	
4. Bedding Material (3⁄4" minus)	South Apron :	940m^3	
5. Transition Material (6" minus)	South Apron:	5,100m^3	

NOTES

1. The designs are based on the contour information shown on these drawings. It is howe□er the Contractor□s responsibility to confirm that the contours are a fair reflection of the ground le□els in the □icinity of the works, and to ad□ise the Construction Manager and Engineer of any differences.
2. The co-ordinate system is □TM NAD 83, Zone 13.
3. All dimensions are in metric units, unless specifically mentioned.
4. All drawings are scaled appropriately for D-Si□e construction drawings. Scales may not be correct if these drawings are reproduced and presented in any other si□e format.
5. The Engineer will pro□ide the Construction Manager and Contractor with digital design files for setting out the works.
6. The Contractor and Construction Manager shall familiari□e themsel□es with all appropriate Licenses and⁄or Permits pertaining to execution of the Works. The Engineer will not be responsible for any infringements.
7. The Contractor is to take due care that no wildlife or birds□nest are disturbed during construction. The Construction Manager is to be immediately notified if such sites are found.
8. The Contractor will employ best practices to identify archaelogical sites, and maintain archaelogical site exclusion boundaries of 30m minimum radius from any of these works.
9. These works must be executed in accordance with the standard TMAC health and safety, and en□ironmental standards and protocols. It is the Contractors responsibility to familiari□e himself with these documents.
10. Construction shall be in accordance with the following Technical Specifications: Earthworks and Geotechnical Engineering, Hope Bay pro□ect, Nuna□ut, Canada, re□ision G -Issue for Construction.
11. The airstrip expansion alignment and dimensions were pro□ided by TMAC are as follows:
    - The Airstrip will ha□e a total length of 5,000 feet (1,524 m) starting at the north end of the existing airstrip.
    - Airstrip will ha□e a total width of 131 feet (40 m) with the west shoulder remaining unchanged from the existing airstrip.
    - The Airstrip will ha□e a minimum fill thickness of 1 m
    - The Airstrip will not be crowned but will be graded at 2% from east to west
    - The Airstrip shoulders will ha□e side slopes of 2H:1□
    - The North Apron remains unchanged
    - The Airstrip will be constructed using Run of □uarry as subgrade material, 2 inch (51 mm) minus as Select Grade Material, and ¾ inch (19 mm) minus as Surfacing Grade Material
12. Notes in this drawing apply to all other acti□e drawings.

REFERENCES

1. SRK Consulting (Canada) Inc., 2012. Engineering Drawings for the Doris North Land Farm, Doris North Pro□ect, Nuna□ut, Canada. Re□ision AB. As-Built Drawings Prepared for Hope Bay Mining Limited. Pro□ect Number 1CH008.033□058. April 20, 2012
2. SRK Consulting (Canada) Inc., 2012. Engineering Drawings for the Roberts Bay Fuel Tank Farm, Doris North Pro□ect, Nuna□ut, Canada. Re□ision AB. As-Built Drawings Prepared for Hope Bay Mining Limited. Pro□ect Number 1CH008.033. April 18, 2012
3. SRK Consulting (Canada) Inc., 2011. Engineering Drawings for the Roberts Bay Laydown Area, Doris North Pro□ect, Nuna□ut, Canada. Re□ision AB. As-Built Drawings Prepared for Hope Bay Mining Limited. Pro□ect Number 1CH008.027□033, December 16, 2011
4. SRK Consulting (Canada) Inc., 2011. Engineering Drawings for the Laydown Expansions, Doris North Pro□ect, Nuna□ut, Canada. Re□ision AB. As-Built Drawings Prepared for Hope Bay Mining Limited. Pro□ect Number 1CH008.027, December 16, 2011
5. SRK Consulting (Canada) Inc., 2011. Engineering Drawings for the Airstrip Expansion □ Bypass Road, Doris North Pro□ect, Nuna□ut, Canada. Re□ision D. Issued for Re□iew Drawings Prepared for Hope Bay Mining Limited. Pro□ect Number 1CH008.033, July 26, 2011

LEGEND

- Proposed Airstrip Expansion
- Lease Boundary
- 0+000 Chainage
- Existing Roads and Infrastructure
- Lakes, Ponds or Permanent Water Bodies

0 50 100 150 200 250
Scale in Metres

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS			

NO.	DESCRIPTION	CHK'D	APP'D	DATE
5	SOUTH APRON UPDATES	MMM	EMR	70ct16
4	SOUTH APRON UPDATES	MMM	EMR	40ct16
3	SOUTH APRON ADDITION	KK	EMR	24Jun16
2	RUNWAY EXTENDED	EMR	EMR	10Feb16
1	RUNWAY CROWNED	LW	EMR	22Oct15
0	ISSUED FOR CONSTRUCTION	LW	EMR	19Oct15
A	ISSUED FOR DISCUSSION	LW	EMR	17Oct15

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
TMAC	NV	EMR
CHECKED:	APPROVED:	DATE:
EMR	EMR	Oct. 7, 2016

FILE NAME: 1CT022.005.300_ND-AE-01-05 Rev5.dwg

TMAC RESOURCES

DORIS NORTH PROJECT

SRK JOB NO.: 1CH022.005.300

Airstrip Expansion

DRAWING TITLE:

General Arrangement

DRAWING NO.	SHEET	REVISION NO.
DN-AE-01	2 OF 7	5

C:\01_SITES\Hope Bay\Doris North\Airstrip Expanded\1CT022.005.300_ND-AE-01-05 Rev 5.dwg