Technical Memorandum

To:	Rowland Howe (Atlas Salt Inc.)	**From:**	Mathi Shan and Luis Vasquez
		Review:	Mathi Shan
Company:	SLR Consulting (Canada) Ltd.	**SLR Consulting (Canada) Ltd.**	
		Date:	November 23, 2023
		Project No.	233.03447.R0000

RE: **Design of Waste & Temporary Salt Stockpiles and Site Water Management Infrastructure**
Great Atlantic Salt Project Feasibility Study

1.0 Introduction

SLR Consulting (Canada) Limited (SLR) was retained by Atlas Salt Inc (Atlas) to develop a feasibility design of the proposed Great Atlantic Salt Project (the Project or GAS Project), located in the province of Newfoundland and Labrador (NL), Canada. A Preliminary Economic Assessment (PEA) for the Project was completed by SLR in March 2023 and Atlas is advancing the Project to a Feasibility Study (FS) level.

This memorandum summarizes the design basis, inputs, and results for the Project's waste rock stockpile, temporary salt stockpile, and associated water management structures.

2.0 Project Understanding

The Project is located within the town limits of St. George's, NL. Previously, production of gypsum has taken place within the GAS Project property by various ventures since 1952. The proposed Project to mine out de-icing salt involves box cut, waste stockpile, temporary salt stockpile, administration building, access roads, overland conveyor, and transmission lines. Figure 1 shows the general site layout.

2.1 Topography

The site is located within the St. George's Bay Lowlands on a gently sloping (in a north-northwesterly direction) ground with an elevation variation from 40 m above sea level (MASL) to 50 MASL. Within the property, there are numerous streams, ponds, and bogs. An extensive plateau of bogs exists to the southeast of the property.

LEGEND

- EXISTING EXPLORATION HOLES
- GEOTECHNICAL HOLES
- PORTAL GEOTECHNICAL TEST HOLES
- BUILDING
- CULVERT

NOTES:

1. FOR OVERALL SITE PLAN, REFER TO DRAWING H21261-0000-G-DWG-001.
2. FOR PORTAL BOXCUT PROFILE, REFER TO DRAWING H21270-2300-G-DWG-002.

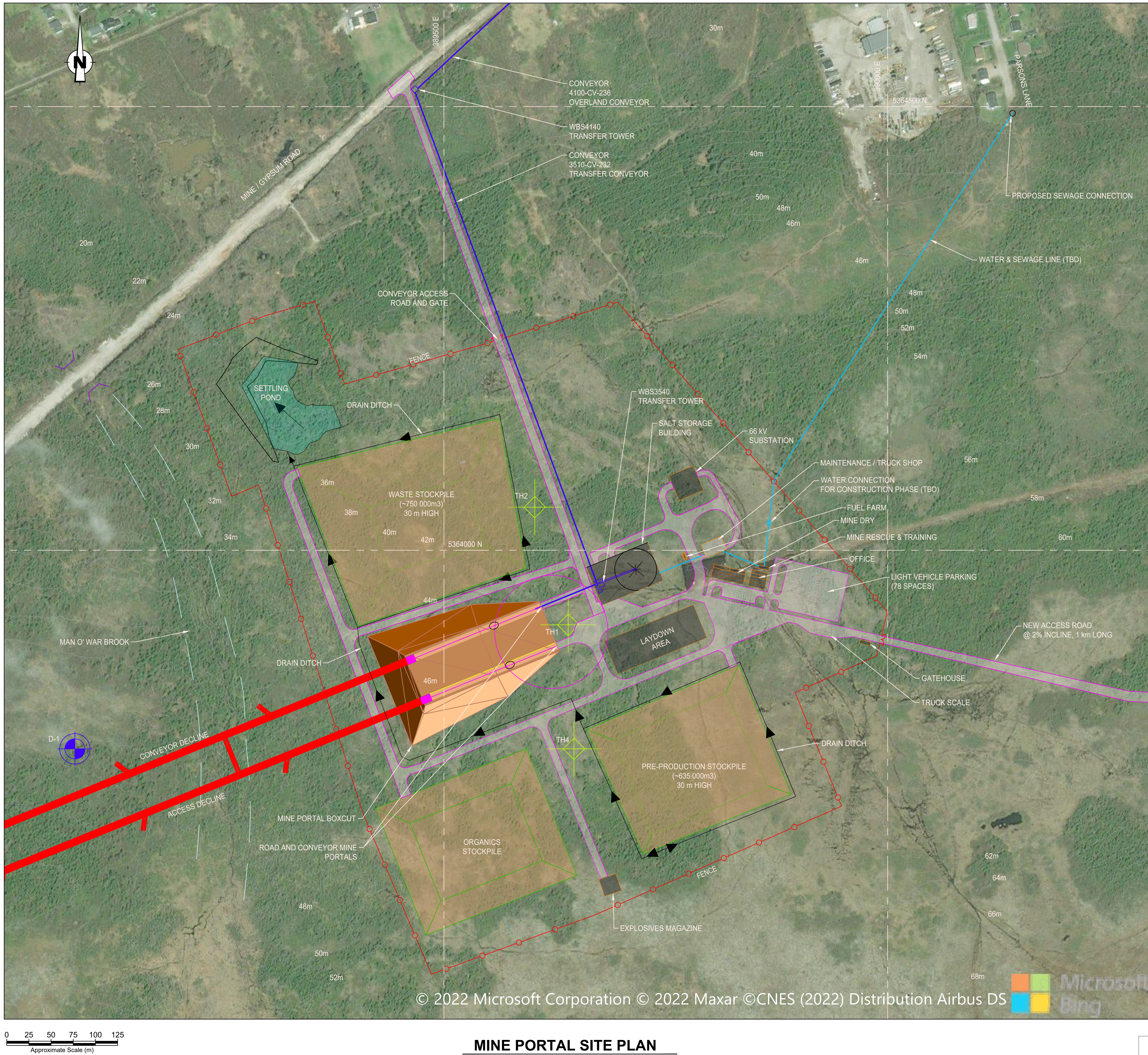


FIGURE 1

MINE PORTAL SITE PLAN

SCALE: 1:2500

REFERENCE DRAWINGS		REVISIONS			
Number	Description	Rev.	Change	Name	Date
		A	ISSUED FOR CLIENT REVIEW	B.MAYO	2023.05.11
		B	RE-ISSUED FOR REVIEW. VARIOUS COMMENTS IMPLEMENTED.	A.A.	2023.06.01
		C	ISSUED FOR APPROVAL	A.A.	2023.06.14
		D	ISSUED FOR USE	A.A.	2023.07.04

SLR | HALYARD

	DATE	NAME
SIZE A1	SCALE AS NOTED	
CLIENT	2022.09.13	L.ENGELBRECHT
PROJ. MNGR	2023.05.11	A.LECKER
PROJECT ENG		
PROCESS ENG		
DESIGN ENG.	2023.05.11	A.LECKER
CHECKED	2023.05.11	A.LECKER
DRAWN	2022.09.09	B.MAYO

CLIENT: ATLAS SALT

DESCRIPTION: GREAT ATLANTIC SALT FEASIBILITY STUDY PORTAL SITE PLAN

PROJECT No	DRAWING NUMBER	SHEET	Rev.
H21261	H21261-3000-G-DWG-001	1OF1	D

2.2 Seismicity

The site is located in an area of relatively low seismicity in Western Newfoundland. The Peak Horizontal Ground Acceleration (PGA), the maximum ground acceleration at a certain location during an earthquake, for the 1 in 2,475-year return period, based on the 2020 National Building Code Seismic Hazard Calculation, is 0.047g (see Figure A1 in Appendix A).

2.3 Geochemistry

Geochemistry of the ore and mine rock materials was not discussed in detail in the information provided to SLR. For the FS, it is envisaged that the temporary salt storage (the pre-production stockpile) will be covered with heavy duty poly tarps to minimize leachate. No water treatment is planned.

3.0 Basis of Design

3.1 Regulations and Guidelines

The engineering design of the waste storage and temporary salt stockpiles will be consistent with Atlas' internal requirements and Canadian regulatory requirements. The relevant regulations and technical guidelines that govern the design comprise of the following documents:

- Canadian Dam Association, 2007, "Dam Safety Guidelines". Revised 2013, CDA Publication.
- Canadian Dam Association, 2014, "Application of Dam Safety Guidelines to Mining Dams", CDA Publication.
- Newfoundland and Labrador Mining Act SNL 1999 Chapter M-15.1.

3.2 Design Criteria

Table 1 summarizes the design basis developed based on input from other engineering disciplines. The feasibility design presented in this memorandum should be revisited in the event any parameters identified in Table 1 are revised. Table 1 also summarizes the design criteria for geotechnical and environmental design of stockpiles and water management facilities.

Of note, the pre-production stockpile will be placed on an impermeable liner and covered with tarps when operational, to conform with the Code of Practice for the Environmental Management of Road Salt.

Table 1: Waste and Water Management Design Basis and Criteria

Design Parameter	Design Input	Source or Calculation
Mine Plan		
Initial Mine Life	30 years	PEA[1] report on GAS Project
Volume of overburden waste (in situ)	184,000 m^3	Per email communication with SLR Mining Advisory. The material to be used for site grading.

Design Parameter	Design Input	Source or Calculation
Silty sand till - swell factor	1.05	Assumed. Note: The organics pile was designed by others.
Volume of Waste Rock (in situ)	286,114 m^3	Per email communication with SLR Mining Advisory.
Waste Rock - swell factor	1.3	Assumed
Salt Rock - swell factor	1.3	Assumed
Waste Rock and Temporary Ore Stockpile		
Maximum Pile Height - Waste Rock Stockpile	28 m	Based on Muk3D model. Ramps, berms, and truck details to be designed by others, considering mine design.
Maximum Pile Height - Temporary Ore Stockpile	15 m	Based on Muk3D model. Ramps, berms, and truck details to be designed by others, considering mine design.
Settling Pond		
Hazard Potential Classification (HPC)	Low	CDA (2013)
Crest width	5 m	Constructability
Maximum embankment height	6 m	Muk3D model
Water Management		
Settling Pond retention time	3 days	Assumed
Pond discharge structure	Compound overflow spillway with capacity to safely pass the runoff resulting from the design storm event	
Pond flow control	None (passive discharge)	
Minimum freeboard below dyke crest	0.2 m	Assumed
Pond design storm event	1 in 2 years storm event for the lower opening of the spillway weir 1 in 100 years storm event for the upper opening of the spillway weir	
Spillway freeboard	0.2 m relative to the maximum water level for the 1:100-year storm event	
Ditches design storm event	1 in 100 years storm event	
Climate Data		

Design Parameter	Design Input	Source or Calculation
Average annual temperature	5°C (-6.7°C to 16.7°C)	ECCC, 2022a
Average annual precipitation	1,340 mm	ECCC, 2022a
Average annual rainfall	995 mm	ECCC, 2022a
Average annual snowfall	393 cm	ECCC, 2022a
Annual lake evaporation	507 mm	Calculated by SLR
Environmental		
Geochemistry	Not Available	
Surface runoff management	Surface runoff collection, sediment control pond, cover temporary salt stockpile with water resistant canvas	
Discharge	Discharge from settling pond to Man o' War Brook	
Geotechnical		
Design earthquake event	1:2,475 year return period	Adopted
Design Peak Ground Acceleration (PGA)	PGA = 0.047g	2020 National Building Code Seismic Hazard Calculation
Factor of Safety (FoS) – long term static	1.5	CDA 2013, 2014
FoS – short term static	1.3	CDA 2013, 2014
FoS – pseudo static	1.0	CDA 2013, 2014

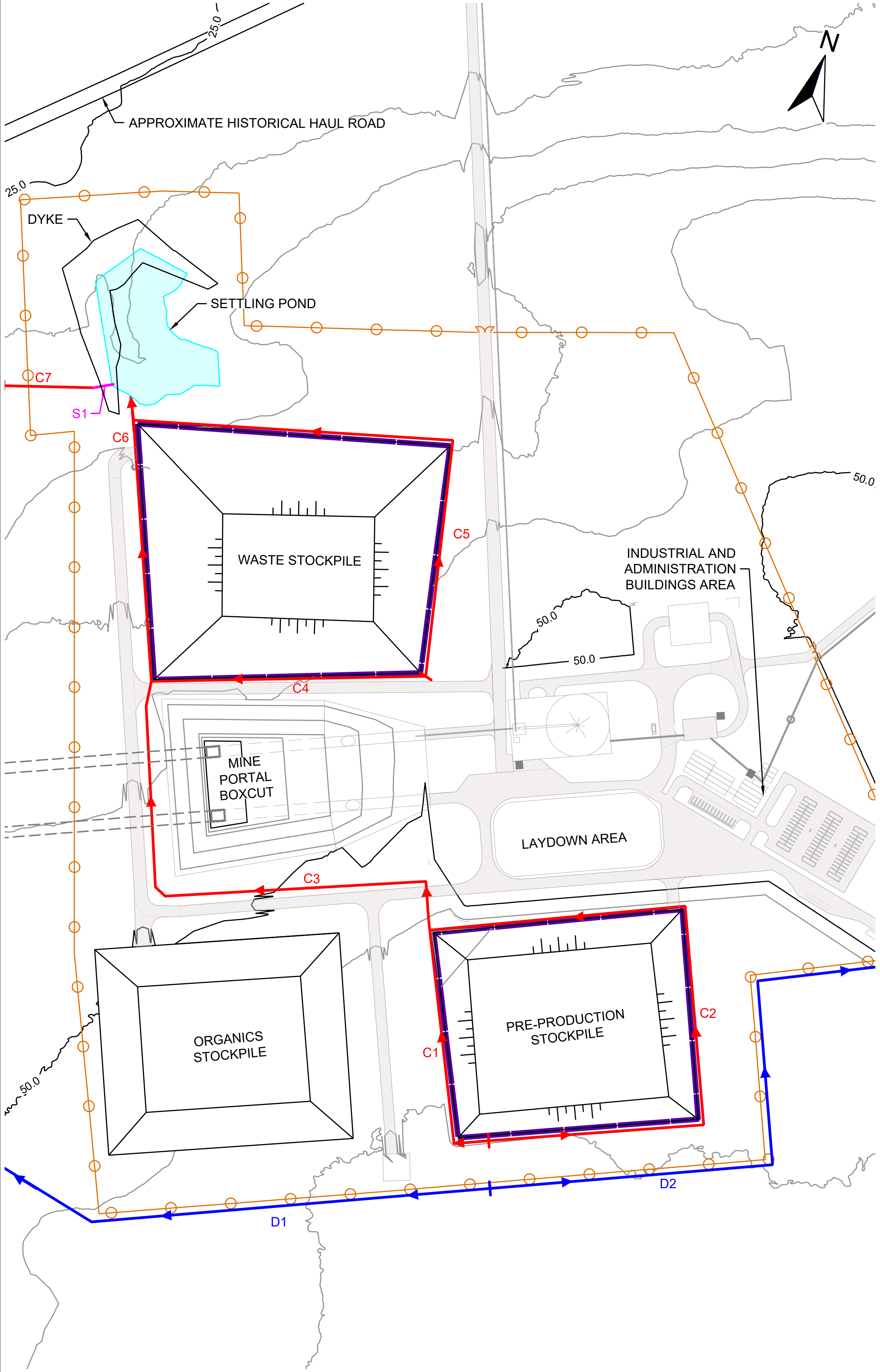
Notes:

1. From meteorological station Stephenville A ID 8403800 - 01 (ECCC, 2022a).
2. No geochemical data available to assess water quality of stockpiles runoff. See Section 6.

4.0 Geotechnical Design

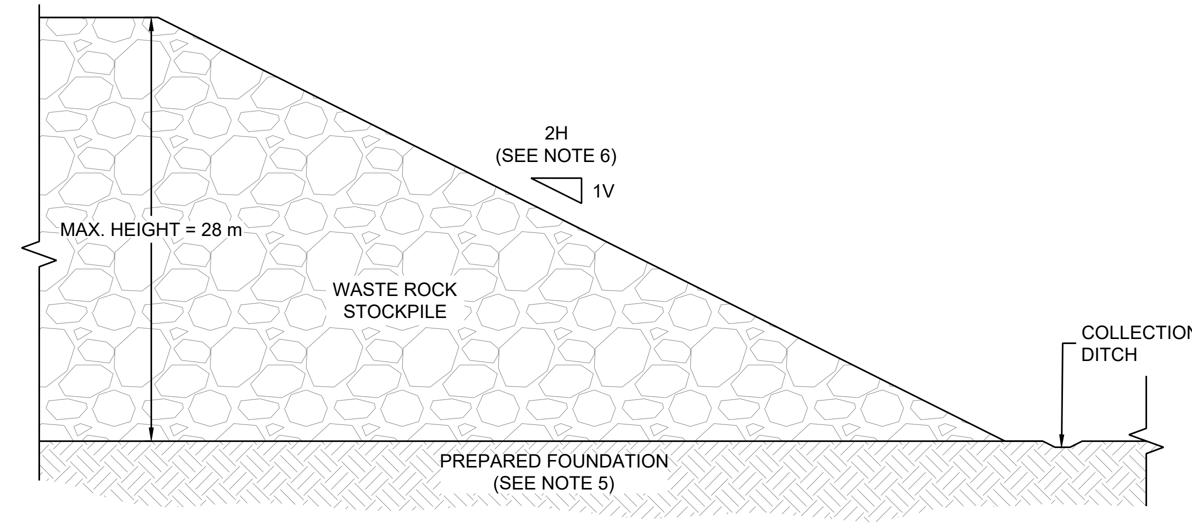
The waste rock stockpile, temporary ore stockpile, and the settling pond deposition were prepared using Muk3D, a three-dimensional modelling software used for deposition planning. The model parameters were based on the design criteria outlined in section 3.2. In the absence of reliable survey data, a topography model prepared in AutoCAD with one metre contour lines was used.

Figure 2 shows a plan view and typical cross sections for the waste rock and pre-production stockpiles. Figure A2 in Appendix A shows the deposition modelling for the modelled structures.



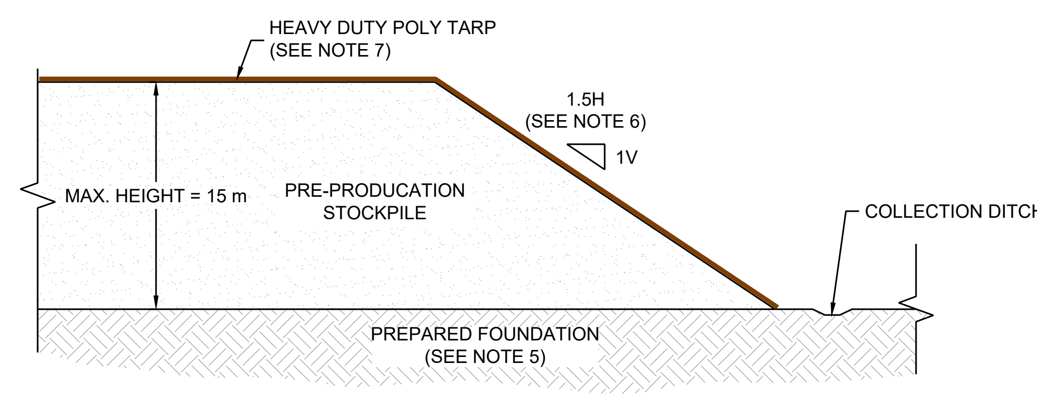
WASTE ROCK AND PRE-PRODUCTION STOCKPILE PLAN VIEW

SCALE 1:4,000



WASTE STOCKPILE TYPICAL CROSS-SECTION

N.T.S.



PRE-PRODUCTION STOCKPILE TYPICAL CROSS-SECTION

N.T.S.

NOTES:

1. ALL UNITS ARE IN METRES, UNLESS OTHERWISE SPECIFIED
2. REFERENCED FROM HALYARD DRAWING: "H21261-3120-C-DWG-0001.DWG" AND "H21261-XREF-G-000.DWG."
3. SURFACE RUNOFF FROM THE CATCHMENTS SHOWN ON THIS FIGURE WILL BE CAPTURED IN THE COLLECTION AND DIVERSION DITCHES.
4. THE NETWORK OF COLLECTION DITCHES ULTIMATELY REPORTS TO THE SETTLING POND. THE DIVERSION DITCHES WILL RELEASE THE WATER DIRECTLY TO THE ENVIRONMENT.
5. ORGANICS AND TOPSOIL SHALL BE REMOVED AND FOUNDATION SHALL BE PROOF ROLLED PRIOR TO FILL PLACEMENT.
6. OVERALL SLOPE IS PROVIDED. INTERMEDIATE BENCHING MAY BE CONSIDERED FOR OPERATIONAL PURPOSES.
7. THE TEMPORARY PRE-PRODUCTION STOCKPILE WILL BE COVERED WITH HEAVY DUTY POLY TARP TO MINIMIZE LEACHATE.
8. THE PRE-PRODUCTION STOCKPILE WILL BE PLACED ON AN IMPERMEABLE LAYER.

LEGEND:

- 25.0 — MAJOR TOPOGRAPHIC CONTOUR - 25 m INTERVAL
- MINOR TOPOGRAPHIC CONTOUR - 5 m INTERVAL
- FENCE
- SETTLING POND
- UNDERGROUND MINE FACILITIES
- D# DIVERSION DITCH
- C# COLLECTION DITCH
- S# SPILLWAY OUTLET CHANNEL
- TOE OF WASTE AND PRE-PRODUCTION STOCKPILE
- TOP OF WASTE AND PRE-PRODUCTION STOCKPILE
- PRE-PRODUCTION MATERIAL
- WASTE ROCK MATERIAL
- PREPARED FOUNDATION
- HEAVY DUTY POLY TARP

NOT FOR CONSTRUCTION

0 25 50 100 150 200 250 m

SCALE 1:4,000

WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT

NAD 1983 UTM Zone 21 U

REV. NO.	BY	CHK	DATE (MM/DD/YYYY)	COMMENTS
0	JC	LV	11/23/2023	ISSUED AS FINAL

SLR
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SITE:

GREAT ATLANTIC SALT DEPOSIT

PROJECT DESCRIPTION:

FEASIBILITY STUDY

FIGURE TITLE:

WASTE ROCK AND PRE-PRODUCTION STOCKPILE PLAN VIEW AND TYPICAL CROSS-SECTION

PROJECT NO.:	FIGURE NO:	REV. NO.
233.V03447.R0000	2	0

DATE: November 23, 2023 SCALE: AS SHOWN

Cadfile name: 233-V03447-R0000 GAS_SETTLING_POND_SECTION REV 0 - 23112023.dwg

4.1 Subsurface Condition

No sub-surface investigation data were available specific to the proposed waste rock stockpile or temporary salt stockpile area. Atlas undertook geotechnical investigations for the proposed box cut location for the GAS deposit including three standard geotechnical boreholes. A program of laboratory testing including moisture content, particle size distribution, and soil plasticity (index testing) has been carried out.

The stratigraphic units encountered at the site include:

- Organics,
- Silty Sand Till, and
- Bedrock

In general, the overburden at the Project site comprised recent organic deposits and glacial till formed during glaciation. The till is composed of silty sand with gravel and trace clay overlying a layer of red-brown, sandy silt to silty sand with trace clay and gravel; till was described as compact to very dense based on SPT-N values (GEMTEC, 2023a). The till is underlain by sedimentary rock of varying formation such as sandstone, siltstone, mudstone, and conglomerates; these bedrock formations are commonly referred to as “Red Beds” (SLR, 2023a). The halite deposit of discrete interbeds underlies Red Beds. Bedrock was encountered at depths ranging from 8.8 metres below ground surface (mbgs) to 12.3 mbgs according to the three boreholes drilled in the proposed box cut area.

Groundwater seepage was observed during drilling. The groundwater table was observed between 0.35 mbgs and 1.52 mbgs in boreholes drilled at the site.

4.2 Material Parameters

Geotechnical parameters were established for the various stratigraphic units using the following:

- Results from in situ tests (Standard Penetration Test),
- The geotechnical properties of the piles are established from engineering judgment and experience with similar materials/projects.

In the absence of site-specific laboratory test results, a correlation in Leps (1970) was used to assess and design appropriate friction angles for the waste rock material. This stability analysis assumes these materials will be mainly supplied from the underground mining and will have geomechanical properties consistent with rocks encountered during site exploration. Table 2 shows the material categories according to Leps (1970).

Table 2: Rock Categories

Category	Compressive Strength	
	psi	MPa
Weak	500 to 2,500	4 to 17
Average	2,500 to 10,000	17 to 69
Strong	10,000 to 30,000	69 to 207

Source: Leps, 1970.

Notes:

1. psi = pounds per square inch
2. MPa = megapascal

The average compressive strength of rock cores recovered from boreholes drilled at the Project area is presented in Table 3, which is near the limit between the weak and average rock categories. As a conservative approach, the weak strength category was selected to assess peak friction angle (Figure 3).

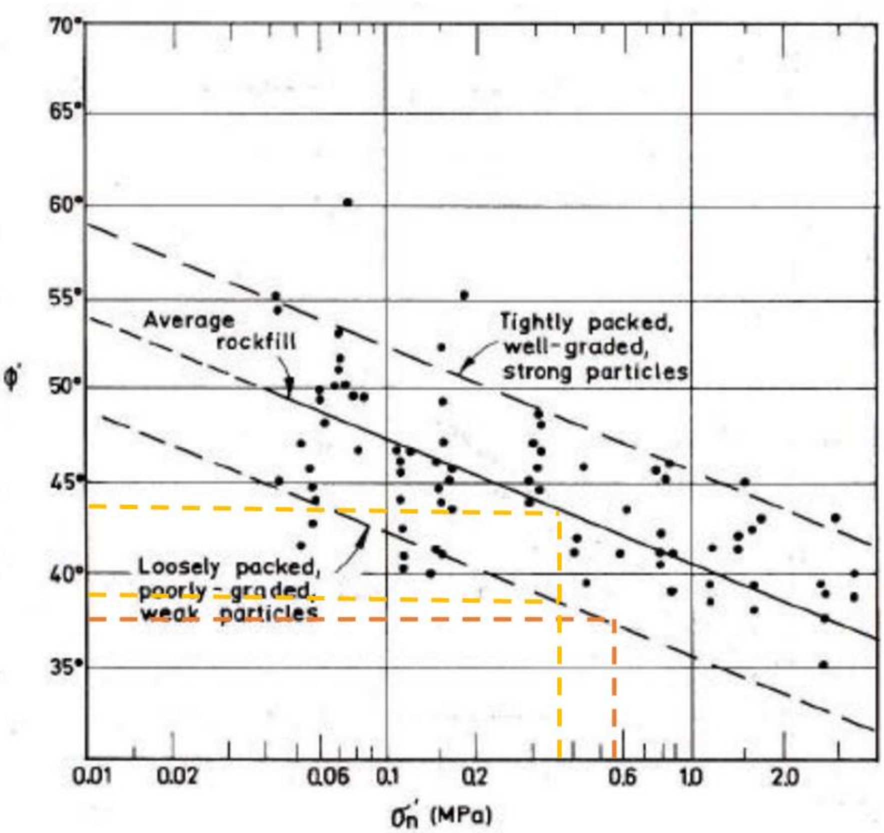
Table 3: Strength Data Provided for the Rock Cores

Lithology	Tensile Strength (MPa)	UCS (MPa)
Mudstone	0.2	11
Sandstone	1.4	44.5

Source: SLR, 2023a.

For the stability analyses, intact rock strength (UCS) of 20 MPa is chosen. Accordingly, the average rock strength category was selected to assess peak friction angle for salt rock.

Figure 3: Effect of Normal Pressure on Peak Friction Angle of Rock Specimens



Source: Leps, 1970

The material properties used in the stability analyses are provided in Table 4.

Table 4: Stability Analyses Geotechnical Parameters

Materials	Unit Weight γ (kN/m³)	Effective Stress Shear Strength Parameters		Undrained Shear Strength (kPa)	Saturated Hydraulic Conductivity (m/s) [1]	ky/kx
		c' (kPa)	φ' (°)			
Temporary Salt Ore	21	0	44	-	-	-
Compacted Till	20.5	-	35	-	1.2×10^{-6}	1
Filter	20.5	0	37	-	1.0×10^{-4}	1
Waste Rock/Rip Rap	21	0	37	-	1.0×10^{-1}	1
Foundation Till	20.5	-	40	-	1.2×10^{-6}	1
Bedrock (slightly weathered)	Impenetrable				1.0×10^{-7}	1

4.3 Slope Stability Analyses

Waste rock stockpile, temporary ore stockpile, and settling pond dam stability analyses were evaluated for the following conditions:

- Long term static: Adopted for the full height of the stockpiles representing permanent condition. This scenario also considers that the sediment containment dam is in operation.
- Short term static: Adopted for the design of the stockpiles during construction phase. Also, this scenario evaluates the stability of the sediment containment dam during or after construction, prior to filling. It is also applicable to temporary high pond level scenario.
- Pseudo-static: In accordance with recommendations by Hynes-Griffin & Franklin (1984), pseudo-static analysis will consider a horizontal seismic coefficient equal to 0.0236g, which corresponds to half of the PGA for 1 in 2,475-year return.

Limit equilibrium slope stability analyses were performed using GeoStudio SLOPE/W software. Seepage analyses were carried out to estimate the steady-state phreatic surface considering the pond operating using the SEEP/W software. The phreatic surface in sediment containment structure corresponding to the Inflow Design Flood loading condition was assumed conservatively at crest elevation, assuming complete blockage of the spillway.

The representative model cross sections developed are:

- Section A-A': oriented in southeast-northwest direction to represent the proposed waste rock stockpile with a maximum height.
- Section B-B': oriented in southeast-northwest direction to represent the proposed temporary salt stockpile with a maximum height.
- Section C-C': oriented in southeast-northwest direction to represent the highest section of the settling pond containment structure.

The layout of the proposed cross sections for the Project is presented in Figure A2 in Appendix A.

4.4 Results

The results of the stability analyses are summarized in Table 5 and presented in Appendix A (Figures A3 to A11). The calculated slope stability FoS values exceed the design criteria in the three critical sections.

Table 5: Summary of Stability Analyses Results

Scenario	Section	Target FoS (CDA 2014)	FoS Calculated	Figure
Waste Rock Stockpile with 2:1 slope	A-A'			
Static Long-Term		1.5	1.6	Figure A3
Static Short-Term (During Construction)		1.3	1.3	Figure A4
Pseudo-Static		1.0	1.6	Figure A5
Temporary Salt Stockpile with 1.5:1 slope	B-B'			
Static Long-Term		1.5	1.5	Figure A6
Static Short-Term (During Construction)		1.3	1.3	Figure A7
Pseudo-Static		1.0	1.5	Figure A8
Sediment Containment Structure with 3:1 downstream slope	C-C'			
Static Long-Term		1.5	2.1	Figure A9
Static Short-Term (During Construction and High Water Level)		1.3	1.9	Figure A10
Pseudo-Static		1.0	1.9	Figure A11

Note: Rapid Drawdown case not applicable, and not analyzed.

5.0 Hydrologic Design

5.1 Climate and Meteorology

5.1.1 Annual and Monthly Precipitation

Environment and Climate Change Canada (ECCC) has been operating 12 different weather stations over time within a 40 km radius of the Project site. The Stephenville A (ID: 8403800 and 8403801) weather station, located 13.5 km away from the Project site at an elevation of 24.7 MASL, was selected to characterize the precipitation of the site as it has available long-term climate records with a period up to 2022 (1942–2022).

The ground elevation of the ECCC weather station is comparable to the range of elevations at the Project site (25 MASL to 60 MASL within the local watershed).

The 1981–2010 Climate Normals published by ECCC for the Stephenville A weather station (ECCC, 2022a) were used to characterize the average monthly and annual precipitation conditions at the site (Table 6). The 1981–2010 Climate Normals were used instead of the long-term climate records for the full available period (1942–2022) and matching record (1981–2010) as they provide higher average annual precipitation, which is considered more conservative from the perspective of surface runoff volumes to be collected and managed at the Project site.

Table 6: 1981–2010 Climate Normals for the Stephenville A Weather Station

Month	Precipitation		
	Rainfall (mm)	Snowfall (cm)	Precipitation (mm)
January	28.9	113.3	124.6
February	27.2	90.1	105.3
March	36.9	54.4	86.2
April	61.5	17.0	77.7
May	94.0	3.3	97.4
June	104.1	0.0	104.1
July	118.4	0.0	118.4
August	130.4	0.0	130.4
September	127.5	0.1	127.6
October	124.0	2.9	126.9
November	93.8	26.2	118.4
December	48.6	86.0	123.4
Total	**995.3**	**393.2**	**1,340.4**

Source: ECCC (2022a)

For water balance modelling purposes, a wet annual precipitation condition (i.e., annual precipitation above the historic average) was simulated assuming 50% higher precipitation than the average year. Accordingly, the total annual precipitation for a wet year used in the water balance model is 2,010.6 mm. For context, the maximum annual precipitation on record based on the data from the Stephenville A weather station for the period 1942 through 2022 is 1,660.5 mm.

5.1.2 Short-Term Rainfall Events

Rainfall storm frequency values were taken from the short duration rainfall Intensity-Duration-Frequency (IDF) data derived by ECCC using recorded data at the Stephenville RCS (ID: 8403820) weather station (ECCC, 2022c). Stephenville RCS weather station was the only station evaluated with IDF data available. Storm durations under an hour for the 1 in 2 years and 1 in 100 years storm event were selected for design (Table 7). The storm intensities were adjusted for climate change using the IDF_CC Tool Version 6.5 developed by Western University Facility for Intelligent Decision Support and Institute for Catastrophic Loss Reduction (Western University, 2015). The most severe climate change scenario, SSP5.85, was selected over the period of

2023–2053 resulting in an average intensity increase of 8% and 19% for the 2-year and 100-year storm, respectively.

Table 7: Summary of Intensity-Duration-Frequency for the Stephenville RCS Weather Station With and Without Climate Change Impacts

Duration (min)	Historic IDF Intensity (mm/hr)		Climate Impact SSP5.85 (2023 – 2053) Intensity (mm/hr)	
	2-Year Storm	100-Year Storm	2-Year Storm	100-Year Storm
5	52.79	141.07	56.72	162.17
10	39.00	108.15	41.82	127.9
15	32.97	85.48	35.45	100.78
30	23.12	63.49	24.83	73.66
60	16.54	38.54	17.81	45.72

Source: ECCC (2022c) and Simonovic (2015)

5.1.3 Evaporation

No ECCC-operated weather station measuring evaporation data was available within proximity to the Project site. Long-term temperature data was used from the Stephenville A weather station to characterize average monthly potential evapotranspiration conditions at the site using the Thornthwaite method (Table 8).

Table 8: Estimated Monthly and Annual Potential Evapotranspiration

Month	
January	0.0
February	0.0
March	0.4
April	15.7
May	55.2
June	88.1
July	116.3
August	108.1
September	71.0
October	38.9
November	12.0
December	0.8
Total	**507.5**

5.2 Water Management Plan

A settling pond is proposed to facilitate settling of suspended solid particles from surface runoff to mitigate water quality concerns at the discharge location to the receiving environment. Surface runoff from the Project facilities will be collected via perimeter ditches and directed to the settling pond. Underground mine dewatering will be pumped to the settling pond.

The settling pond will discharge to the Man o' War Brook (Figure 1) via an overflow spillway and a conveyance ditch. The Man o' War Brook, located immediately west of the Project site, flows in the north direction, discharging into Bay of St. George's.

Perimeter ditches are proposed to collect and convey water around and off both the pre-production stockpile and waste stockpile. The network of ditches will discharge into the settling pond (Figure 1). Surface runoff from the terrace where the industrial and administration buildings will be built will also be collected and directed to the network of ditches ultimately reporting to the settling pond.

Surface runoff from the undisturbed catchment area upstream of the Project site will be diverted to reduce the volume of water from precipitation to be collected and managed at the Project site (Figure 4).

Of note, a limited amount of surface water and sediment quality data have been collected to date for the Project (SLR, 2023b). If further water quality investigation identifies that discharge could significantly impact on the receiving environment, the Man o' War Brook, then controls and mitigation may be necessary. Such controls and mitigation may include containment (e.g., lining storage ponds and waste rock stockpile), water treatment before discharge, alternative use or recycling of mine water, or an alternative discharge (e.g., land discharge, or discharge to the ocean). Once sufficient data have been collected to characterize the potential for impacts, these alternative mitigation measures should be further evaluated in the next stage of Project engineering.

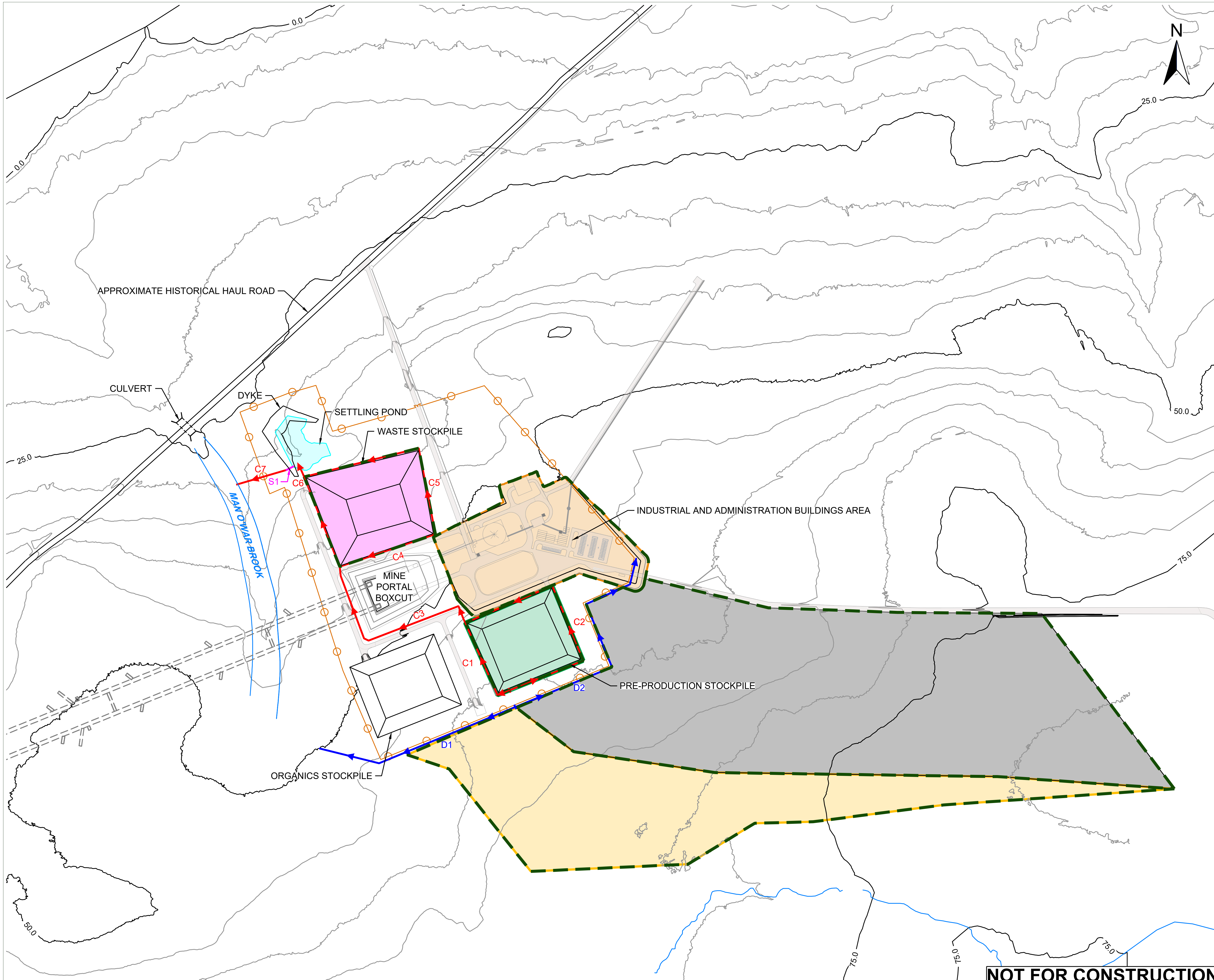
5.3 Water Balance

5.3.1 Catchment Areas

The total catchment area that will contribute surface runoff to the proposed pond is approximately 15 ha. The delineated catchment boundaries are shown in Figure 4. The breakdown of the catchment area by type of surface considered in the water balance is provided in Table 9.

Table 9: Catchment Area by Type of Surface

Type of Surface	Area (ha)
Stockpiled Ore	2.8
Stockpiled Waste Rock	3.9
Prepared Ground (Process Plant Area)	7.4
Pond Surface	0.9
Total	**15.0**



NOTES:

1. ALL UNITS ARE IN METRES, UNLESS OTHERWISE SPECIFIED
2. REFERENCED FROM HALYARD DRAWING: "H21261-3120-C-DWG-0001.DWG" AND "H21261-XREF-G-000.DWG."
3. SURFACE RUNOFF FROM THE CATCHMENTS SHOWN ON THIS FIGURE WILL BE CAPTURED IN THE COLLECTION AND DIVERSION DITCHES.
4. THE NETWORK OF COLLECTION DITCHES ULTIMATELY REPORTS TO THE SETTLING POND. THE DIVERSION DITCHES WILL RELEASE THE WATER DIRECTLY TO THE ENVIRONMENT.

LEGEND:

- 25.0 — MAJOR TOPOGRAPHIC CONTOUR - 25 m INTERVAL
- MINOR TOPOGRAPHIC CONTOUR - 5 m INTERVAL
- FENCE
- SETTLING POND
- UNDERGROUND MINE FACILITIES
- D# DIVERSION DITCH
- C# COLLECTION DITCH
- S# SPILLWAY OUTLET CHANNEL
- WATERSHED DIVIDE
- WASTE STOCKPILE CATCHMENT
- PRE-PRODUCTION STOCKPILE CATCHMENT
- SITE TERRACE CATCHMENT
- D1 DITCH CATCHMENT
- D2 DITCH CATCHMENT

0 50 100 200 300 400 m

SCALE 1:7,500
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 21 U

REV. NO.	BY	CHK	DATE (MM/DD/YYYY)	COMMENTS
0	JC	LV	11/23/2023	ISSUED AS FINAL

SLR
SUITE 200, 300 TOWN CENTRE BLVD
MARKHAM, ON
L3R 8H8
T: 905.415.7248
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SITE:
GREAT ATLANTIC SALT DEPOSIT

PROJECT DESCRIPTION:
FEASIBILITY STUDY

FIGURE TITLE:
SURFACE RUNOFF CATCHMENT AREAS

PROJECT NO.:	FIGURE NO:	REV. NO.
233.V03447.R0000	4	0

DATE: November 23, 2023
SCALE: 1:7,500

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5.3.2 Water Balance Inputs and Assumptions

The following assumptions were made to set up the water balance model for the Project site:

- Seepage losses through the settling pond dam are negligible.
- The spring freshet is distributed as a 40% snowpack melt in April and the remaining 60% in May.
- All flow entering the settling pond is assumed to be released, therefore no accumulation occurs in the pond.

Groundwater pumped from the underground mine was accounted for as an input to the water balance model. SLR developed a conceptual groundwater model of the Project and surrounding area followed by a numerical groundwater model developed using MODFLOW (SLR, 2023c). The calibrated groundwater flow model was used to simulate groundwater levels and flow under baseline conditions and to generate model predictions during the operation phase of the Project. The model was run under steady-state conditions during the maximum box cut/decline development footprint. Predicted long-term inflows to the fully built-out box cut/decline were simulated to be approximately 500 m^3/day (SLR, 2023c). This value was used for water balance modelling.

The runoff factor is a dimensionless coefficient relating the amount of runoff to the amount of precipitation received. It is a larger value for areas with low infiltration and high runoff, and it is lower for permeable and/or well vegetated areas. Table 10 shows the yearly averaged runoff factors assumed in the water balance model to calculate surface runoff from the contributing catchment areas.

Table 10: Runoff Factors used for Water Balance Modelling by Type of Surface

Type of Surface	Runoff Factor (%)
Stockpiled Ore	100
Stockpiled Waste Rock	30
Prepared Ground	90
Pond Surface	100

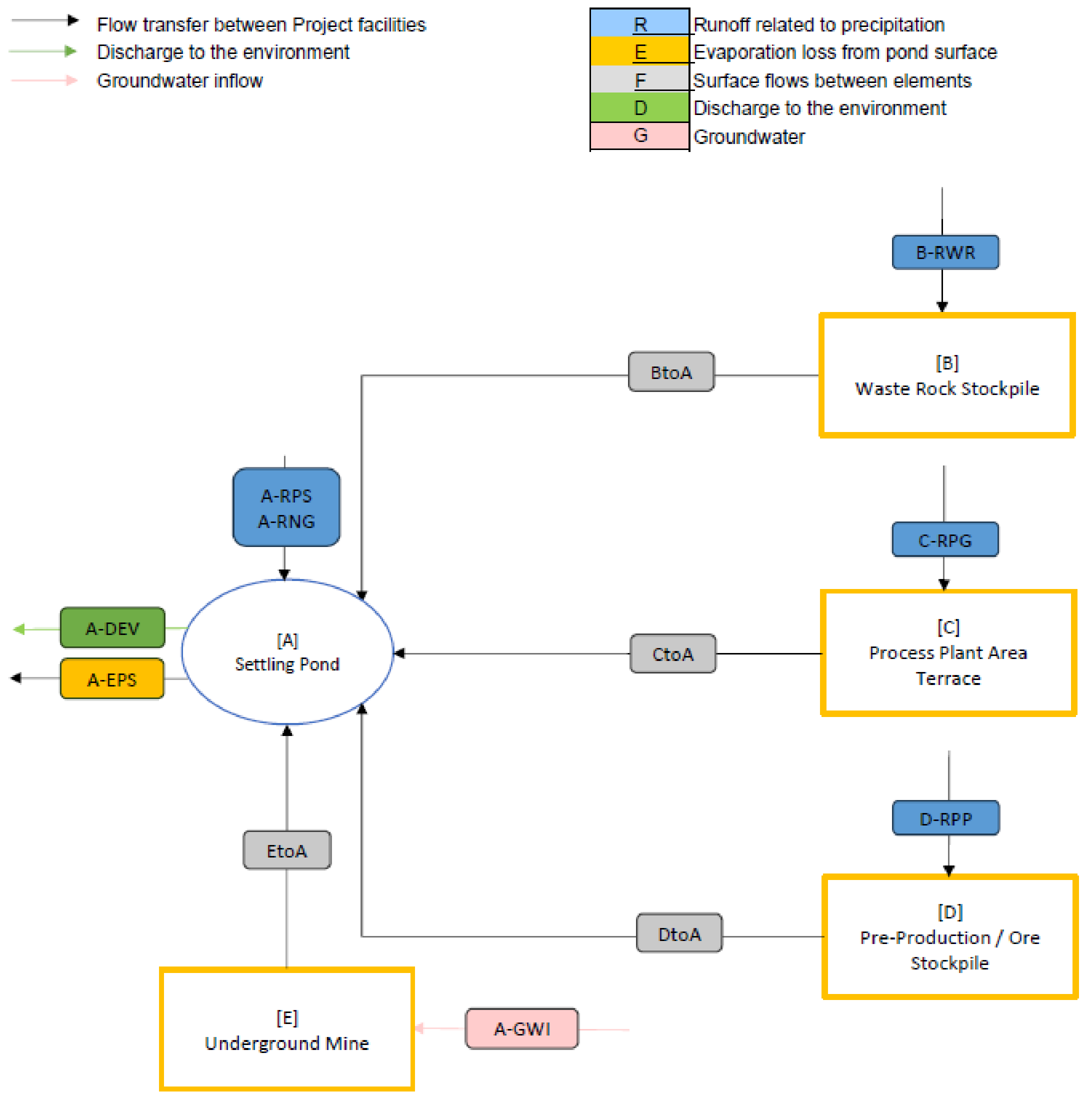
5.3.3 Water Balance Calculation

A deterministic water balance calculation was developed on linked electronic spreadsheets to simulate the water balance for the Project site. The flow diagram is shown in Figure 5. The monthly water inflow to the settling pond for average and wet annual precipitation conditions was calculated with the water balance model. Table 11 shows the inflows and outflows/losses considered.

Table 11: Inflow and Outflows Considered in Water Balance

Inflows	Outflows/Losses
Underground mine dewatering flow	Evaporation from settling pond surface
Surface runoff from precipitation	
Direct precipitation on settling pond surface	

Figure 5: Flow Diagram



Legend	
Facilities	
Settling Pond	A
Waste Rock Stockpile	B
Process Plant Area Terrace	C
Pre-Production/ Ore Stockpile	D
Underground Mine	E
Runoff from Precipitation	R
Natural ground	RNG
Pond surface	RPS
Prepared ground	RPG
Deposited waste rock	RWR
Stockpiled ore	RPP
Evaporation Loss	E
Pond surface	EPS
Other	
Groundwater inflow	GWI
Discharge to the environment	DEV

Average Annual Flows		
		m^3/yr
Inflow to Settling Pond	BtoA	15,630
	CtoA	89,716
	DtoA	38,174
	EtoA = A-GWI	182,500
	A-RPS & A-RNG	208,929
Evaporation loss (A-EPS)		4,040
Discharge from Settling Pond (A-DEV)		530,909

Note:
Flows shown correspond to average annual precipitation conditions

5.3.4 Water Balance Modelling Results

Climate conditions influence the water balance. The following two annual precipitation conditions were evaluated.

1 Average year, and

2 Wet year represented as 50% higher annual precipitation than the average year.

The water balance modelling results are summarized in Table 12. The maximum monthly inflow for both scenarios is observed in May, which aligns with the spring freshet, and are 104,312 m^3/month and 148,994 m^3/month for the average and wet year, respectively.

Table 12: Monthly and Annual Simulated Inflow into the Settling Pond

Month	Net Monthly Inflow to Pond (m^3)	
	Average Year	Wet Year
January	18,557	20,086
February	18,112	20,169
March	24,098	28,403
April	73,839	103,352
May	104,312	148,994
June	42,403	56,495
July	46,529	62,557
August	49,845	67,497
September	48,879	66,139
October	49,041	65,827
November	39,936	52,417
December	25,482	30,545
Total	**541,032**	**722,480**

5.4 Collection Ditches

Two types of ditches are proposed to manage surface runoff at the site: diversion ditches to divert water around the site from the upstream undisturbed catchment, and collection ditches to catch surface runoff from onsite facilities and direct the flow towards the settling pond. A total of nine ditches are proposed, as follows (Figure 1):

- Diversion Ditch 1 will collect surface runoff from the natural upstream catchment southeast of the site and discharge west of the site towards Man o' War Brook.
- Diversion Ditch 2 will collect surface runoff from the natural upstream catchment southeast of the site and discharge northeast of the site.
- Collection Ditches 1, 2, and 3 will collect surface runoff from the ore stockpile and convey it to Ditch 4.

- Collection Ditches 4, 5, and 6 will collect surface runoff from the waste rock stockpile and Ditch 3, and convey it to the settling pond.
- Conveyance Ditch 7 will receive the flow discharge from the overflow structure of the settling pond and convey it to the Man o' War Brook.

5.4.1 Design Flow Assessment

5.4.1.1 Approach

The design flow for the ditches was calculated using the Rational Method. This method is commonly used to calculate peak flows from small watersheds. A runoff factor, drainage area, and precipitation intensity linked to a specific design storm event are required for this method. No numerical flood routing modelling was conducted to calculate peak flows.

5.4.1.2 Drainage Areas

The ditch alignments considered for delineation of catchment boundaries are shown in Figure 1. The drainage areas contributing to generation of surface runoff are as follows:

- Diversion Ditch 1 20 ha
- Diversion Ditch 2 37 ha
- Contact Water Ditch 1 0.3 ha
- Contact Water Ditch 2 2.6 ha
- Contact Water Ditch 4 1.4 ha
- Contact Water Ditch 5 2.5 ha

In the proposed water management plan, surface runoff from the natural ground within the Project site immediately around the Project facilities will not be captured in the collection ditches and will not be conveyed to the settling pond (Figure 4). It will continue draining naturally in the northwest direction towards the Man o' War Brook and the historical haul road.

5.4.1.3 Design Precipitation Event

All ditches were sized with capacity to convey the peak flow resulting from the 1 in 100 years storm event. The design event duration was selected based on estimation of time of concentration of the catchment areas. The 30-minute duration rainfall intensity was used for the diversion ditches and the 15-minute duration rainfall intensity was used for the collection ditches. The rainfall intensity values are 73.7 mm/hr and 100.8 mm/hr, respectively (Table 7).

5.4.1.4 Design Flow

The Rational Method was applied for the estimation of the design flow. Given that numerical flood routing modelling was not performed, a conservative runoff factor of 1.0 was assumed for all catchment areas. The calculated design flows are as follows:

- Diversion Ditch 1 4.2 m^3/s
- Diversion Ditch 2 7.5 m^3/s
- Contact Water Ditch 1 0.022 m^3/s

- Contact Water Ditch 2 0.22 m^3/s
- Contact Water Ditch 3 0.24 m^3/s
- Contact Water Ditch 4 0.36 m^3/s
- Contact Water Ditch 5 0.21 m^3/s
- Contact Water Ditch 6 0.57 m^3/s
- Contact Water Ditch 7 3.3 m^3/s

5.4.2 Ditch Sizing

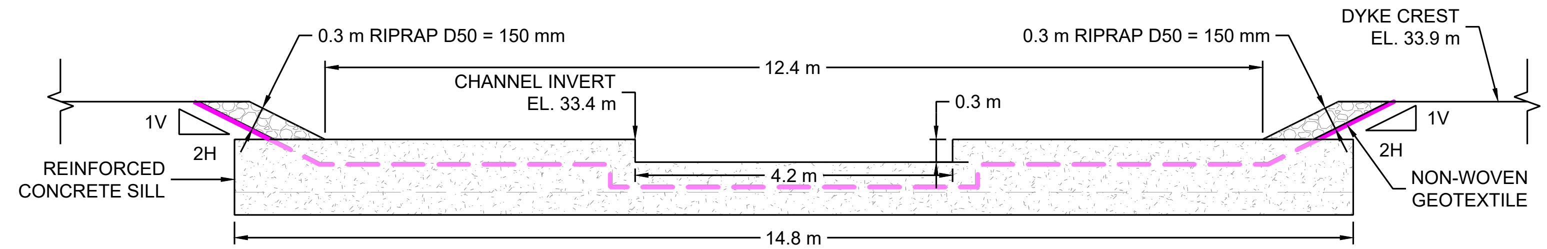
The minimum depth of the ditches was determined using Manning's Equation. The parameters required to calculate the flow depth for the design flow are the ditch bottom width, the side slopes, the average longitudinal gradient, and a Manning's roughness[1] coefficient (0.035 was assumed for riprap erosion protection). All ditches have been sized with a trapezoidal section and gradients determined from topographic mapping with one metre interval contours. Additionally, a freeboard of 0.2 m was assumed for all ditches. Figure 6 provides a summary of the ditch dimensions. Figure 6 shows typical cross sections for the ditches.

5.4.3 Culvert Sizing

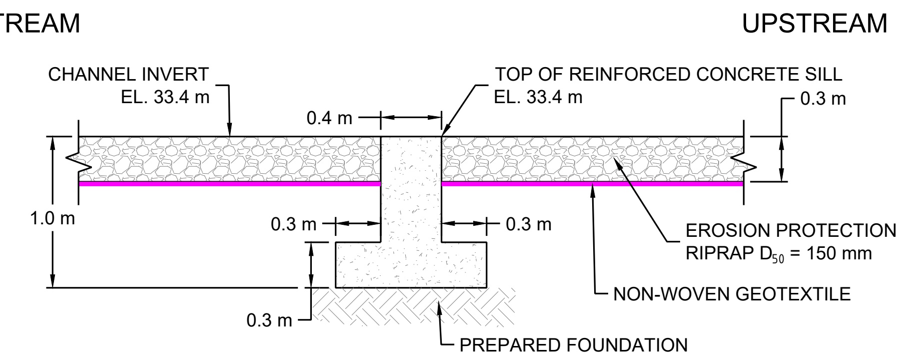
Culverts are required near the outlet of Diversion Ditch 2 and Collection Ditch 3 for the flows to pass under the proposed access roads. The culverts were sized to convey the same design flow as Diversion Ditch 2 (7.5 m^3/s) and Collection Ditch 3 (0.24 m^3/s). The HY-8 modelling software, a culvert hydraulic analysis program developed by the U.S Department of Transportation Federal Highway Administration (FHWA, 2022), was used to size the culverts assuming high density polyethylene (HDPE) circular pipes.

One 2.0 m diameter circular pipe is proposed for Diversion Ditch 2 crossing and one 0.5 m diameter circular pipe is proposed for Collection Ditch 3.

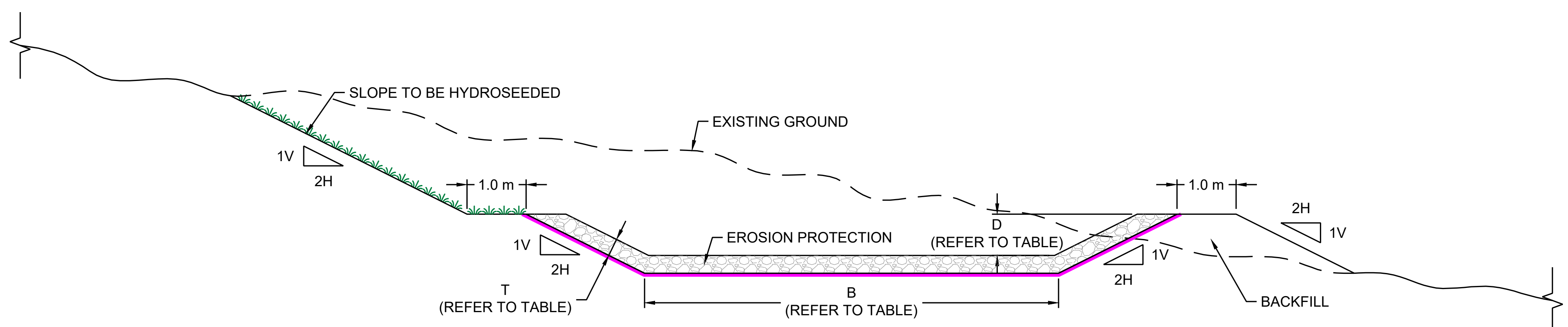
[1] The Manning's coefficient represents the roughness or friction applied to the flow by the channel.



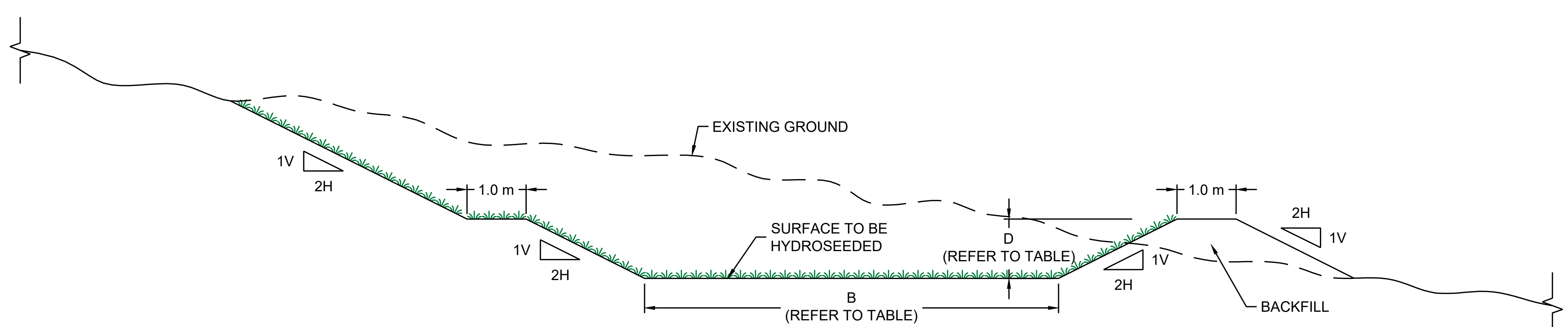
SPILLWAY OVERFLOW WEIR CROSS-SECTION



SPILLWAY CONCRETE SILL DETAIL



DITCH TYPICAL CROSS-SECTION
RIPRAP EROSION PROTECTION



DITCH TYPICAL CROSS-SECTION
HYDROSEEDED SURFACE

Ditch	Bottom Width B (m)	Ditch Depth D (m)	Erosion Protection -	Riprap Thickness T (m)	Riprap D_{50} (mm)
Runoff Diversion Ditch 1		0.9	Riprap lining	0.5	250
Runoff Diversion Ditch 2		1.3	Riprap lining	0.3	150
Water Collection Ditch 1		0.2	Grass lining	-	-
Water Collection Ditch 2		0.4	Grass lining	-	-
Water Collection Ditch 3	1.0	0.4	Grass lining	-	-
Water Collection Ditch 4		0.4	Grass lining	-	-
Water Collection Ditch 5		0.3	Grass lining	-	-
Water Collection Ditch 6		0.5	Grass lining	-	-
Water Collection Ditch 7		0.8	Riprap lining	0.3	150

NOTES:

1. ALL UNITS ARE IN METRES, UNLESS OTHERWISE SPECIFIED
2. THE SPILLWAY OUTLET CHANNEL (NOT SHOWN ON THIS FIGURE) IS PROPOSED TO HAVE TWO LAYERS OF RIPRAP: A 0.5 m THICK 100 mm - 300 mm SIZE BEDDING LAYER, UNDERNEATH A 750 mm THICK D_{50} = 650 mm LAYER.

LEGEND:

- CONCRETE
- EROSION PROTECTION
- PREPARED FOUNDATION
- NON-WOVEN GEOTEXTILE

REV. NO.	BY	CHK	(MM/DD/YYYY) DATE	COMMENTS
0	JC	LV	11/23/2023	ISSUED AS FINAL

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SITE:
GREAT ATLANTIC SALT DEPOSIT

PROJECT DESCRIPTION:
FEASIBILITY STUDY

FIGURE TITLE:
SITE WATER CONVEYANCE STRUCTURES TYPICAL CROSS SECTIONS

PROJECT NO.: 233.V03447.R0000
FIGURE NO.: 6
REV. NO.: 0
DATE: November 23, 2023
SCALE: NTS

NOT FOR CONSTRUCTION

Cadfile name: 233-V03447-R0000 GAS_SETTLING_POND_SECTION REV 0 - 23112023.dwg

5.5 Settling Pond

All surface runoff collected from the Project site and the underground mine dewatering will be conveyed to the settling pond before being discharged into the natural environment. The settling pond will discharge into Man o' War Brook via an overflow structure. Containment will be achieved by a combination of natural topography and an earthfill dam constructed with locally available sources. The settling pond design consists of a sediment storage zone, a sediment settling zone, and an overflow section.

5.5.1 Design Volume

The hydraulic retention time is the design approach adopted to define the pond volume. The hydraulic retention time is the average amount of time a certain amount of water remains in the pond before exiting the pond. Typical retention times to promote settling of solid particles in a settling pond range from one to three days.

A 3-day retention time was selected to calculate the volume of the sediment storage zone and the sediment settling zone. The maximum monthly flow under average annual precipitation conditions calculated with the water balance model was used to determine the required storage volume.

Due to the timing of the spring freshet, the maximum monthly flow of approximately 104,300 m^3/month occurs in May. For a 3-day retention time, the operational pond volume was determined to be 10,095 m^3.

5.5.2 Design Flow

The Rational Method was applied for the estimation of the design flow for the flow discharge structure. Given that numerical flood routing modelling was not performed, a conservative runoff factor of 1.0 was assumed for the contributing catchment area. Peak flows were calculated for a normal and extreme rainfall storm event. The normal event adopted for the design is the 1 in 2 years storm event with a 30-min duration. The calculated peak flow is 1.1 m^3/s. The extreme event adopted for the design is the 1 in 100 years storm event with a 30-min duration. The calculated peak flow is 3.3 m^3/s. The rainfall intensities used to calculate the peak flows were taken from Table 7.

5.5.3 Pond Design

The location of the pond was selected to take advantage of the natural topography to provide containment. Locating the pond downstream of the Project site and in proximity to the Man o' War Brook also maximizes gravity drainage, and facilitates the discharge of water to the environment (Figure 1 and 8). The stage-storage capacity curve of the settling pond is shown in Figure 7.

Containment requires construction of a 'U' shaped dyke as illustrated in Figure 1. The typical cross section of the dyke is presented in Figure 8. The proposed dyke will be an earthfill embankment (silty sand till) with erosion protection on the downstream slope (cobble size), a filter and a toe drain. Erosion protection will also be placed on the upstream slope within the expected wave action zone. The 6.0 m wide crest will be applied with road surfacing material to allow vehicular traffic for inspection and maintenance. The maximum height of the dyke will be 6.0 m.

The pond will have an overflow spillway positioned near the south end of the west arm of the dyke to allow gravity flow discharge towards the Man o' War Brook. Figure 6 shows the cross section of the proposed overflow spillway. The water head of the flood was determined using the broad crested weir equation, with the weir coefficient being 1.6. The structure is a compound weir with a small opening at a lower elevation to allow flow discharge under normal operating conditions. This opening, with 0.3 m depth, was sized to convey the peak flow resulting from the normal rainfall storm event adopted for design (1.1 m^3/s).

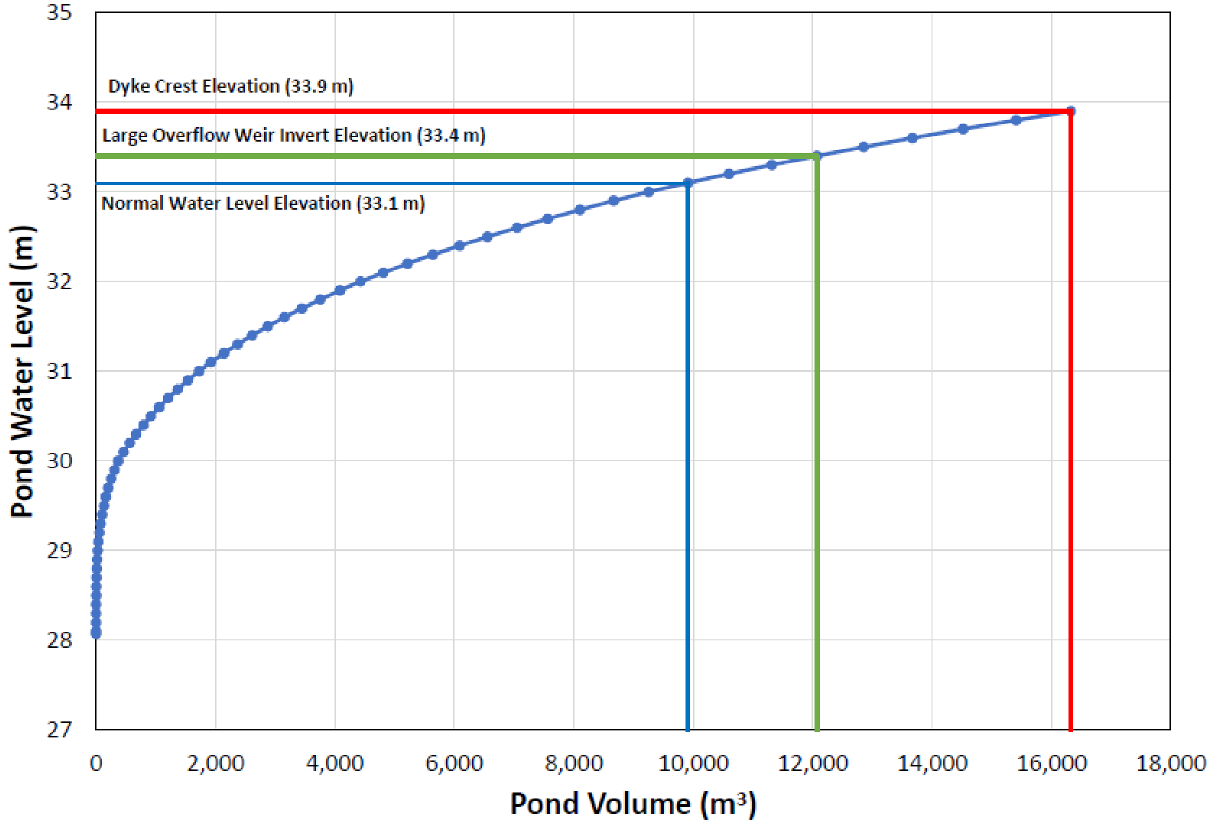
The larger overflow section of the spillway was assigned a depth of 0.5 m to allow the safe passage of the peak flow resulting from the extreme rainfall storm event adopted for design (3.3 m^3/s) without dyke overtopping. The maximum water head calculated with the broad crested weir equation is 0.3 m leaving a minimum freeboard of 0.2 m for wave run-up and wind set-up.

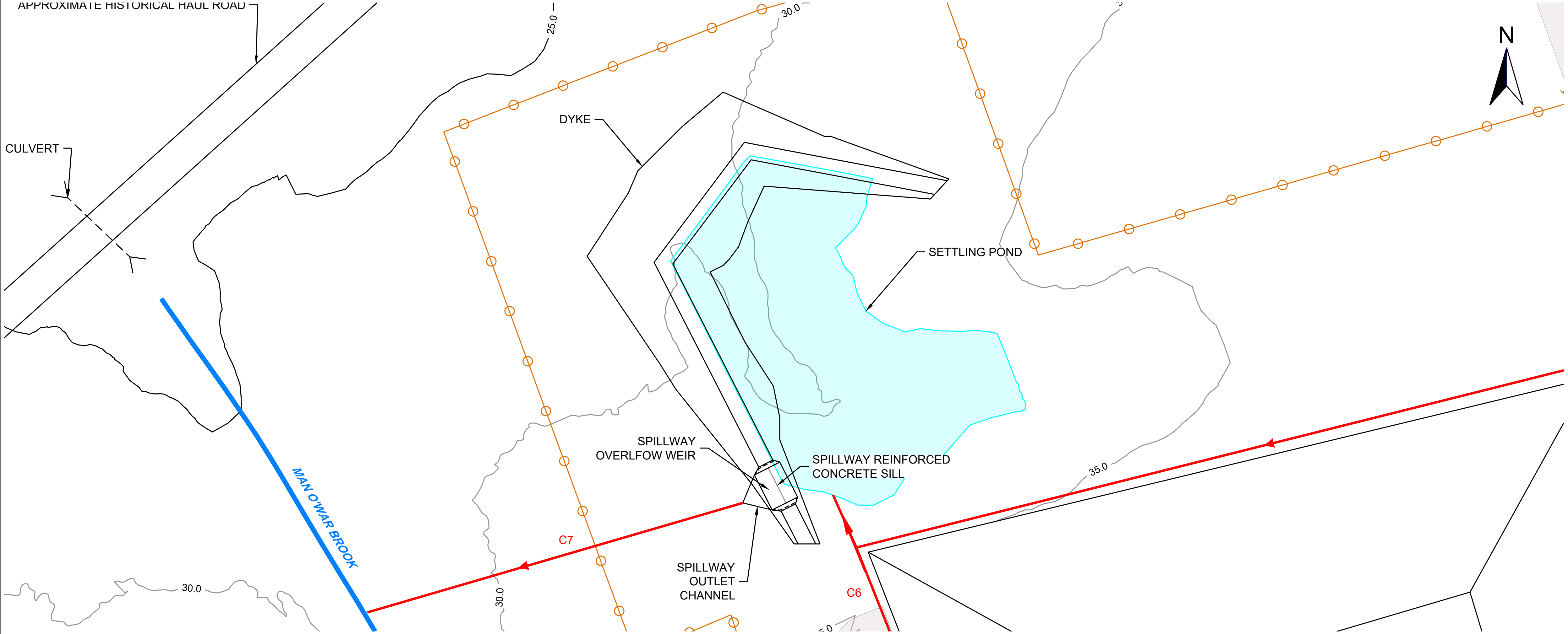
The spillway will be built with riprap lining and a reinforced concrete sill to set the invert elevation at 33.4 MASL (Figure 6). The spillway will have an outlet channel lined with riprap to convey the flow discharge to Collection Ditch 7. Both the outlet channel and Collection Ditch 7 were sized to convey a peak flow of 3.3 m^3/s. The spillway outlet channel was sized with a longitudinal slope of 6H:1V and side slopes 2H:1V using the same approach described in Section 5.4.2 for the ditches. The dimensions of the outlet channel are presented in Table 13. The outlet channel will be lined with two layers of riprap placed above non-woven geotextile to withstand high flow velocities and prevent or mitigate erosion: a 0.5 m thick 100 mm to 300 mm size bedding layer, underneath a 750 mm thick D_{50} 650 mm layer. The outlet channel will require construction of a transition segment between the control section (i.e., the spillway weir) and the channel to account for the difference in width between both components.

Table 13: Catchment Area and Dimensions of Spillway Outlet Channel

Attribute	Value
Catchment Area	15 ha
Bottom Width	1.0 m
Water Depth	0.4 m
Channel Depth	0.6 m
Gradient	17% (6H:1V)
Peak Velocity	4.7 m/s
Side Slopes	2H:1V

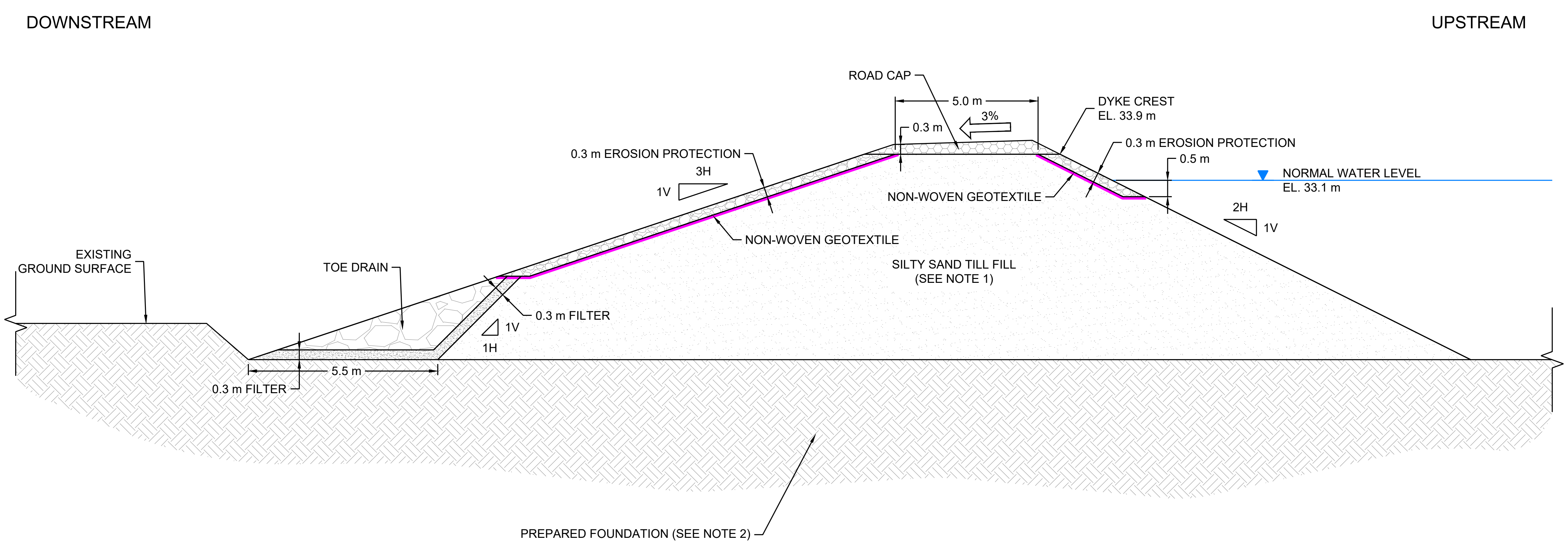
Figure 7: Settling Pond Stage-Storage Capacity Curve





SETTLING POND PLAN VIEW

SCALE 1:2,500



SETTLING POND DYKE TYPICAL CROSS-SECTION

N.T.S.

NOT FOR CONSTRUCTION

NOTES:

1. BASED ON AVAILABLE DATA, OVERBURDEN SOIL (SILTY SAND TILL) EXCAVATED DURING BOX CUT CAN BE USED AS EMBANKMENT FILL. GRADATION SPECIFICATION SHOULD BE ESTABLISHED DURING ENGINEERING PHASE.
2. ORGANICS & TOPSOIL SHALL BE REMOVED AND FOUNDATION SHALL BE PROOF ROLLED PRIOR TO FILL PLACEMENT.
3. HISTORICAL HAUL ROAD, MAN O'WAR BROOK ALIGNMENT AND LOCATION OF CULVERT UNDER THE HISTORICAL HAUL ROAD ARE APPROXIMATE (NO GROUND SURVEY OR LIDAR DATA AVAILABLE).

LEGEND:

- 25.0 — MAJOR TOPOGRAPHIC CONTOUR - 25 M INTERVAL
- 20.0 — MINOR TOPOGRAPHIC CONTOUR - 5 M INTERVAL
- FENCE
- SETTLING POND
- C# — COLLECTION DITCH
- SILTY SAND TILL FILL
- EROSION PROTECTION
- ROAD CAP
- ROCKFILL
- FILTER
- PREPARED FOUNDATION
- NON-WOVEN GEOTEXTILE

0 25 50 100 m

SCALE 1:1,500

WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT

NAD 1983 UTM Zone 21 U

REV. NO.	BY	CHK	DATE (MM/DD/YYYY)	COMMENTS
0	JC	LV	11/23/2023	ISSUED AS FINAL

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SITE: GREAT ATLANTIC SALT DEPOSIT

PROJECT DESCRIPTION: FEASIBILITY STUDY

FIGURE TITLE: **SETTLING POND PLAN VIEW AND DYKE TYPICAL CROSS-SECTION**

PROJECT NO.:	FIGURE NO:	REV. NO.
233.V03447.R0000	8	0

DATE: November 23, 2023 SCALE: NTS

Cadfile name: 233-V03447-R0000 GAS_SETTLING_POND_SECTION REV 0 - 23112023.dwg

5.5.4 Culvert Sizing

It is anticipated that flows in the Man o' War Brook will increase downstream of the location where the settling pond will discharge, relative to the flows prior to Project development. As a result, a larger culvert will be required under the historical haul road (Figure 1) to pass larger flows under the road. The culvert was sized using the same approach described in Section 5.4.3. Two HDPE 1.5 m diameter circular pipes are proposed.

6.0 Recommendations and Path Forward

The following recommendations are provided to advance the design to detailed engineering:

1 Carry out a waste rock geochemistry assessment and evaluate if water quality of runoff from the waste stockpile and the temporary pre-production stockpile could impact the downstream receiver.

2 Carry out additional monitoring of surface water quality for gathering of data to supplement the limited existing database. Details on recommendations for water quality monitoring are presented in SLR (2023b).

3 Confirm the adequacy of the 3-day retention time for the settling pond through additional desktop analysis if soil particle size becomes available from additional field data to be gathered in the future.

4 Conduct flood-routing to confirm the geometry of the settling pond overflow spillway.

5 Complete a site-specific sub-surface investigation for detailed engineering. The investigation should focus on overburden thickness, depth of organics/topsoil, strength and deformation characteristics of each soil stratum, and groundwater conditions.

6 Conduct a ground topographic survey of the road crossing of the Man o' War Brook (existing culvert under the historical haul road) to support the engineering design work.

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8.0 Statement of Limitations

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Atlas Salt Inc, hereafter referred to as the "Client". It is intended for the sole and exclusive use of the Client. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

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Opinions and recommendations contained in this report are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames, and project parameters as outlined in the Scope of Work and agreement between SLR and the Client. The data reported, findings, observations, and conclusions expressed are limited by the Scope of Work. SLR is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SLR does not warranty the accuracy of information provided by third party sources.

9.0 Closing Remarks

SLR would like to thank Atlas for the opportunity to work on this Project. Should you have any questions, please do not hesitate to contact us at any time.

Yours sincerely,

SLR Consulting (Canada) Ltd.

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10.0 Appendix A

Government of Canada Gouvernement du Canada

2020 National Building Code of Canada Seismic Hazard Tool

This application provides seismic values for the design of buildings in Canada under Part 4 of the National Building Code of Canada (NBC) 2020 as prescribed in Article 1.1.3.1. of Division B of the NBC 2020.

Seismic Hazard Values

User requested values

Code edition	NBC 2020
Site designation X_S	X_A
Latitude (°)	48.402
Longitude (°)	-58.529

Please select one of the tabs below.

NBC 2020 Additional Values Plots API

Background Information

The 5%-damped spectral acceleration (S_a(T,X), where T is the period, in s, and X is the site designation) and peak ground acceleration (PGA(X)) values are given in units of acceleration due to gravity (g, 9.81 m/s^2). Peak

ground velocity (PGV(X)) values are given in m/s. Probability is expressed in terms of percent exceedance in 50 years. Further information on the calculation of seismic hazard is provided under the *Background Information* tab.

The 2%-in-50-year seismic hazard values are provided in accordance with Article 4.1.8.4. of the NBC 2020. The 5%- and 10%-in-50-year values are provided for additional performance checks in accordance with Article 4.1.8.23. of the NBC 2020.

See the *Additional Values* tab for additional seismic hazard values, including values for other site designations, periods, and probabilities not defined in the NBC 2020.

NBC 2020 - 2%/50 years (0.000404 per annum) probability

$S_a(0.2, X_A)$	$S_a(0.5, X_A)$	$S_a(1.0, X_A)$	$S_a(2.0, X_A)$	$S_a(5.0, X_A)$	$S_a(10.0, X_A)$	$PGA(X_A)$	$PGV(X_A)$
0.0836	0.063	0.039	0.0205	0.00611	0.00247	0.0473	0.0479

The log-log interpolated 2%/50 year $S_a(4.0, X_A)$ value is : **0.0082**

▶ Tables for 5% and 10% in 50 year values

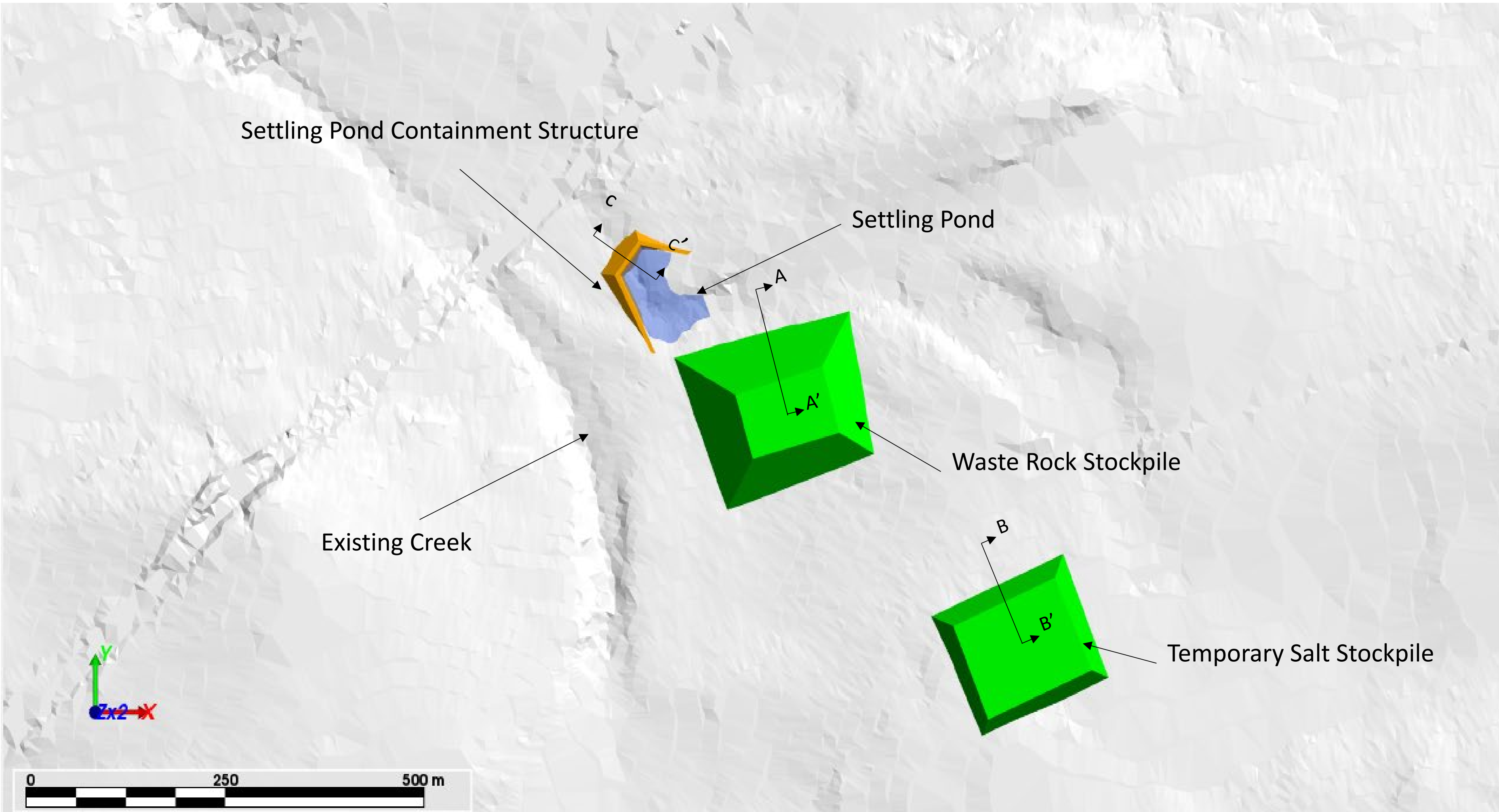
Download CSV

Go back to the seismic hazard calculator form

Date modified: 2021-04-06

SLR	SLR CONSULTING (CANADA) LTD	PROJECT	Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile
CLIENT:	Atlas Salt Inc. (ASI)	TITLE	2020 National Bulding Code Seismic Hazard Calculation

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A1	A



SLR

SLR CONSULTING (CANADA) LTD

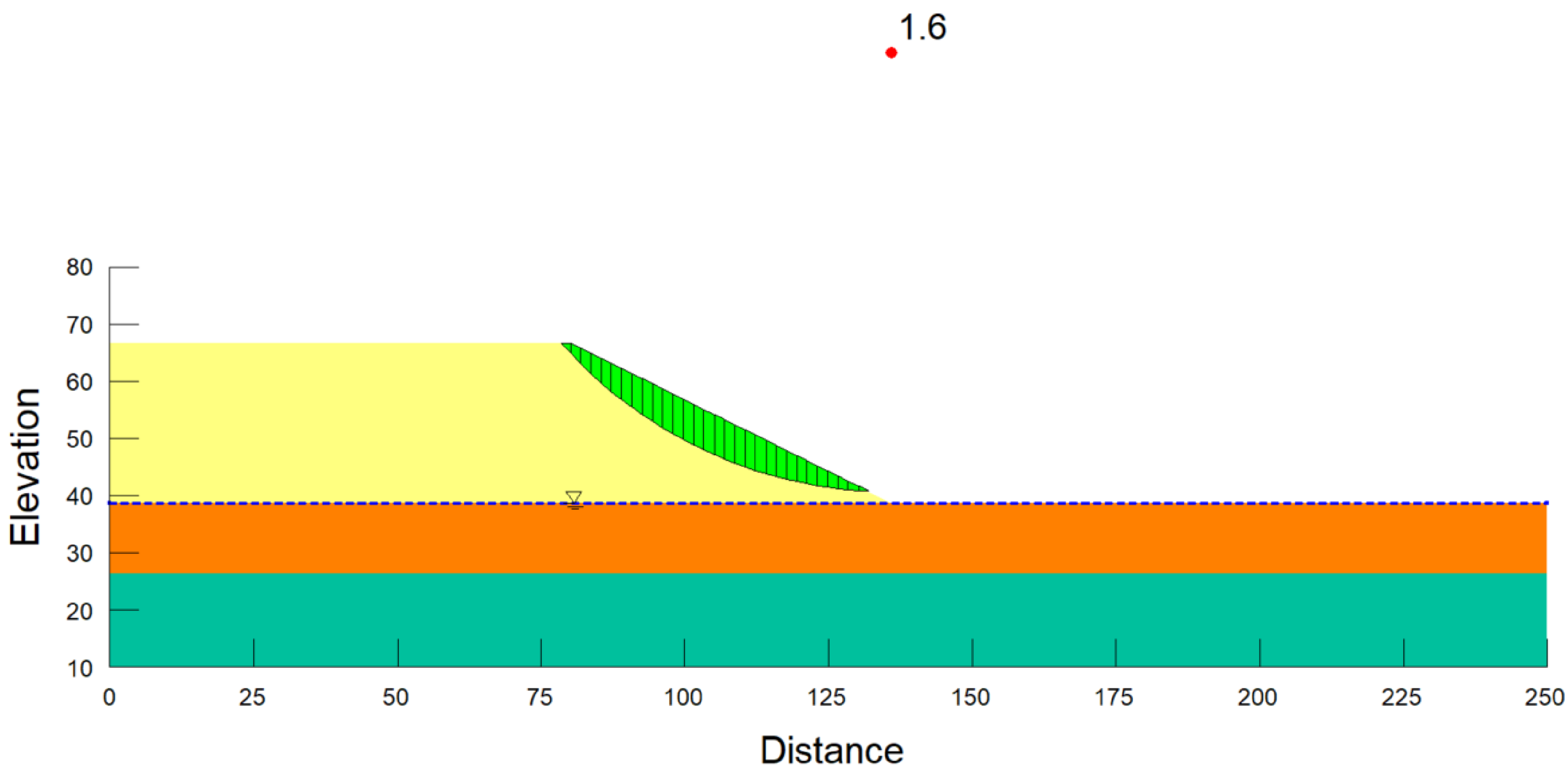
CLIENT:

Atlas Salt Inc. (ASI)

PROJECT	Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile
TITLE	Waste Storage and Temporary Salt Stockpile Deposition Model

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A2	A

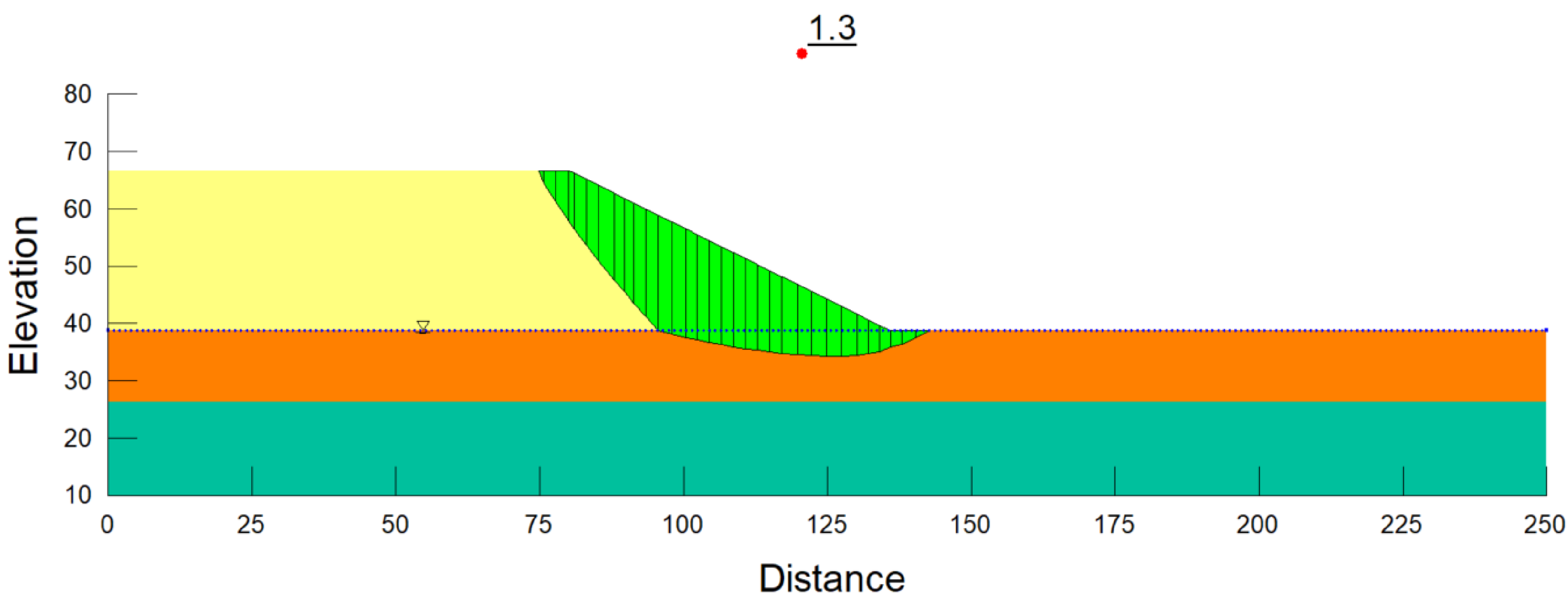
Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Waste Rock	Mohr-Coulomb	21	0	37



SLR	SLR CONSULTING (CANADA) LTD	PROJECT	Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile
CLIENT:	Atlas Salt Inc. (ASI)	TITLE	Waste rock Stockpile with 2:1 slope – Static Long Term

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A3	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	B-bar	Add Weight
	Bedrock	Bedrock (Impenetrable)				0	No
	Foundation Till	Mohr-Coulomb	20.5	0	40	0.7	No
	Waste Rock	Mohr-Coulomb	21	0	37	0	Yes



SLR

SLR CONSULTING (CANADA) LTD

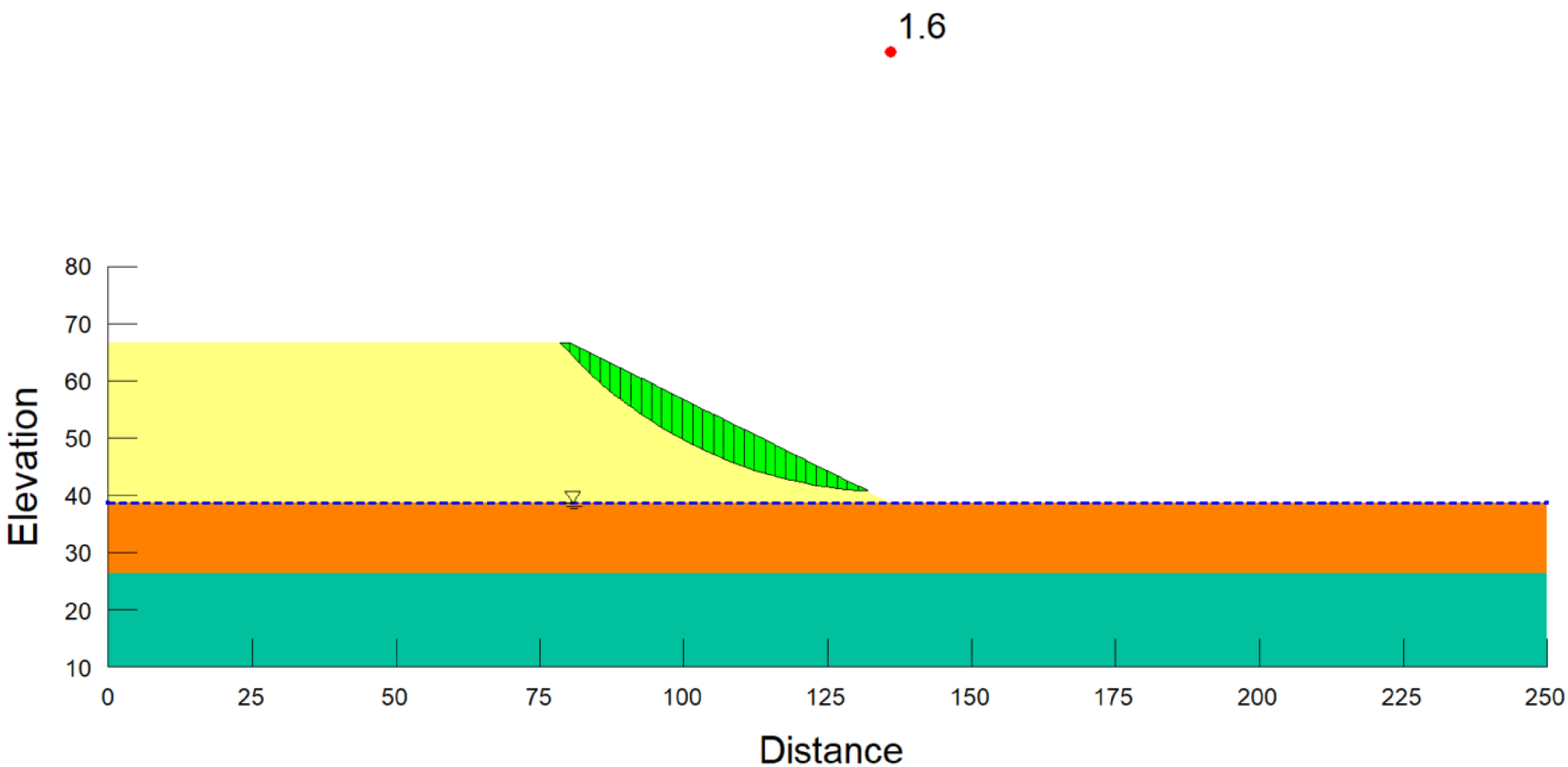
CLIENT: Atlas Salt Inc. (ASI)

PROJECT: Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE: Waste rock Stockpile with 2:1 slope – Static Short Term (During Construction)

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A4	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Waste Rock	Mohr-Coulomb	21	0	37



SLR

SLR CONSULTING (CANADA) LTD

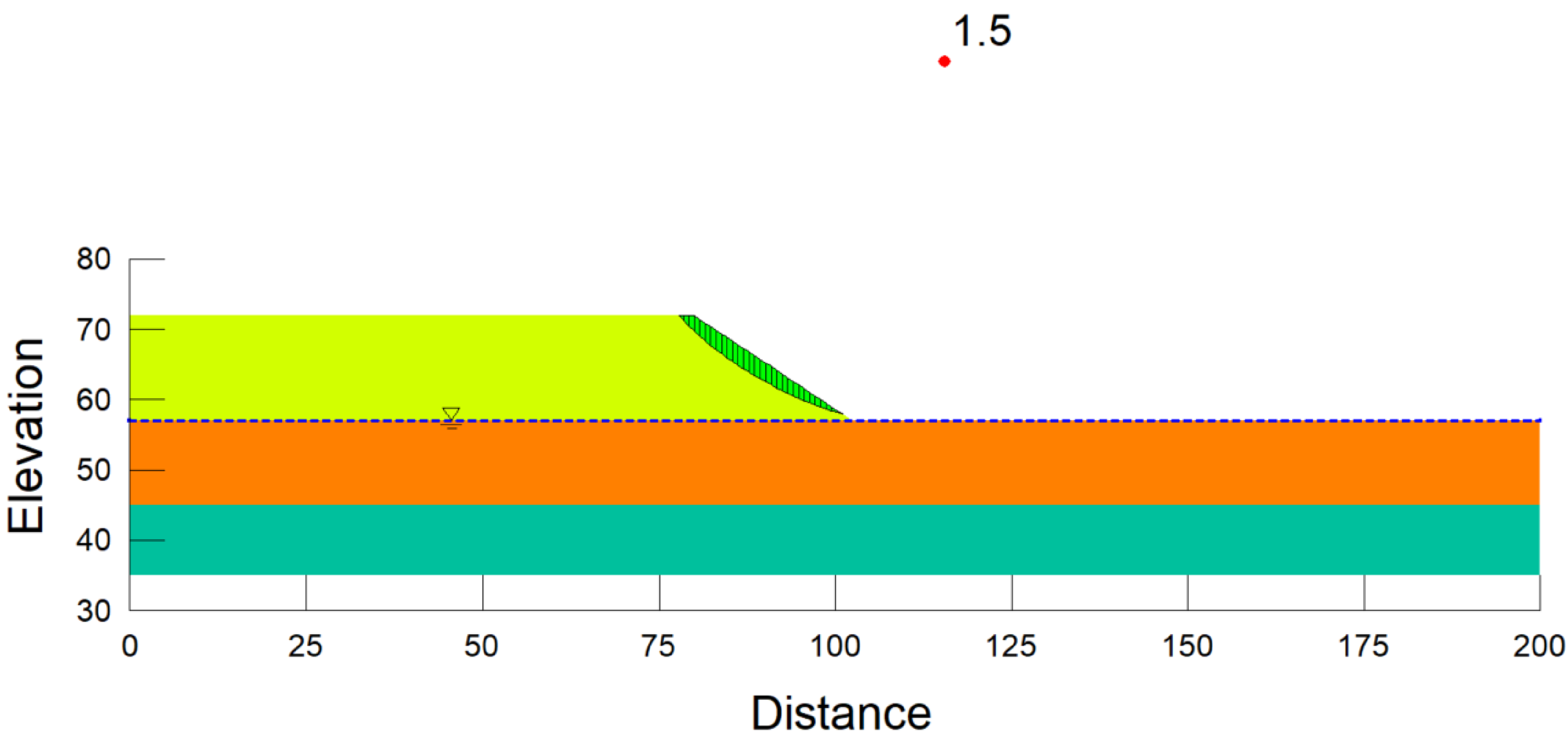
CLIENT: Atlas Salt Inc. (ASI)

PROJECT: Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE: Waste rock Stockpile with 2:1 slope – Pseudo-static

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A5	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Temporary Salt Ore	Mohr-Coulomb	21	0	44

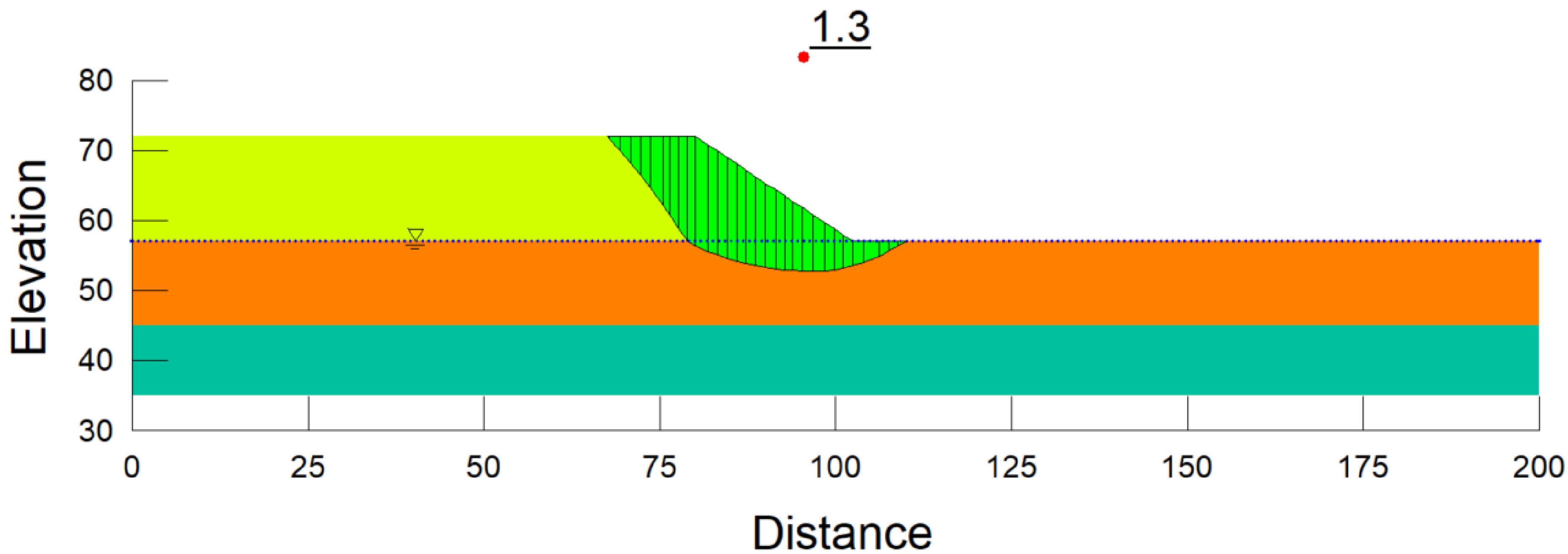


SLR	SLR CONSULTING (CANADA) LTD
CLIENT:	Atlas Salt Inc. (ASI)

PROJECT	Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile
TITLE	Temporary Salt stockpile with 1.5:1 slope – Static Long Term

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A6	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	B-bar	Add Weight
	Bedrock	Bedrock (Impenetrable)				0	No
	Foundation Till	Mohr-Coulomb	20.5	0	40	0.7	No
	Temporary Salt Ore	Mohr-Coulomb	21	0	44	0	Yes



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SLR CONSULTING (CANADA) LTD

CLIENT:

Atlas Salt Inc. (ASI)

PROJECT

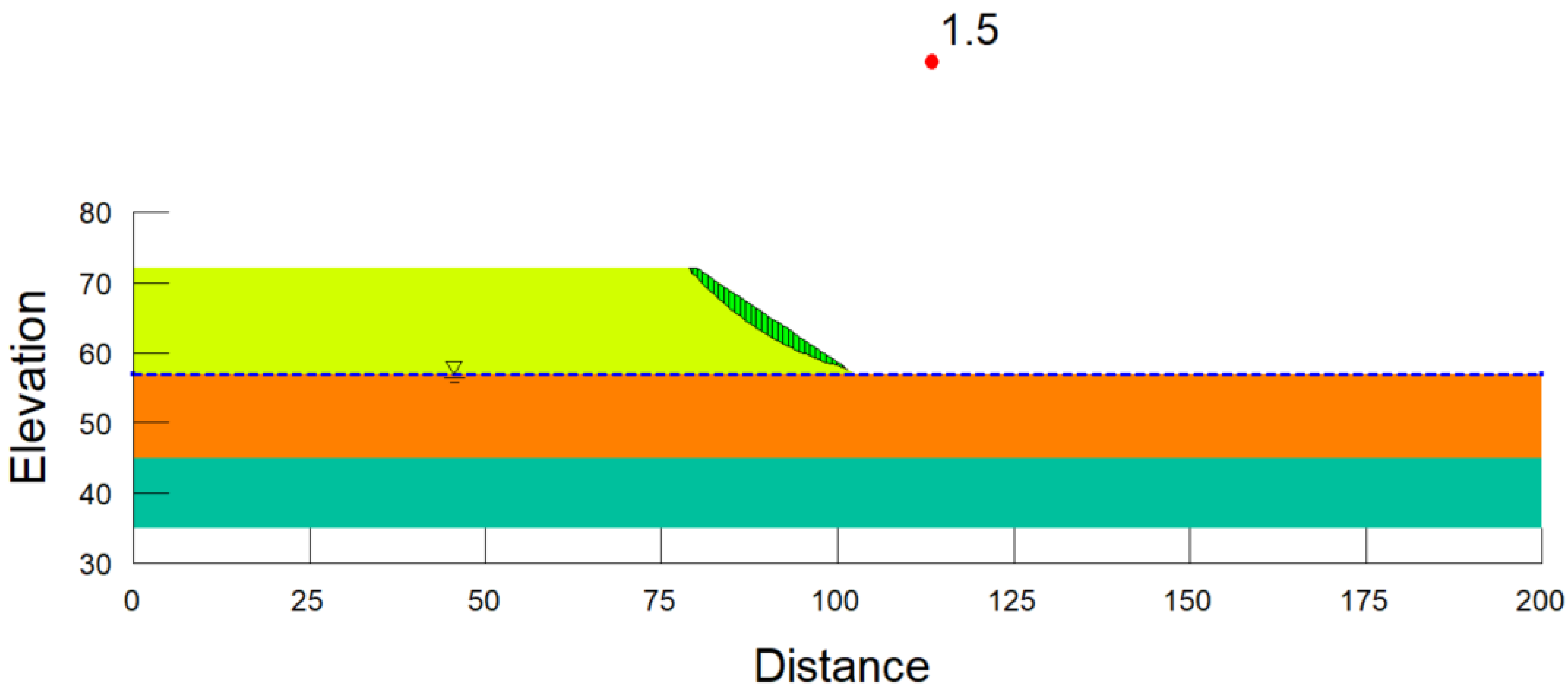
Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE

Temporary Salt stockpile with 1.5:1 slope – Static Short Term (During Construction)

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A7	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Temporary Salt Ore	Mohr-Coulomb	21	0	44



SLR CONSULTING (CANADA) LTD

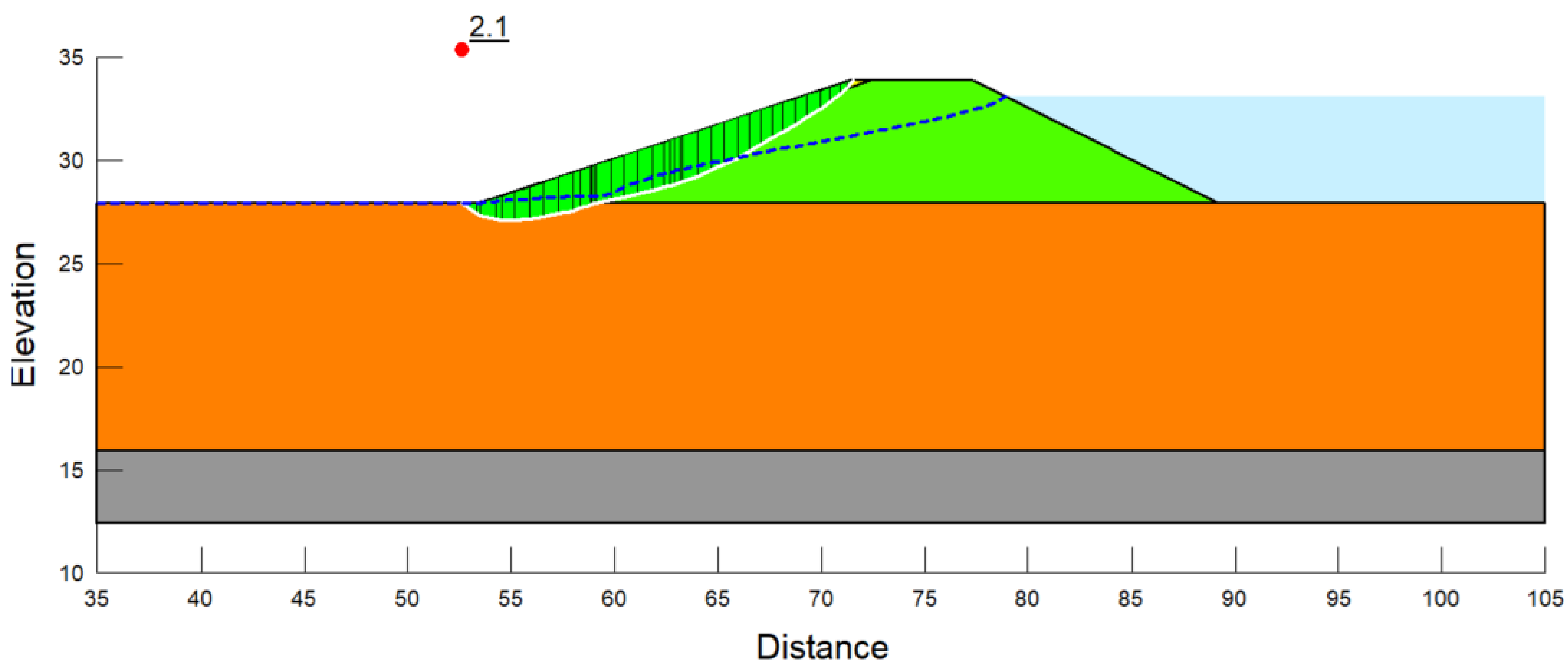
CLIENT: Atlas Salt Inc. (ASI)

PROJECT: Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE: Temporary Salt stockpile with 1.5:1 slope – Pseudo-static

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A8	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Compacted Till	Mohr-Coulomb	20.5	0	35
	Filter	Mohr-Coulomb	20.5	0	37
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Waste Rock/Riprap	Mohr-Coulomb	21	0	37



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SLR CONSULTING (CANADA) LTD

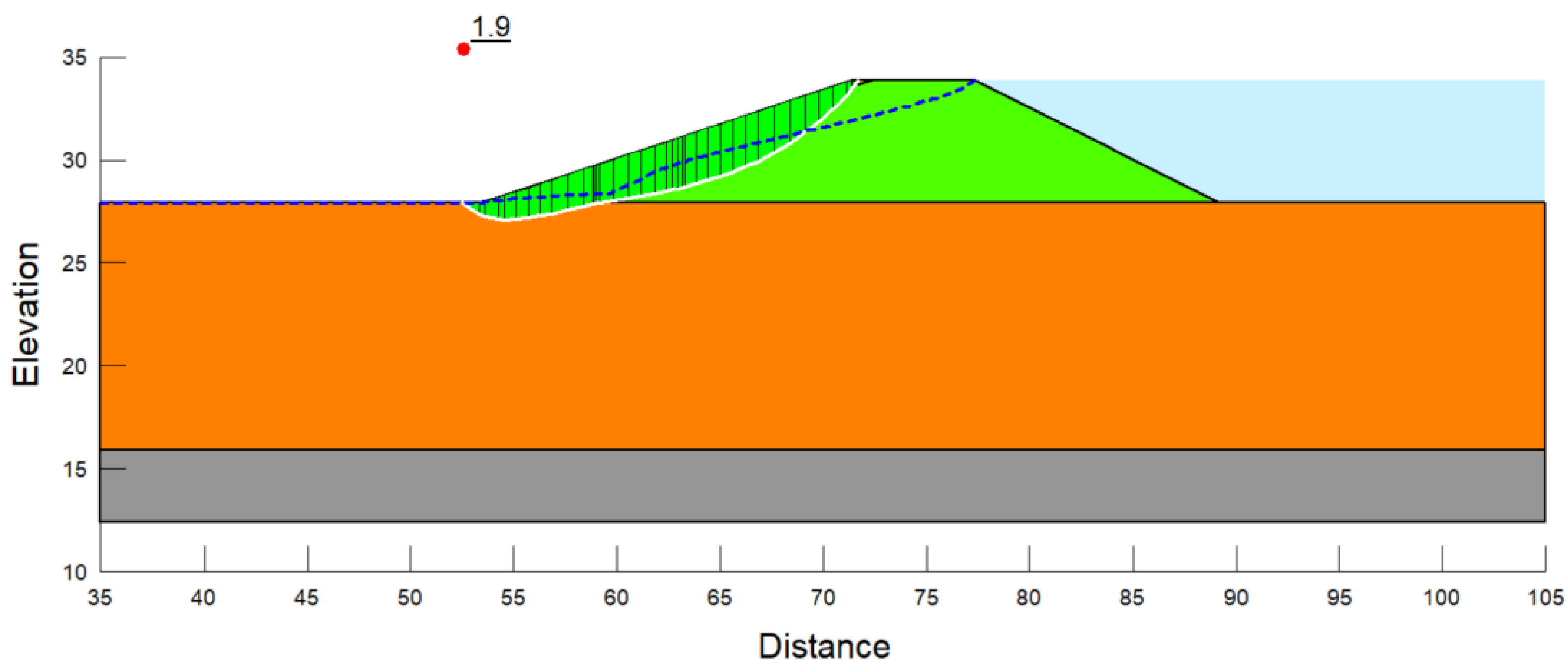
CLIENT: **Atlas Salt Inc. (ASI)**

PROJECT: Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE: Sediment Containment Structure with 3:1 Downstream Slope – Static Long Term

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A9	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Compacted Till	Mohr-Coulomb	20.5	0	35
	Filter	Mohr-Coulomb	20.5	0	37
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Waste Rock/Riprap	Mohr-Coulomb	21	0	37



SLR

SLR CONSULTING (CANADA) LTD

CLIENT:

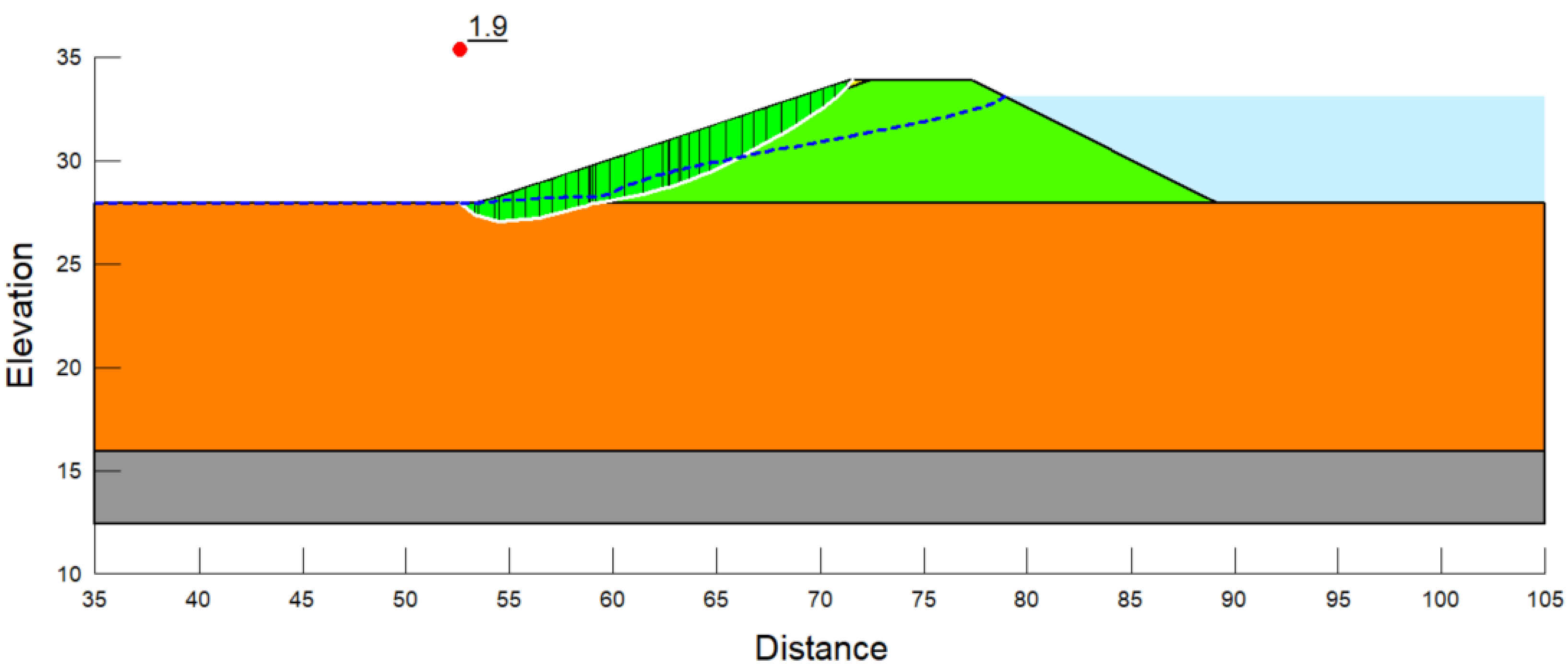
Atlas Salt Inc. (ASI)

PROJECT: Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE: Sediment Containment Structure with 3:1 Downstream Slope – Static Short Term (High Water Level)

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A10	A

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Compacted Till	Mohr-Coulomb	20.5	0	35
	Filter	Mohr-Coulomb	20.5	0	37
	Foundation Till	Mohr-Coulomb	20.5	0	40
	Waste Rock/Riprap	Mohr-Coulomb	21	0	37



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SLR CONSULTING (CANADA) LTD

CLIENT:

Atlas Salt Inc. (ASI)

PROJECT

Great Atlantic Salt Project Feasibility Study – Design of Waste Storage and Temporary Salt Stockpile

TITLE

Sediment Containment Structure with 3:1 Downstream Slope – Pseudo-static

DATE:	PROJECT	FIGURE NO:	REV. NO.:
5/11/2023	233.V03447.R0000	A11	A