REPORT

Waste Rock and Overburden Management Plan

Coffee Gold Mine

Prepared for:

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REVISION TRACKING LOG

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0	November 2023	-	First submission of the Waste Rock and Overburden Management Plan
1	March 2025	Various	Updated in response to QML IR1 and partial updates based on Type A WUL IR9
2			

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS ..... **VI**

LIST OF SYMBOLS AND UNITS OF MEASURE ..... **VIII**

INFORMATION REQUIREMENTS FOR QUARTZ MINE LICENSE AND WATER LICENSE ..... **IX**

1.0 INTRODUCTION **1**

1.1 Project Summary 1
1.2 Scope and Objectives 4
1.3 Incorporation of Traditional Knowledge and Consultation Feedback 4
1.4 Synergies with Newmont Standards and Requirements and Other Project Documents 4
1.5 Roles and Responsibilities of Key Personnel 6
1.6 Applicable Legislation 6

2.0 DESIGN CRITERIA **7**

2.1 Surficial Geology Overview 7
2.2 Waste Rock 8
2.2.1 Waste Rock Properties 8
2.2.2 Waste Rock Quantities 8
2.3 Overburden 9
2.3.1 Overburden Properties 9
2.3.2 Overburden Quantities 10
2.4 Permafrost 11
2.4.1 Permafrost Distribution 16
2.5 Classification of Metal Leaching and Acid Rock Drainage Potential 18
2.5.1 ARD Potential 18
2.5.2 Metal Leaching Potential 20
2.5.3 Potential Sources of ML/ARD 22
2.6 Geotechnical Criteria 23
2.6.1 Geotechnical Assessment 23
2.6.2 Stability and Settlement 25
2.7 Hydrologic Criteria 30
2.8 Mine Rock Management Facility Classification 31

3.0 STORAGE FACILITY DESIGN **36**

3.1 Alpha WRSF 36
3.1.1 Foundation Design 36
3.1.2 Alpha WRSF Design 37
3.1.3 Rock Drain and Seepage Design 38

3.2 Open Pit Backfill 39
3.2.1 Open Pit Backfill Design 39
3.3 ROM Stockpile 40
3.3.1 ROM Stockpile Design 40
3.4 Soil and Overburden Stockpiles 40
3.4.1 Foundation Design 41
3.4.2 Soil and Overburden Stockpiles Design 41
3.5 Frozen Soil Storage Area 42
3.5.1 Frozen Soil Storage Area Design 42
3.6 Water Management Infrastructure 43

4.0 STORAGE FACILITY GENERAL CONSTRUCTION 44
4.1 Construction QA/QC 44
4.2 Vegetation Clearing 44
4.3 Excavation 45
4.4 Transport and Handling 46
4.5 Material Availability 46

5.0 MATERIAL MANAGEMENT 47
5.1 Waste Rock 47
5.2 Overburden 49
5.3 ROM Stockpile 50
5.4 Heap Leach Facility 51
5.5 Haul Roads 52
5.6 Pit Wall Rock 53
5.7 Frozen Materials Management 54
5.8 Segregation Protocol 57
5.8.1 Waste Rock 57
5.8.2 Overburden 57
5.8.3 Mineralized Material 58
5.9 Materials for Reclamation 58

6.0 MONITORING PROGRAM AND REPORTING 59

7.0 ADAPTIVE MANAGEMENT 59

8.0 REFERENCES 60

LIST OF TABLES (WITHIN TEXT)

Table 1-1 Newmont Global Standards 5
Table 1-2 Key Project Personnel 6
Table 2-1 Estimated Annual Waste Allocations by Destination (Mt) 9
Table 2-2 Estimated Average Daily Waste Rock Deposition Rate (kt/day) 9
Table 2-3 Estimated Total Waste Rock Excavations Over Mine Life (Mt) 9
Table 2-4 Excavations of Overburden from Various Mine Components 10
Table 2-5 Approximate Permafrost Distribution for Mine Infrastructure Locations 17
Table 2-6 Classification of ML/ARD Potential 23
Table 2-7 Summary of Bedrock Geotechnical Data 24
Table 2-8 Average Intact Rock Properties Derived from Laboratory Test Results 24
Table 2-9 Suggested Stability Acceptance Criteria 29
Table 2-10 Factors of Safety Results 29
Table 2-11 Hydrologic Design Criteria for Formulating Peak Flows 30
Table 2-12 Alpha Waste Rock Storage Facility Classification 32
Table 2-13 Run-of-Mine Stockpile Classification 33
Table 2-14 Open Pit Backfill Classification 34
Table 2-15 Overburden Stockpile Classification 35
Table 5-1 Mass, Spillway Elevation, and Construction Period of the WRSF and in-pit backfill 47
Table 5-2 Approximate Mass Required for Haul Road Construction 52
Table 5-3 Plan View of Surface Areas of Wall Rock Exposed in Mine Pit 54
Table 5-4 Field Identification, Classification and Management of Frozen Soils 56

LIST OF FIGURES (WITHIN TEXT)

Figure 1-1 Coffee Project Location and Northern Access Route 2
Figure 1-2 Mine Site General Arrangement 3
Figure 2-1 Permafrost Distribution, Thickness and Ground Temperatures 12
Figure 2-2 Permafrost Distribution and As-Drilled Borehole Layout 13
Figure 2-3 Description of Frozen Soils 15
Figure 2-4 Total C plotted against CaNP for Waste Rock and Ore 19
Figure 2-5 Slope Stability Section Traces – Alpha WRSF 25
Figure 2-6 Slope Stability Section Traces – Alpha WRSF – Section A 26
Figure 2-7 Slope Stability Section Traces – Alpha WRSF – Section B 26
Figure 2-8 ROM Stockpile 27
Figure 2-9 Supremo In-pit Backfill Waste Rock Configuration 27
Figure 2-10 Soil Stockpile 28

LIST OF APPENDICES

Appendix A WRSF Stockpile Stability Analysis
Appendix B Thermal Modeling for the Alpha WRSF Rock Drain
Appendix C Block Model Figures
Appendix D WROMP Table of Concordance

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
ABA	Acid Base Accounting
ACA	average continental abundance
Ag	Silver
Al	Aluminum
AP	Acid potential
ARD	Acid rock drainage
ASTM	American Society for Testing and Materials
Au	Gold
As	Arsenic
BC	British Columbia
BCM	Bank Cubic Meters
Bi	bismuth
BMP	Best Management Practice
C	Carbon
$CaCO_3$	Calcium carbonate
CaNP	Carbonate neutralization potential
CCLs	compacted clay liners
Cd	cadmium
Cn	Cyanide
Co	Cobalt
COCs	contaminants of concern
Cr	Chromium
Cu	Copper
ELL	Electrical Leak Location
EPCM	Engineering, Procurement, and Construction Management
EQS	Effluent Quality Standards
Fe	Iron
Fi	Frozen, ice-rich
Fn	Frozen, no visible ice
Fv	Frozen, visible ice
FoS	Factor of safety
g	Gravity
GCL	geo-synthetic clay liner
GMP	Good Management Practices
Hg	mercury
HLF	Heap Leach Facility
H:V	Horizontal to vertical
ICP-OES	Inductively coupled plasma optical emission spectrometry
ITPs	Inspection and Test Plans
LOM	Life of mine

Acronym / Abbreviation	Definition
ML	metal leaching
MMER	Metal Mining Effluent Regulations
Mn	Manganese
Mo	Molybdenum
MPa	Megapascals
NAR	Northern Access Route
NaCN	Sodium cyanide
Ni	Nickel
NP	neutralization potential
NPR	Net potential ratio
NRC	National Research Council of Canada
OMS	Operation, Maintenance and Surveillance
PAG	Potentially acid generating
PGA	Peak ground acceleration
PLC	Programmable logic controller
PoF	Probability of Failure
Project	Coffee Gold Project
QA/QC	Quality Assurance / Quality Control
QP	Qualified Professional
R^2	Linear regression equation and coefficient of determination
RMR	Rock Mass Rating
RO	reverse osmosis
ROM	Run-of-mine
RQD	rock quality designation
S	sulphur
Sb	Antimony
Se	selenium
SOP	Standard operating procedure
Total-C	Total carbon
TSS	total suspended solids
U	Uranium
UCS	Uniaxial Compressive Strength
USBR	United States Bureau of Reclamation
USCS	Unified Soil Classification System
VFD	Variable Frequency Drive
WBM	Water balance model
WBWQM	Water balance and water quality model
WRSF	Waste Rock Storage Facility
YTT	Yukon-Tanana Terrane
Zn	Zinc

LIST OF SYMBOLS AND UNITS OF MEASURE

Symbol, Unit of Measure	Definition
°C	degrees Celsius
g	gravity acceleration
ha	hectare
%	Percent
kg	kilogram
km	kilometre
km^2	square kilometre
m	metre
m^2	square metre
m^3	cubic metre
Mt	million metric tonnes
ppm	parts per million
t	tonne
wt.%	percentage by weight
kW	kilowatt
L	litre
m	Metre
M	million
masl	metres above sea level
ML	million litres
mm	millimetre
Mt	million tonnes
Mt/a	million tonnes per annum
MW	megawatt
rpm	revolutions per minute
t	tonne
t/d	tonnes per day

INFORMATION REQUIREMENTS FOR QUARTZ MINE LICENSE AND WATER LICENSE

Information Requirement	Location in this Plan
Table of Concordance	Appendix D
Revision Log	Page i
Provide an overview of the design for all rock and overburden storage facilities, including facilities for waste rock, overburden, ore, and low-grade ore. Also describe the associated water management infrastructure and the proposed operational plan for handling and storing rock and overburden materials.	Section 3: Storage Facility Design Water Management Plan Section 5: Material Management
Describe the timing and sequencing for each proposed facility.	Section 2.2.2: Waste Rock Quantities
Outline the design criteria that were used to guide the design for the waste management facilities including project constraints, regulatory and guidance-based criteria and other criteria. Rationale for selection of all criteria should be provided.	Section 1.6: Applicable Legislation Section 2: Design Criteria
Where criteria are developed in accordance with regulatory requirements or guidance documents, rationales must clearly demonstrate how the proposed criteria meet these requirements or guidance. If different criteria will be applied during different project phases, these should be specified. If the criteria are based on detailed site-specific analyses (e.g., stability analyses), these should be referenced and provided.	Section 2: Design Criteria
Design documentation should demonstrate how the proposed design achieves the design criteria.	Section 2: Design Criteria
Provide the overall tonnage, daily and annual deposition rates for each type of material.	Section 2.2.2: Waste Rock Quantities
Provide the densities, moisture and drainage characteristics, strengths, and other geotechnical properties for each type of material.	Section 2.4: Permafrost Section 2.6: Geotechnical Criteria Section 3.4.1: Soil and Overburden Foundation Design
Based on the Mined Rock and Overburden Piles Investigation and Design Manual Interim Guidelines, provide the general criteria that will be used for each dump constructed on site. Describe seismic design events, factors of safety, slope angles, material strengths, seepage rates.	Section 2: Design Criteria
Provide flood design events, inflow hydrographs, erosion control, sediment removal.	Section 3.1.3: Rock Drain and Seepage Design Water Management Plan Erosion and Sediment Control Plan
Describe any constraints on rock or overburden storage, e.g., under water storage, thaw unstable materials.	Section 2.4: Permafrost Section 3.1.2: Alpha WRSF Design Section 3.5: Frozen Soil Storage Area
Provide permeabilities and leakage rates of the liner system.	N/A

Information Requirement	Location in this Plan
Identify contaminants of concern and proposed water treatment, discharge and receiving water quality criteria.	Water Management Plan; Heap Leach Process Facilities Plan
Provide specific designs for each dump that will be operated on site, including all facilities for contaminated and non-contact water management. Designs and construction plans must account for site-specific conditions including adverse geotechnical conditions and extreme climatic events. Designs must demonstrate how the proposed facilities will meet the design criteria, and that they will be stable both during construction and in the long term.	Section 3: Storage Facility Design Water Management Plan
Describe any geotechnical conditions at the dump site that warrant specific design considerations and provide any assumptions that were used when designing the dump. Identify foundation conditions with logs of vertical sections that show the locations of drill holes, material sizing, material type, and permafrost. Include a stability analysis with a factor of safety based on earthquake scenarios.	Section 2.4: Permafrost Section 2.6: Geotechnical Criteria
Describe in detail the construction of the dump, the materials that will be used to create drainage systems below the dump, any liners that will be place, whether a toe berm is required, any specific material sorting procedures, and any water diversion structures that are required. Include lift heights, bench widths, internal and overall slopes, and specific measures to address site or material conditions. Describe material and construction specifications.	Section 3: Storage Facility Design Water Management Plan
Provide design drawings showing the cross-section of the dump from side-to-side and front-to-back in several locations, include any water diversion structures that will be constructed around or on the dumps. These drawings must be stamped by an engineer licensed to practice in the Yukon.	Section 2.6.2: Stability and Settlement
Describe any proposed co-disposal of waste rock with tailings materials.	N/A
Describe any clearing, stripping and grubbing activities that are required to prepare the dump locations. Include the area to be cleared, and where materials will be stored including foundation descriptions, site preparation, water management, erosion control and stability analysis. Describe any specific requirements for addressing storage of ice rich or high moisture materials.	Section 3: Storage Facility Design Section 2.6.2: Stability and Settlement
Describe how materials will be transported, unloaded, and distributed on the waste dumps. Describe how lifts will be built up, if grading is necessary, and how the final dump lift will be constructed.	Section 3: Storage Facility Design
Provide stability analyses for proposed facilities. These must be supported by site-specific sampling and testing of materials present in foundations and the stored materials, providing realistic and defensible material strengths and properties.	Section 2.6: Geotechnical Criteria

Information Requirement	Location in this Plan
Describe the construction quality assurance/quality control program that will be implemented to ensure that construction activities achieve expected performance for important factors like foundation preparation, permafrost identification and mitigation, dump construction, liner placement, and compaction. Also describe how the construction quality assurance/quality control program will ensure appropriate implementation of construction constraints related to climatic conditions like wet, dry and freezing conditions.	Section 4.1: Construction QA/QC
Provide designs for surface water management facilities and infrastructure (e.g., temporary diversions, permanent diversions, intercept ditches, sediment control ponds) including hydraulic analyses, layout, sizing, material and construction specifications, and erosion control. Designs should demonstrate how the facilities will route design events and effectively manage segregation of non-contact water from contact water. Operations in low flow and freezing conditions should be addressed. Designs for both permanent and temporary facilities must be included. Provide designs for sediment control and removal facilities for both construction and operation phases, including retention times and removal efficiencies.	Water Management Plan
Provide designs for all proposed liner systems. For proposed liner systems, provide rationales for the selection of the overall liner system, and for selection of individual liner components, describing how the system and components achieve the design criteria and provide suitable management of risks.	N/A
Provide analysis to predict leakage through proposed liners and describe how water that accumulates above the liner will be managed. Describe how liner systems will respond to predicted foundation settlement and to expected loading. For each liner component, provide material and construction specifications, and describe surface preparation and the proposed placement, including any construction constraints or frost protection requirements. Provide details for all liner anchoring, transitions and perforations.	N/A
Provide a detailed description of proposed operations, maintenance and monitoring programs for rock and overburden management.	EMAMP: Physical Monitoring Plan EMAMP: Geochemical Monitoring Plan
Provide detailed descriptions of proposed monitoring programs and infrastructure (e.g., slope inclinometers, survey hubs, thermistors, etc.) for water quality, flow, physical stability, and climate. Describe programs for evaluating and interpreting the results of monitoring programs, and how these will be used to influence operational decisions and maintenance requirements.	EMAMP: Physical Monitoring Plan EMAMP: SWQ Monitoring Plan EMAMP: Hydrology Monitoring Plan EMAMP: Meteorological Monitoring Plan
Describe the different types of rock and overburden (ore, waste rock, overburden, lowgrade ore) that will be excavated throughout the duration of the project, their geochemical make-up and whether acid rock drainage or metal leaching is expected from the different rock types.	Section 2.5: Classification of Metal Leaching and Acid Rock Drainage Potential

Information Requirement	Location in this Plan
Provide detailed sampling programs for characterizing rock and overburden during operations, including how materials will be tested to meet requirements of segregation protocols (e.g., acid generation or metal leaching potential, or the suitability for reclamation purposes). Provide the testing protocols, including how often drill cuttings are sent for assay, what tests are completed on site, and how the assay results are used to lay out field polygons.	Section 2.5: Classification of Metal Leaching and Acid Rock Drainage Potential Section 5.8 Segregation Protocol EMAMP: Geochemical Monitoring Plan
Describe criteria, protocols and operational procedures for segregation of rock and overburden materials. Specify criteria that will be used to segregate waste on the basis of chemical or geotechnical properties. Describe the waste segregation protocol that will be followed to ensure potentially acid generating or metal leaching materials are kept separate from more chemically stable materials, and how materials placed in dumps will meet geotechnical design specifications (e.g., thaw stable, liquefaction potential). Describe the locations where overburden and reclamation materials will be stored and how these materials will be kept separate from waste rock not suitable for reclamation purposes.	Section 5: Material Management
Provide the volume estimates for each rock and overburden type; provide both bank cubic meter and cubic meter estimates.	Section 2.2.2: Waste Rock Quantities Section 2.3.2: Overburden Quantities
Provide an estimate of the volumes of rock and overburden that will go into each dump, and the timeframe in which these dumps will be used.	Section 2.2.2: Waste Rock Quantities
Describe the monitoring program to monitor movement and stability of the waste dumps as well as water quality and flow conditions. Provide details that include monitoring frequency and locations and describe how the monitoring data will be evaluated, interpreted, and reported.	EMAMP: Physical Monitoring Plan EMAMP: SWQ Monitoring Plan
Describe any proposed adaptive management plans that are designed to address unexpected performance of rock and overburden management programs.	Section 7: Adaptive Management

YWB EMR Plan Requirements Applicable to the General Mine Development Plan		
Information Requirement	**Location in this Plan**	**Referenced From**
Provide a geotechnical assessment that describes the competency of the rock and describe the methods that were used to determine the rock mass quality on site rock masses on site, and a summary of the typical rock mass qualities for all ore bodies and zones. Provide the point load strength index for the different rock types. Describe seismic design events, factors of safety, and slope angles.	Section 2.6 Geotechnical Criteria	General Mine Development Plan Mine Operations Plan
Describe site clearing, stripping, and grubbing and foundation preparation. Include areas to be cleared and volumes of material removed. Identify storage locations for waste materials generated from construction activities. For foundation preparation, describe how unsuitable in-situ materials, such as ice-rich permafrost, soft, or weak materials will be identified and addressed.	Section 5.7 Frozen Materials Management	General Mine Development Plan Mine Operations Plan

Information Requirement		Location in this Plan
YWB EMR Plan Requirements Applicable to the General Mine Development Plan		
Information Requirement	**Location in this Plan**	**Referenced From**
Provide a description of how ore will be handled on site, including location and design of stockpiles, segregation protocols, stockpile inventories, and projected life of stockpiles.	Section 5.3 ROM Stockpile	General Mine Development Plan Mine Operations Plan
Provide a brief description of the waste rock and high grade and low-grade ore storage locations and the segregation protocols. Describe any dynamic stockpiles that will be on site, and the timing of these facilities.	Section 2.2.1 Waste Rock Properties Section 5 Material Management Section 5.8 Segregation Protocol	General Mine Development Plan Mine Operations Plan

1.0 INTRODUCTION

1.1 Project Summary

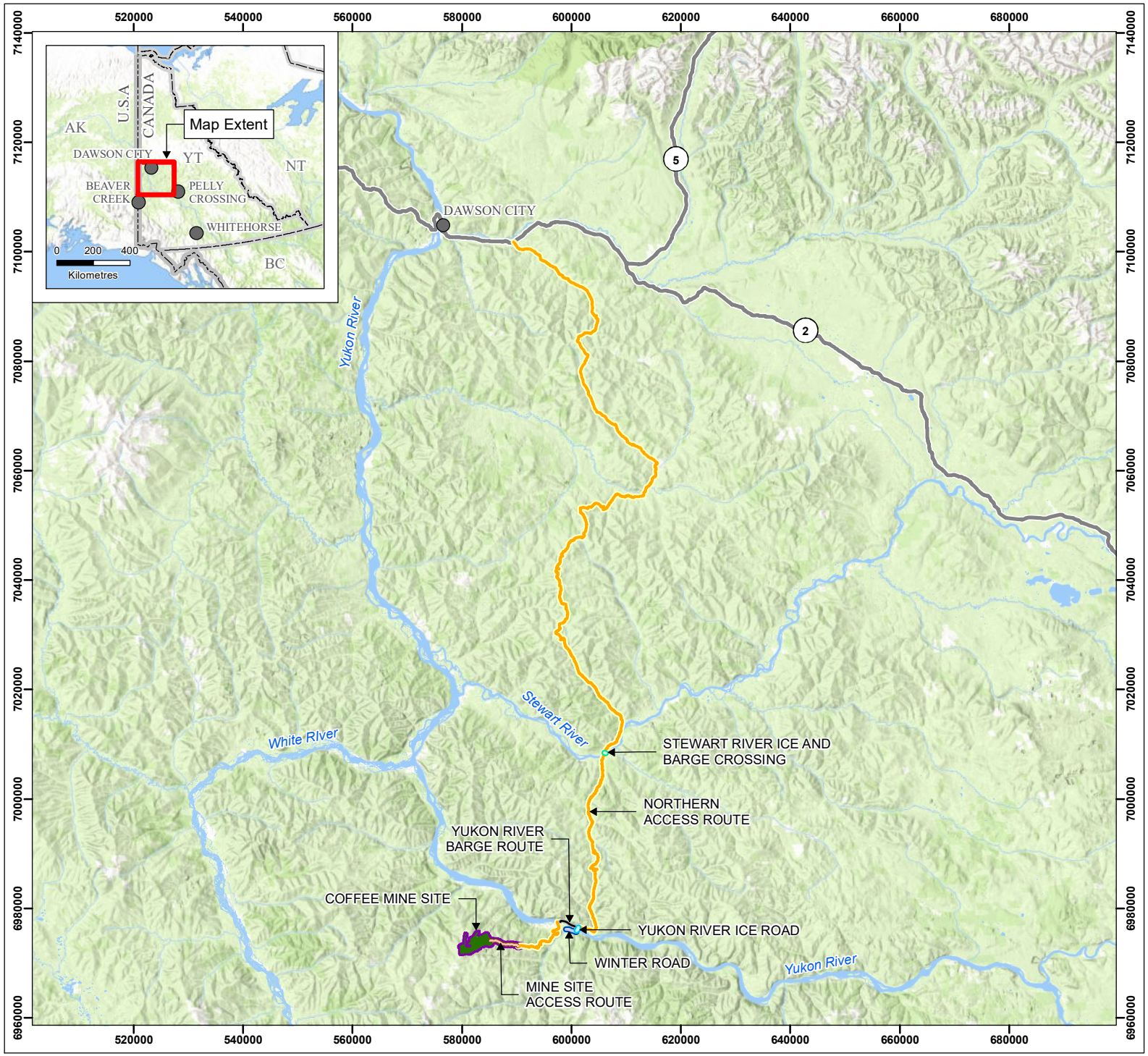
The proposed Coffee Gold Mine (the Project) is an open-pit gold mine owned by Goldcorp Kaminak Ltd., a wholly owned subsidiary of Newmont Corporation (Newmont), located on the south side of the Yukon River in the White Gold District of west-central Yukon. The Project site is approximately 130 km south of the City of Dawson, 140 km west of Pelly Crossing, 95 km north-east of Beaver Creek, and 340 km northwest of Whitehorse. The Project is located wholly within the traditional territory of Tr'ondëk Hwëch'in, partially within the traditional territory of Selkirk First Nation and First Nation of Na-cho Nyäk Dun, and partially within the asserted territory of White River First Nation. The Project contains several gold occurrences within an exploration concession covering an area of more than 600 km^2. The Mine Site will be accessed by road from Dawson via a 16-km stretch of Klondike Highway and 192-km all-season road, referred to as the Northern Access Route (NAR) (Figure 1-1). The NAR includes seasonal barge crossings on both the Stewart and Yukon rivers, with ice bridges and a seasonal winter road in the winter months.

The Project is comprised of four open pits: Supremo, Latte, Double Double, and Kona. Waste rock is proposed to be permanently stored in the Alpha Waste Rock Storage Facility (WRSF) (Figure 1-2). The ore production rate is proposed to be up to approximately 9.0 million tonnes (Mt) per year, producing an estimated total of 67 Mt of heap leach feed over the 10-year Operation Phase. The conceptual-level estimate for waste material to be moved over the life of mine (LOM) is up to approximately 330 Mt based on an average strip ratio of 5.0:1. The ore will be crushed and transported to the Heap Leach Facility (HLF) via overland conveyor or trucks for nine months of the year. During the three coldest months of winter, run-of-mine (ROM) ore will be stockpiled in the ROM stockpile. Gold will be extracted from gold-bearing leach solution by a six tonnes per day (t/d) adsorption, desorption, recovery carbon plant with mercury retorting to produce a final gold doré product. A total of 2.6 million ounces of gold is planned to be recovered over a 10-year mine life.

The Project phases are defined as follows:

- Construction Phase: Q2 Year –3 to end of Year –1 (30 months)
- Operation Phase: Year –1 to end of Year 9 (10 years)
- Reclamation and Closure Phase: Year 10 to end of Year 21, including a 6-year Post-Mining Closure Stage and a 5-year Active Closure Stage (11 years)
- Post-Closure Phase: Year 21 onwards as determined to be required.

These phases broadly describe the activities occurring within a particular time period; however, some activities will continue from one phase to another as mine site development advances with operational activities (e.g., Open Pits, WRSF). When areas that support mine operations are no longer required, they will be progressively reclaimed. The overall Project schedule is the general expected scenario for mine construction and operation; detailed activities are subject to change depending on detailed mine planning and the timing of receipt of authorizations.



COFFEE GOLD MINE

Coffee Project Location and Northern Access Route

Legend

- Stewart River Ice and Barge Crossing
- Yukon River Barge Route
- Yukon River Ice Road
- Winter Road
- Mine Site Access Route
- Northern Access Route
- Project Area
- Project Footprint
- Highway
- Waterbody

Notes

1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.
2. Contains information licensed under the Open Government Licence - Yukon Territory
3. Basemap: ESRI World Topographic Map
4. Inset Basemap: ESRI World Topographic Map

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Kilometres

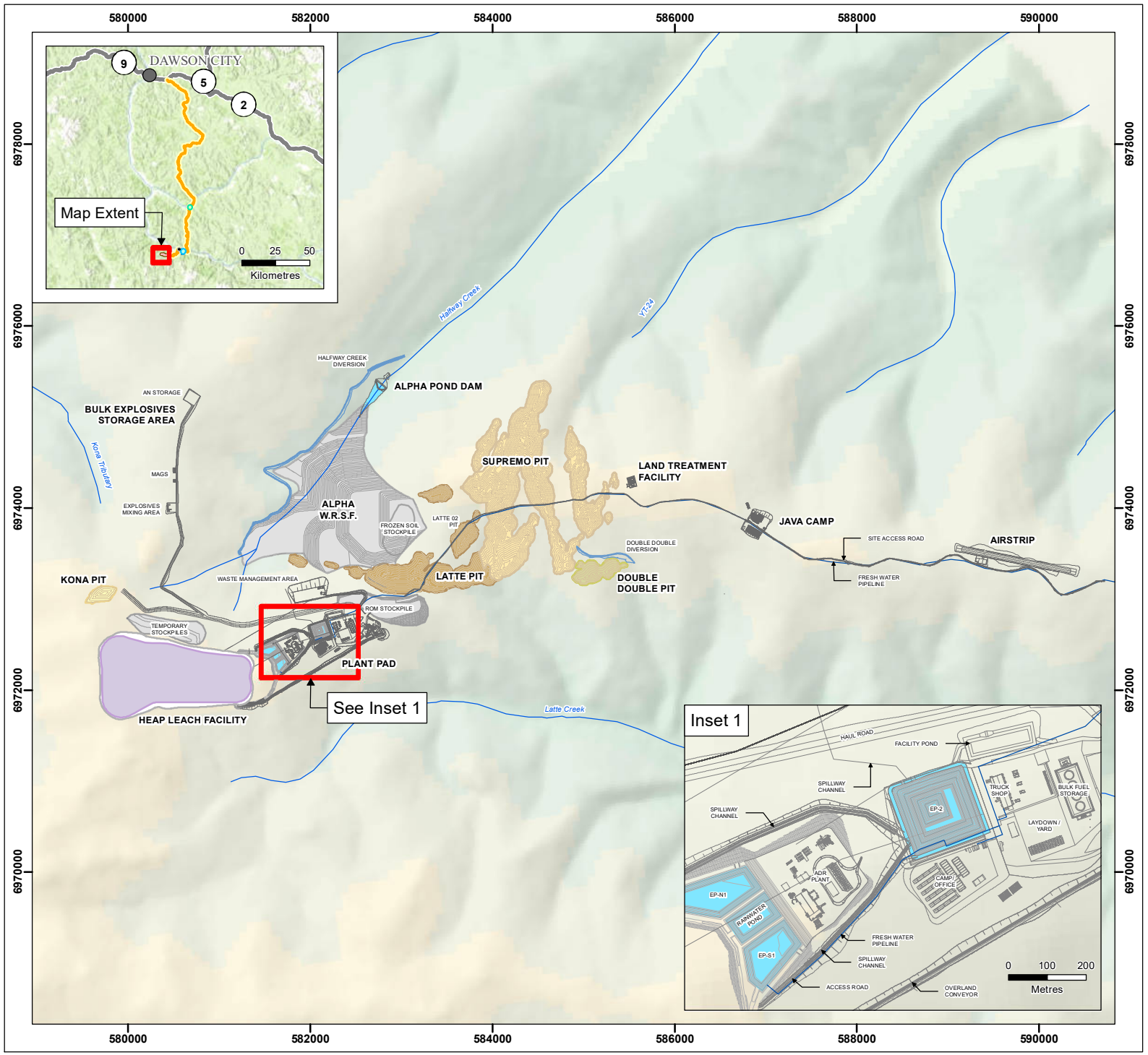
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Figure 1.1	Date: Mar 2, 2023	Drawn by: AS	Reviewed: KP

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COFFEE GOLD MINE

General Arrangement - Mine Site

Legend

- Double Double Pit
- Kona Pit
- Latte Pit
- Supremo Pit

Notes

1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.
2. Contains information licensed under the Open Government Licence - Yukon Territory
3. Inset Basemap: ESRI World Topographic Map

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Kilometres

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Figure 1.2	Date: Oct 6, 2023	Drawn by: AS	Reviewed: CH

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1.2 Scope and Objectives

This Waste Rock and Overburden Management Plan (the Plan) describes the types of waste rock, soil overburden and ROM stockpiles that will be constructed and how their materials will be characterized, segregated, and stored to ensure long-term chemical and physical stability. This Plan also describes how frozen materials will be handled and stored to support long-term closure and reclamation objectives. This Plan was developed to provide a description of the materials and management procedures and may be updated as the mine design advances, including material volumes and permafrost distribution.

This Plan provides a description of the geological conditions of the site, as well as the design criteria for the management of waste rock, overburden and frozen materials. This Plan also describes the procedures for identifying the potential for acid rock drainage (ARD) generation and metal leaching, and methods for handling materials to ensure leachate from the mine waste does not adversely affect water quality. A discussion on how frozen materials will be separated, stored, and used during reclamation is also provided, including how the soils with the highest quantities of excess ice will be identified and managed separately from other frozen overburden soils.

This Plan has been written to meet the guidance provided in the *Plan Requirement Guidance for Quartz Mining Projects* (YWB and EMR 2013). Commitments that were made during the YESAB screening process related to the Waste Rock and Overburden Management Plan are incorporated into the plan where possible and are summarized in the Waste Rock and Overburden Management Plan Table of Concordance (Appendix D).

This Plan is provided in conjunction with several other plans to meet the requirements for quartz mine applications for a Quartz Mining License and a Water Use Licence under the *Quartz Mining Act* and the *Waters Act*, respectively. Other applicable regulations related to mine development are detailed in Section 1.6.

1.3 Incorporation of Traditional Knowledge and Consultation Feedback

First Nation engagement and consultation is ongoing, and any feedback that is received or concerns that are heard during consultation will be incorporated into this plan, where applicable.

1.4 Synergies with Newmont Standards and Requirements and Other Project Documents

As an important part of Newmont's internal governance process, Newmont has implemented Global Policies and Standards (Global Standards) that are reviewed and preliminarily approved by a Global Policies & Standards Committee. The Global Standards provides the framework and standards for Newmont sustainability management and ensures a consistency of approach for implementing these global policies across the Company.

The Global Standards apply to all directors, officers and employees of Newmont Corporation, its subsidiaries, and any other entities that it controls. A variance request process for existing or future conditions is in place. The process provides an alternative mechanism for those instances where a Newmont site/operation cannot logistically or feasibly conform to a requirement established in a Standard due to special conditions or unique hardships. The Global Standards are intended to be fully integrated into all core business functions, and they emphasize sustainability, responsibility, and accountability at all organizational levels.

The list of Global Standards is provided in Table 1-1.

Table 1-1 Newmont Global Standards

Global Standards	
Air Emissions Management Standard	Land Acquisition and Involuntary Resettlement Standard
Biodiversity Management Standard	Local Procurement and Employment Standard
Closure and Reclamation Management Standard	People Policy
Code of Conduct	Product Stewardship Standard
Community Investment and Development Standard	Social Baseline and Impact Assessment Standard
Cultural Resource and Management Standard	Stakeholder Relationship Management Standard
Drug and Alcohol Policy (Coffee-Specific)	Tailings Storage Facility and Heap Leach Facility Environmental Standard
Hazardous Materials Management Standard	Tailings Storage Facilities Technical and Operations Standard
Health and Safety Policy	Waste Management Standard
Human Resources Standard	Waste Rock and Ore Stockpile Management Standard
Human Rights Standard	Water Management Standard
Indigenous Peoples Standard	

The Waste Rock & Ore Stockpile Facility Management Standard sets the minimum requirements for the management of waste rock and ore stockpiles to minimize adverse environmental and human health impacts, to promote beneficial post-mining land uses, and to reduce post mining closure and reclamation liability. This standard addresses the characterization of ore and waste rock, as well as the design, construction, operation, closure and reclamation of waste rock stockpiles and other unsuitable material that has the potential to degrade the environment. Geotechnical assessment methods for the waste rock and ore stockpiles will follow applicable guidelines as well as Newmont internal guidelines.

While this Plan can be reviewed in isolation to inform the specific actions for waste rock, overburden, and frozen materials management, this plan should be viewed in concert with the following additional management plans in order to attain a holistic understanding of the Project:

- Reclamation and Closure Plan
- Water Management Plan
- General Mine Development Plan
- Mine Operations Plan
- Erosion and Sediment Control Plan
- Environmental Monitoring and Adaptive Management Plan; including
  - Surface Water Quality Monitoring Plan
  - Geochemical Monitoring Plan
  - Physical Monitoring Plan.

1.5 Roles and Responsibilities of Key Personnel

Newmont has committed to providing the necessary human, material, and financial resources to implement and maintain the Waste Rock and Overburden Management Plan and associated monitoring activities. The Mine General Manager will be responsible for overseeing the requirements outlined in these plans, which includes hiring qualified professionals (QPs) to implement the responsibilities outlined in Table 1-2. Key Project personnel responsible for being familiar with the contents of this Plan are shown in Table 1-2.

Table 1-2 Key Project Personnel

Role	Responsibility
Mine General Manager	Overall responsibility for Mine Site management.
Operations Manager	Responsible for mine planning and production, mine technical monitoring, and mine regulatory compliance.
Health and Safety (H&S) Manager	Responsible for conducting regular safety site inspections and implementing the appropriate controls in a timely manner. The H&S Manager shall maintain records of all safety inspections as well as any actions taken because of these inspections throughout the life of the Project. Where safety inspections show the potential for environmental effects, the H&S Manager will work in collaboration with the Environment Department.
Sustainability and External Relations (SER)	Responsible for recording and addressing any complaints received from nearby land users, or other interested parties regarding waste rock, overburden, and frozen materials management-related impacts off-site. The SER department shall maintain records of all complaints received as well as any actions taken because of these complaints.
Environmental Manager	Responsible for permitting, environmental monitoring, and regulatory compliance.
Pit Superintendent	Responsible for all operational aspects of the open pit mine.
Mining Engineer	Mine design and its operation, ensuring compliance with designs and monitoring requirements, Professional Engineer licensed to practice in Yukon.
Chief Geologist	Qualified Professional responsible for providing oversight regarding materials segregation.
Mine Geologist	Responsible for collecting samples and for field identification of materials for segregation

1.6 Applicable Legislation

The storage facilities will be designed and constructed and monitored in accordance with the *Mined Rock and Overburden Piles Operating and Monitoring Manual* prepared by the BC Mine Waste Rock Pile Research Committee (1991). In addition, draft guidelines for mine waste management facilities have been developed to assist proponents in managing facilities within the context of the Yukon assessment and regulatory system (YG 2017). As such, the guidelines will be referenced during mine development, operations, and closure activities to support compliance with applicable regulations.

Development of a mining property to support operational mining including management of waste rock, overburden and frozen materials is governed by federal and territorial legislation, including but not limited to the following:

Federal Legislation:

- *Fisheries Act* (RSC 1985, c. F-14)

Yukon Legislation:

- *Environment Act* (RSY, c. 76)
- *Quartz Mining Act* (SY 2003, c.14)
- *Waters Act* (SY 2003, c. 19)
- *Territorial Lands (Yukon) Act* (SY 2003, c.17)
- *Workers' Safety and Compensation Act* (SY 2021, c.11).

2.0 DESIGN CRITERIA

The following sections outline the design criteria that was used to guide the design for the waste rock and overburden management facilities. The WRSF site was selected to meet geotechnical, geochemical, and mine design criteria and will be engineered to minimize operational and closure costs, to minimize the potential for metal leaching and ARD generation, and to reduce long-term environmental effects.

The following sections also describe the physical material that will be managed at the Project, including properties and quantities, and the classification criteria for ARD potential for various geologic materials.

2.1 Surficial Geology Overview

The Mine Site falls within the unglaciated portion of the Yukon. The surficial soils at the Project site are dominated by residual soils and colluvium derived from the physical and chemical weathering of bedrock. Colluvial deposits typically comprise of loose, poorly sorted, angular gravel, and boulders with a sandy silt to silty sand matrix (KP 2015; SRK 2016a; SRK 2016b). Rubble lithologies are local: felsic or mafic gneiss, granite, and schist (Lorax 2016a). Beds of silt, sand, or both are often interspersed with otherwise unstratified material. Fluvial deposits are found in narrow valley bottoms and are generally thin. The Latte Creek valley is an exception, where fluvial sediments are thicker and are overlain by organic deposits.

Soil depths at the site are typically less than 1 m near the ridge tops, with depths increasing up to approximately 2 m on south facing slopes and 6 m on north facing slopes. Soil depths of up to approximately 10 m have been measured in drainage bottoms and valley inverts. The composition of the residual soils and colluvial materials at the Mine Site is variable and typically contains mixtures of gravels, sands, and silts with organic materials in the upper approximately 20 to 30 cm.

The organic surface soil layer typically ranges from 0.1 metre (m) to 0.3 m thick and is on average 0.3 m in thickness. Thicker organic deposits are the primary unit in four locations within the Mine Site; three of these are in the Latte Creek valley and one is in an unnamed valley in the northeast. Organic deposits are typically poorly drained due to the presence of permafrost and consist mainly of moss (AECOM 2012).

Weathered bedrock is exposed on several ridge tops in the mine area, as well as in several valleys where the surface has been cut by stream erosion (AECOM 2012). Bedrock exposed at surface is described as coarse-grained granite or felsic gneiss with clay alteration and fracture-controlled hematite and limonite. Bedrock exposed on slopes and in valley bottoms appears to be less weathered. Additional information

regarding geotechnical conditions at the Mine Site are provided in the Site Characterization Plan, as well as the following reports:

- 2015 Geotechnical Field Investigation Report (SRK 2016a)
- Fall 2016 Geotechnical Investigation Data Report (Tetra Tech and SRK 2017)
- Summer 2017 Geotechnical Investigation Data Report (Tetra Tech 2017)
- Fall 2018 Testpitting Program Data Report (Tetra Tech 2019).

2.2 Waste Rock

2.2.1 Waste Rock Properties

Each open pit excavates primarily a single lithology, with associations between lithologies and pits the same as that of mineralized material described in Section 2.6.1. Non-mineralized waste rock surrounding the weathered mineralized material bodies exhibits a variable degree of weathering, but as a whole is typically less weathered compared to mineralized material zones. A majority of waste rock is either partially weathered and classified as 'lower transition', or unoxidized and classified as 'fresh'.

In-situ discontinuity spacings within the rock mass were estimated as part of pit slope geotechnical evaluation (Mine Operations Plan) and were used to estimate average dimensions of the rock block sizes, prior to blasting. The length of the various discontinuity sets will heavily influence the waste rock block size; however, limited information is available on the discontinuity lengths as the majority of the observations are derived from core, which effectively provides a one-dimensional measurement and can have sampling or orientation bias.

Preliminary estimates indicate average in-situ block sizes of about 0.5 m in diameter. Blasting induced fractures during mining operations will also have a substantial effect on waste rock block size. As such, the Kuz-Ram (Cunningham 2005) blast fragmentation model was used to estimate the average block size after blasting. Using the model, an average particle size of approximately 30 cm derived. Additional details on the pit slope geotechnical evaluation are provided in the Mine Operations Plan.

2.2.2 Waste Rock Quantities

Over the life of mine (LOM), a total of approximately 300 – 330 Mt of waste rock will be excavated from the open pits. A majority of the waste rock (estimated 242 Mt) produced from the open pits will be deposited in the Alpha WRSF, which has an ultimate storage capacity of approximately 250 Mt. A portion of the waste rock (estimated 57 Mt) will also be backfilled into mined out pits at Latte, Supremo, Double Double, and Kona in order to create causeways and facilitate ore haulage routes to the crusher. The volume of backfill will be optimised as mining progresses. Waste rock from the Kona Pit will be stored in the Alpha WRSF. Additional backfill to the open pits will be considered as the mine plan is optimized early in operation.

The locations of the Alpha WRSF and open pits are shown on Figure 1-2. To calculate tonnages, a waste rock density of 2.0 t/m^3 was used in the design which is based on an in-situ density of 2.59 t/m^3 and a 30% swell or bulking factor. Table 2-1 summarizes annual tonnages allocated to the Alpha WRSF or the open pits for each year of the LOM production schedule. The estimated average daily deposition rates for the Alpha WRSF and open pits are provided in Table 2-2 the total tonnage of waste rock being excavated from each pit is presented in Table 2-3.

Table 2-1 Estimated Annual Waste Allocations by Destination (Mt)

Destination	Total	Year									
		Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Alpha WRSF	**238.8**	14.4	30.1	37.5	26.0	30.3	26.8	26.5	26.2	17.8	3.2
Alpha WRSF - waste from Kona	**2.8**	-	-	-	-	-	-	-	-	0.7	2.1
In-pit Backfill (LA, SU, and DD)	**55.0**	-	-	-	12.5	6.3	8.3	9.0	9.0	7.0	3.0
In-pit Backfill (Kona)	**2.0**	-	-	-	-	-	-	-	-	-	2.0
TOTAL	**298.7**	**14.4**	**30.1**	**37.5**	**38.5**	**36.6**	**35.1**	**35.5**	**35.2**	**25.5**	**8.3**

Table 2-2 Estimated Average Daily Waste Rock Deposition Rate (kt/day)

Placement Rate	AVG	Year									
		Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Alpha WRSF	**67**	52	82	103	71	83	74	73	72	49	9
Alpha WRSF - waste from Kona	**4**	0	0	0	0	0	0	0	0	2	6
In-pit Backfill (BF LA, SU, and DD)	**22**	0	0	0	34	17	23	25	25	19	8
In-pit Backfill (BF Kona)	**5**	0	0	0	0	0	0	0	0	0	5
TOTAL	**83**	**52**	**82**	**103**	**106**	**100**	**96**	**97**	**96**	**70**	**23**

Table 2-3 Estimated Total Waste Rock Excavations Over Mine Life (Mt)

PIT	LITHO	Unit	Total	Year									
				Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Latte	**Schist**	Mt	63	13	12	3	9	9	2	0	0	7	7
Double Double	**Gniess**	Mt	9	0	1	7	0	0	0	0	0	0	0
Kona	**Granite**	Mt	3	0	0	0	0	0	0	0	0	1	2
Supremo	**Gniess**	Mt	224	2	16	28	29	27	33	35	35	17	1
TOTAL		Mt	**299**	**14**	**30**	**37**	**39**	**37**	**35**	**35**	**35**	**26**	**10**

2.3 Overburden

2.3.1 Overburden Properties

Overburden is classified as organics, silt layer, gravel layer, and weathered bedrock. Overburden suitable for use as reclamation material includes organics, silt, and the upper 20 cm of gravel, which will be managed

to segregate the organics rich overburden from the mineral overburden to the extent practical. Overburden will be removed from the open pits, heap leach pad, site infrastructure pads and portions of the WRSF footprints during construction of the Project and placed in a temporary stockpile located immediately north of the HLF, if suitable. Overburden that does not meet reclamation material criteria will be used for haul road construction, used as general fill, or disposed of within the WRSF. The thickness of organic material is estimated to be 0.3 m on average based on the geotechnical drilling and test pit data. The organic materials have a very dark color and are easily identifiable compared to the soil and bedrock below. Based on the anticipated average depth of 0.3 m, the estimated total volume of organics to be stripped from the site is approximately 2.5 Mm3, assuming a 15% bulking factor. The organic materials are not anticipated to be ice-rich.

Based on natural moisture contents and Tetra Tech EBA (2016) permafrost mapping, the overburden soils on the ridge tops and upper to mid-slopes are typically ice-poor with natural moisture contents typically ranging from 3 to 30%. Ice-rich samples have been encountered typically on north facing slopes and valley bottoms at depths ranging between 0.2 and 2 m below ground surface. One hole drilled in the Halfway Creek valley bottom encountered ice-rich materials to a depth of 5.5 m. Ice-rich samples exhibited natural moisture contents from 50 % to over 400%. Most soils exhibited no to low plasticity, with occasional samples indicating high plasticity. Additional information foundation conditions at the Mine Site are provided in the following reports:

- 2015 Geotechnical Field Investigation Report (SRK 2016a)
- Fall 2016 Geotechnical Investigation Data Report (Tetra Tech and SRK 2017)
- Summer 2017 Geotechnical Investigation Data Report (Tetra Tech 2017).

2.3.2 Overburden Quantities

The volumes of excavated overburden materials are outlined in Table 2-4.

Table 2-4 Excavations of Overburden from Various Mine Components

Mine Area	Total Footprint	Organics rich Overburden	Mineral Overburden	Frozen Mineral Overburden
Units	**m^2**	**m^3**	**m^3**	**m^3**
Heap leach and ponds (pre-production)	567,125	339,030	305,737	390,000
Heap leach and ponds (Stage 1, 2, 3)	731,019	708,800	1,977,446	211,000
Process plant area and crusher	527,847	158,354	74,612	422,803
Alpha WRSF	2,114,000	N/A	-	-
Double Double Pit	162,000	32,400	32,400	-
Supremo Pit	2,073,000	508,331	1,490,775	-
Latte Pit	865,000	173,000	346,000	-
Kona Pit	71,000	21,300	106,500	-
On-Site Development	414,056	185,853	171,629	280,027
In-place Total Volumes	7,525,047	2,127,068	4,505,100	1,303,830
Total with Bulking (15%)		**2,446,129**	**5,180,865**	**1,499,404**

2.4 Permafrost

The Project area is located within the zone of extensive discontinuous permafrost, where 50 percent (%) to 90% of the area is expected to be perennially frozen (Heginbottom 1995). There is a relationship between permafrost distribution, slope aspect, and vegetation within the Project area. Shallow permafrost typically underlies the northeast-facing slopes vegetated by sparse, stunted black spruce with thick moss cover. Southwest-facing slopes are permafrost-free and covered by almost pure stands of trembling aspen, which require warmer air temperatures and deeper root penetration.

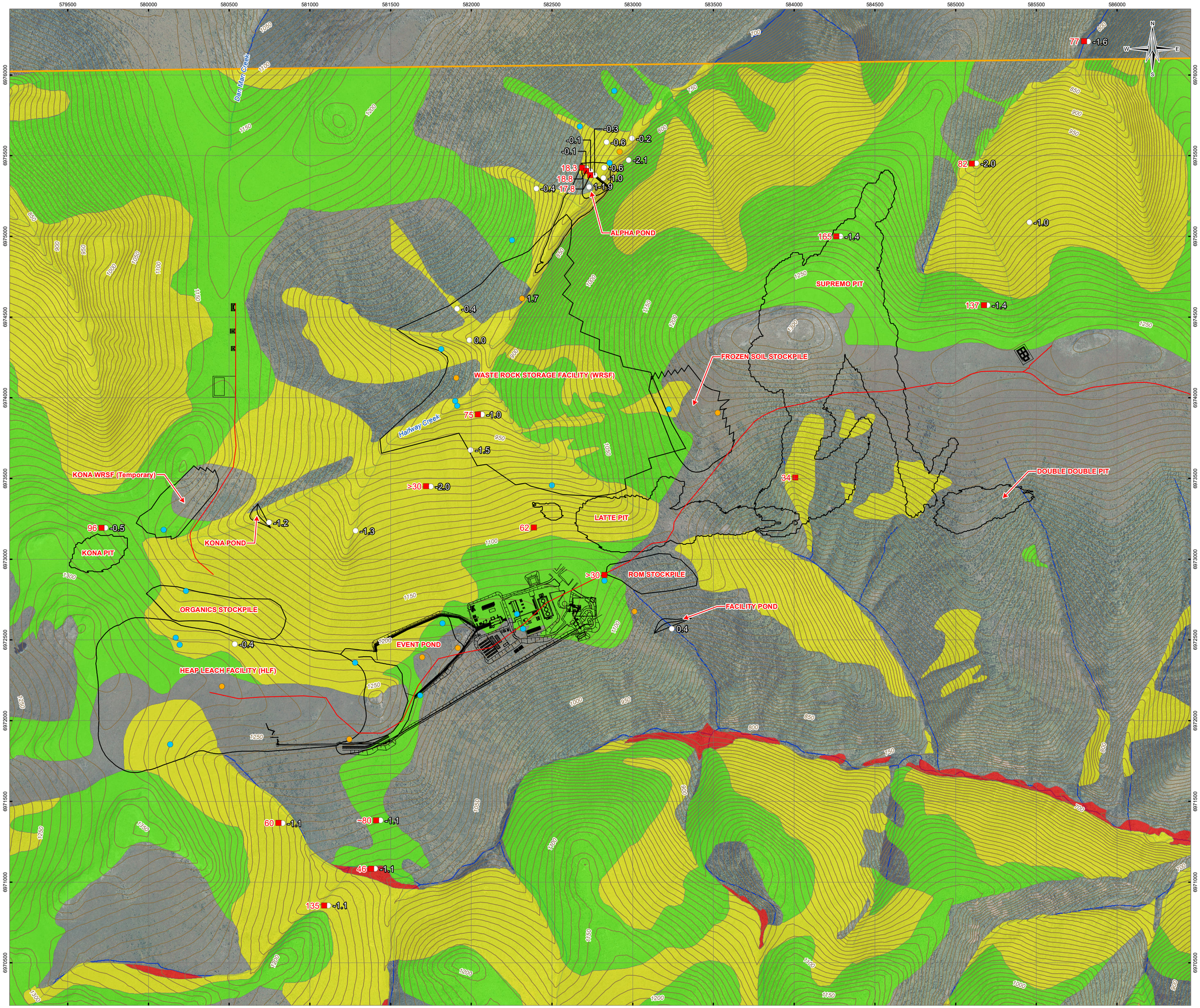
Permafrost thicknesses within the Project area as measured with thermistor cables are highly variable, ranging from approximately 30 m to 165 m. Depths of permafrost measured by the thermistor cables are shown on Figure 2-1. Thickness of the active layer (the layer that freezes and thaws seasonally each year) in the Project area varies spatially and temporally. In areas with thicker insulating organic cover, it is usually thin (approximately 0.3 m to 0.6 m), whereas it can be several metres thick within partially exposed bedrock or in coarse surficial material with a high clast content.

Measured permafrost temperatures at the depth of zero annual amplitude (i.e., the depth of zero seasonal temperature variations within the permafrost interval), are no colder than –2 degrees Celsius (°C). The warmest permafrost temperature (–0.6°C) was recorded at the bottom of the Halfway Creek valley. Temperatures at the depth of zero annual amplitude are shown on Figure 2-1. The depth of zero annual amplitude at the site generally lies between approximately 10 m and 15 m below the ground surface.

Based on natural moisture contents and Tetra Tech EBA (2016) permafrost mapping, the overburden soils on the ridge tops and upper to mid-slopes are typically ice-poor with natural moisture contents typically ranging from 3 to 30%. Ice-rich samples have been encountered typically on north facing slopes and valley bottoms at depths ranging between 0.2 and 2 m below ground surface. One hole drilled in the Halfway Creek valley bottom encountered ice-rich materials to a depth of 5.5 m. Ice-rich samples exhibited natural moisture contents from 50 % to over 400%. Most soils exhibited no to low plasticity, with occasional samples indicating high plasticity.

The near surface fine-grained colluvial soils undergo seasonal freezing and thawing and can be saturated during the summer months due to the presence of underlying permafrost that hinders drainage. The fine-grained soils typically drain poorly and are referred to as potentially thaw-unstable materials due to their potential for strength reduction upon thawing if the rate of thawing is higher than the soils ability to expel the pore water.

Permafrost distribution for the mine area is shown in Figure 2-1 and Figure 2-2 in two different formats. Figure 2-2 also shows the location of geotechnical and hydrogeologic boreholes advanced at the site. Calculations of permafrost distribution within the Project area using ArcGIS technology show that approximately 62% of the mapped area is underlain by permafrost, which is in agreement with the Canada Permafrost map (Heginbottom 1995).



LEGEND

- Ground Temperature (°C) Measured with GTC
- Permafrost Thickness (m)
- Location of Single-bead Thermistor Indicating Permafrost Condition
- Location of Single-bead Thermistor Indicating Unfrozen Condition
- Fi — Perennially frozen ground – predominantly very ice-rich with ground ice content locally exceeding 50% by volume of visible ice
- Fv — Perennially frozen ground – predominantly ice-rich with ground ice content generally ranging between 10% and 50% by volume of visible ice. May include patches of ice-poor permafrost (Fn) and/or unfrozen ground (UF)
- Fn — Perennially frozen ground – predominantly ice-poor with either non-visible ground ice or visible ice (ice content generally less than 10% by volume). May include patches of ice-rich permafrost (Fv) and/or unfrozen ground (UF)
- UF — Predominantly permafrost-free terrain; may include patches of permafrost (Fv, Fn)
- Mine Site Development Area
- Site Access Road
- Contour (10 m)
- Watercourse

NOTES
1. Base Data Source: Project Footprint provided by Hatch (February 2019). Updates by JDS (April 2019). CanVec 1:50,000.
2. Permafrost boundaries as of September 28, 2022.
3. Imagery provided by Kaminak (2011).

STATUS
ISSUED FOR USE

COFFEE MINE PROJECT
GROUND TEMPERATURE CABLE MONITORING UPDATE

Permafrost Distribution, Thickness and Ground Temperatures

PROJECTION	DATUM	CLIENT
UTM Zone 7	NAD83	Newmont CANADA

Scale: 1:15,000
300 150 0 300
Metres

TETRA TECH

FILE NO.				
EARC03259-01_Figure03b_ThicknessTemp.mxd				
OFFICE	DWN	CKD	APVD	REV
TI-EDM	MRB	SL	VER	0
DATE	PROJECT NO.			
December 14, 2022	ENG.EARC03259-01			

Figure 2-1

Q:\Edmonton\GIS\ENGINEERING\EARC\EARC03259-01\Maps\MAPPING_UPDATE\EARC03259-01_Figure03b_ThicknessTemp.mxd modified 2022-12-14 by megan.verburg

COFFEE GOLD MINE

Permafrost Distribution and As-Drilled Borehole Layout

Legend

- Borehole (T-Themistor Installed) (TT, Summer 2017)
- Testpit (TT, Summer 2017)
- Tespit (TT / SRK, 2016)
- Borehole (TT / SRK, 2016)
- Thermistor (TT / SRK, 2016)
- Thermistor (Knights Piesold, 2014)
- Vibrating Wire Pizeaometer (WWP) (TT EBA, 2013)
- Thermistor (SRK, 2015)
- Thermistor / WWP (SRK, 2015)
- Borehole (Lorax, 2015)
- Borehole (SRK, 2015)
- Fi — Perennially frozen ground – predominantly very ice-rich with ground ice content locally exceeding 50% by volume of visible ice
- Fv — Perennially frozen ground – predominantly ice-rich with ground ice content generally ranging between 10% and 50% by volume of visible ice. May include patches of ice-poor permafrost and/or unfrozen ground
- Fn — Perennially frozen ground – predominantly ice-poor with ground ice content generally less than 10% by volume of visible ice or not visible ground ice. May include patches of ice-rich permafrost and/or unfrozen ground
- Predominantly permafrost-free. May include patches of permafrost.
- Site Feature
- Access Road
- Watercourse
- Diversion Berm
- Haul Road
- Active Pit (Yr 9)
- Pit Footprint
- Waste Rock Storage Facility
- Pit Backfill
- Heap Stack
- Frozen Soil Stockpile
- Organics Stockpile
- ROM Stockpile

Notes

1. This map is not intended to be a “stand-alone” document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.
2. Contains information licensed under the Open Government Licence - Yukon Territory
3. Aerial Image: ESRI World Imagery

N

1:20,000

0 200 400 600 800 1,000

Metres

NAD 1983 UTM Zone 7N

Page Size: 11" x 17"

Figure 2.2	Date: Aug 24, 2023	Drawn by: AS	Reviewed: KP

Newmont COFFEE

Path: S:\Geomatics\Projects\103862\03\mxd\MWRGMP\Fig2_2_103862_03_Permafrost_AsDrilledBH_250503.mxd

Geotechnical investigations carried out at the Project have typically utilized the most recognized description procedure for frozen soil, that being ASTM 4083 *Standard Practice for Description of Frozen Soils (Visual-Manual Procedure).* The ASTM standard was initially based on an older Canadian approach developed by National Research Council (NRC) and presented in Technical Memorandum 79, Guide to Field Description of Permafrost for Engineering Purposes, which is typically used by practitioners of permafrost engineering in Canada. The suggested description approach for frozen soils anticipated to be excavated within the Mine Site area is shown in Figure 2-3 (based on ASTM and NRC descriptions).

Based on this description approach, the Project area was found to be underlain by perennially frozen ground with ground ice that is predominantly:

- Not visible (Nf, Nbn, Nbe)* labeled as **Fn** on the map figures
- Visible (Vx, Vc, Vr, Vs)* labeled as **Fv**
- Forming significant accumulations, such as ice wedges and other massive ice bodies, labeled as **Fi**.

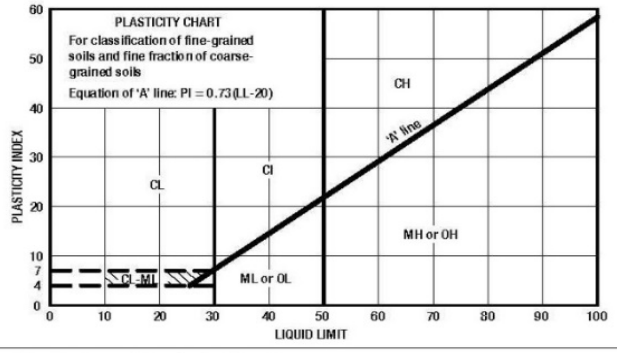
The following describes each of the three permafrost types in detail:

- **Areas labelled as Fn** are generally ice-poor (Frozen, No Visible Ice). These consist of perennially frozen ground that is well bonded to friable and typically does not contain visible excess ice; however, these areas may include patches of permafrost with visible ground ice (Fv), having visible ice contents less than 10% by volume, as well as patches of unfrozen ground.
- **Areas labelled as Fv** include visible excess ground ice (Frozen, Visible Ice). This moderately ice-rich permafrost is well-bonded but rarely includes large ground ice bodies. The higher ice content areas may include patches of ice-poor permafrost with ground ice that is not visible to the unaided eye (Fn) and patches of permafrost-free ground. Visible ice content is estimated to range from 10% to 50% by volume. The visible excess ice content (percent by volume) within areas designated as Fv may exceed 50% in some locations.
- **Areas labelled as Fi** (Frozen, Ice-Rich) are generally ice-rich and may include large accumulations of ground ice such as ice wedges and other massive ice bodies.

MODIFIED UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE - GRAINED SOILS More than 50% retained on No. 75 µm sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	$C_U = D_{60} / D_{10}$ Greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			GP	Poorly-graded gravels and gravel-sand mixtures, little or no fines	Not meeting both criteria for GW	
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures	Atterberg limits plot below 'A' line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits plot above 'A' line and plasticity index greater than 7	
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines	$C_U = D_{60} / D_{10}$ Greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			SP	Poorly-graded sands and gravelly sands, little or no fines	Not meeting both criteria for SW	
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures	Atterberg limits plot above 'A' line and plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Atterberg limits plot above 'A' line and plasticity index greater than 7	
FINE-GRAINED SOILS (by behavior) 50% or more passes 75 µm sieve*	SILTS Liquid limit <50		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands of slight plasticity		
	SILTS Liquid limit >50		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts		
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit <30		CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays		
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit 30-50		CI	Inorganic clay of medium plasticity, silty clays		
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit >50		CH	Inorganic clay of high plasticity, fat clays		
	ORGANIC SILTS AND CLAYS Liquid limit <50		OL	Organic silts and organic silty clays of low plasticity		
	ORGANIC SILTS AND CLAYS Liquid limit >50		OH	Organic clays of medium to high plasticity		
HIGHLY ORGANIC SOILS			PT	Peat, muck and other highly organic soils		

Classification on basis of percentage of fines: Less than 5% pass 75 µm sieve — GW, GP, SW, SP; More than 12% pass 75 µm sieve — GM, GC, SM, SC; 5% to 12% pass 75 µm sieve — Borderline classification requiring use of dual symbols



* Based on the material passing the 75 mm sieve

† ASTM Designation D 2487, for identification procedure see D 2488 USC as modified by PFRA

GROUND ICE DESCRIPTION

ICE NOT VISIBLE

GROUP SYMBOL	SYMBOL	SUBGROUP DESCRIPTION	
N	Nf	Poorly-bonded or friable	
	Nbn	No excess ice, well-bonded	
	Nbe	Excess ice, well-bonded	

VISIBLE ICE LESS THAN 50% BY VOLUME

GROUP SYMBOL	SYMBOL	SUBGROUP DESCRIPTION	
V	Vx	Individual ice crystals or inclusions	
	Vc	Ice coatings on particles	
	Vr	Random or irregularly oriented ice formations	
	Vs	Stratified or distinctly oriented ice formations	

VISIBLE ICE GREATER THAN 50% BY VOLUME

ICE	ICE + Soil Type	Ice with soil inclusions	
	ICE	Ice without soil inclusions (greater than 25 mm thick	

NOTES:

1. Dual symbols are used to indicate borderline or mixed ice classifications.
2. Visual estimates of ice contents indicated on borehole logs ± 5%
3. This system of ground ice description has been modified from NRC Technical Memo 79, Guide to the Field Description of Permafrost for Engineering Purposes.

LEGEND: Soil ☐ Ice ■

TI_Modified Unified Soil Classification_Arctic.cdr

TETRA TECH

Figure 2-3 Description of Frozen Soils

If an area is not mapped as having one of these three frozen material types, it is considered to be predominantly permafrost-free; however, such areas may contain patches of permafrost in areas where conditions are favourable for permafrost aggradation. This management plan identifies how frozen soils will be identified, classified, and handled during construction and as such, no specific additional geotechnical investigation activities are anticipated prior to construction.

Further geotechnical investigations were carried out in 2016 and 2017 in areas of anticipated frozen soils and, in particular, in areas where various infrastructure components such as the waste rock storage areas and sedimentation ponds are located. The results of the characterization programs are contained in the 2016 Geotechnical Site Investigation Report (Tetra Tech and SRK 2017) and the Summer 2017 Geotechnical Data Report (Tetra Tech 2017).

2.4.1 Permafrost Distribution

The permafrost distribution in the mine area can be broken down as follows:

- 35% is underlain by predominantly ice-poor permafrost (**Fn**)
- 30% is underlain by permafrost with visible ground ice (**Fv**)
- Approximately 1% is underlain by very ice-rich permafrost (**Fi**), which is mainly located at the bottom of the Latte Creek valley
- Approximately 34% of the Project area is therefore estimated to be permafrost-free.

Figure 2-2 shows the proposed primary Mine Site infrastructure locations overlain on the permafrost distribution map. The anticipated permafrost conditions at each of the main infrastructure locations are provided in Table 2-5. Overburden conditions are documented in SRK 2016a and 2016b.

Table 2-5 Approximate Permafrost Distribution for Mine Infrastructure Locations

Mine Area	Volumes					Percentages				
	Unfrozen Soil	Type I <5% ice, Coarse Or fine F_n 1-5%*	Type II 5-15% ice, coarse	Type III 5-15% ice, fine	Type IV >15% ice F_i 30+%*	Unfrozen Soil	Type I <5% ice, Coarse Or fine F_n 1-5%*	Type II 5-15% ice, coarse	Type III 5-15% ice, fine	Type IV >15% ice F_i 30+%*
			F_V 1-30%*					F_V 1-30%*		
Heap leach and ponds (pre-production)	305,737	363,288	26,712		-					
Heap leach and ponds (Stage 1, 2, 3)	1,977,446	196,548	14,452		-					
Heap Leach						27%	68%	5%		-
Process plant area and crusher	74,612	422,803	-		-	15%	85%	-		-
Alpha WRSF	N/A	N/A	N/A		N/A	8-69%	41-62%	31-48%		-
Double Double Pit	32,400	-	-		-	-	-	-		-
Supremo Pit	1,490,775	-	-		-	-	-	-		-
Latte Pit	346,000	-	-		-	-	-	-		-
Kona Pit	106,500	-	-		-	-	-	-		-
On-Site Development	171,629	153,563	121,947		4,517	38%	34%	27%		1%
In-place Total Volumes	**4,505,100**	**1,136,202**	**163,112**		**4,517**					
Total with Bulking	**5,180,865**	**1,306,632**	**187,578**		**5,194**					

Notes:

* - Variability in ground ice content (percent by volume of visible ice) in permafrost units shown in Figures 2-1 and 2-2 is generalized, and includes three broader categories: predominantly very ice-rich permafrost (**Fi**) with ground ice content locally exceeding 50%; predominantly ice-rich permafrost (**Fi**) with ground ice content generally ranging between 10% and 50%, and predominantly ice-poor permafrost (**Fn**) with generally non-visible ice or visible ice with ground ice content less than 10%.

N/A – area is not stripped of indicated material.

Measures to protect the permafrost conditions at the site during site development will be implemented to minimize hazardous impacts on the surrounding undisturbed terrain, including excavation of ice-rich material in foundations, building roads using fill-only approaches where possible, or overcutting and replacement of fill for roads.

In addition, a blanket of waste rock placed over the ground surface at the Alpha WRSF area during the winter can mitigate foundation disturbance during the placement of the bulk of the waste rock on top of this blanket at other times of the year. In the long term, the waste rock will alter the thermal conditions in the ground below by causing the permafrost to aggrade up into the waste rock. As a result, thawing of the WRSF foundation due to global warming will be much slower than that of undisturbed terrain and therefore stability of the WRSF should be less affected than the stability of undisturbed natural terrain. Detailed design of the infrastructure components located on permafrost terrain will involve thermal analysis at each location to determine the impact of the infrastructure component on the permafrost and of the permafrost on the infrastructure (stability, thaw settlement, etc.).

The Alpha Dam and Alpha WRSF will be equipped with instrumentation to provide information on the impact that the facilities have on the native permafrost soil/rock.

2.5 Classification of Metal Leaching and Acid Rock Drainage Potential

2.5.1 ARD Potential

The metal leaching and acid rock drainage potential of various geologic materials to be disturbed at the Project site has been assessed by a variety of geochemical testwork, which is presented in Coffee Mine Project Geochemical Source Term Report (Lorax 2022) of the Water Use License Application. In this section, criteria to define ARD potential and ML potential are defined. These criteria are based on intrinsic properties of mine rock and will be used to inform how mine waste is managed. The manifestation of ARD and ML from excavated geologic material will be determined in large part by the degree of exposure, handling, and storage.

The acid rock drainage potential of mine waste is determined by acid base accounting (ABA) testwork, which measures the ratio of acid generating to acid neutralizing minerals. Geochemical characterization of waste rock, ore and overburden at the Project found that most rock types have little or no potential for acid generation, with the exception of granite ore produced form the Kona Pit. The criteria for determining neutralization potential (NP), acid potential (AP), and defining potentially acid generating (PAG) and non-potentially acid generating (non-PAG) material during mining are described in this section.

2.5.1.1 NP Determination

This section describes how NP will be determined to classify the ARD potential of mine rock samples collected as part of the ML/ARD monitoring program. The geochemical characterization program conducted as part of mine permitting used a variety of methods to measure NP, including; sobek NP, total C (C NP), inorganic C (CaNP), siderite NP, and surrogate NP based on Ca measured by ICP-OES. Analysis of these NP measurements concluded that total C NP is a simple and effective means of determining NP in waste rock, ore and leach tailings. Total C is an accurate measurement of NP in samples where the vast majority of carbon exists in the form of carbonate, which is typically the case in bedrock samples. A comparison between total C NP and CaNP of waste rock and ore measured as part of the geochemical characterization

program shows a close correlation between the two measurements (Figure 2-4). The dotted line shows the linear regression as per the equation on the figure. Lithologies are indicated by colour, weathering facies are indicated by shapes, ore samples are filled while waste rock samples are hollow.

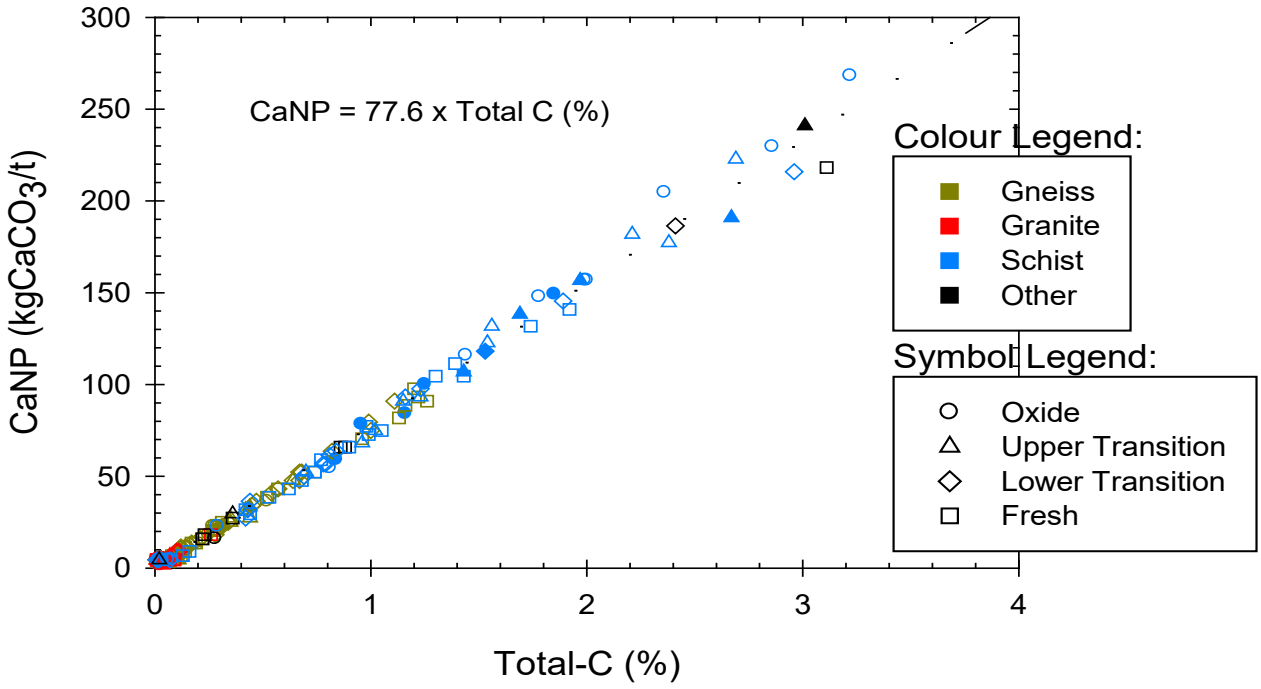


Figure 2-4 Total C plotted against CaNP for Waste Rock and Ore

The linear regression equation and coefficient of determination (R^2) value are shown on Figure 2-4. The R^2 value of 0.99 indicates that the total C can accurately predict CaNP according to the equation:

$$CaNP\ (kg\ CaCO_3/t) = 77.6 \times Total\ C(\%) \quad (1)$$

This correlation indicates that approximately 93% of total C is present as inorganic carbon. The difference between these values is likely related to a small amount of organic carbon being present (either in-situ or from sample contamination) or from analytical differences between the total C and inorganic C measurement. Equation 1 above will be used to predict NP based on total C measurements for ore, leach tailings and waste rock samples. Alternatively, direct measurement of inorganic C (CaNP) can be used to determine NP.

Total C measurement is not considered a reliable estimate of NP of surficial materials (i.e., overburden and borrow material) due to organic soils often being intermixed within these materials. Therefore, NP determination for overburden and access road samples will be based on direct inorganic carbon (CaNP) measurement.

2.5.1.2 AP Determination

The acid generating potential of a rock sample is estimated based on its sulphur content. The amount of acidity generated per mass of sulphur depends in large part on the mineralogy and solid phase speciation of sulphur. Different sulphide and sulphate minerals produce different amounts of acidity when oxidized. Mineralogical analysis indicates that when sulphur is detectable it is typically present as sulphide, with pyrite being the most frequently identified sulphide mineral. Sulphate-S minerals are present as a combination of non-acid generating minerals (e.g., barite and gypsum) and acid generating sulphate minerals (e.g., jarosite). For the purposes of mine rock management, AP is estimated from total S by assuming that all sulphur is in the form of pyrite. The relationship between total S and AP, assuming that all sulphur is in the form of pyrite, is as follows:

$$\text{Total S (\%)} \times 31.25 = \text{AP (kgCaCO}_3\text{/t)} \quad (2)$$

This equation will be used to define AP for all waste streams produced during mine operations.

2.5.1.3 PAG Definition

The acid generating potential of mine rock will be defined by the ratio of NP to AP and a minimum sulphur content. The NP/AP ratio, or net potential ratio (NPR), is used to define PAG and non-PAG mine rock. Carbonate minerals are generally affective at maintaining a neutral pH while present, and an NPR ratio of 2 is applied when NP estimates are based on a total C or inorganic C NP measurement. For the purposes of routine operational PAG definition, AP will be defined by a total sulphur measurement for all material types.

In addition to this NPR criteria, geologic material requires the presence of AP to be classified as acid generating. A total S cut-off of 0.01 wt.% is used to define a minimum AP for a sample to be classified as PAG. This is considered highly conservative given that this low concentration is below average continental abundance (0.04 wt.%) and much of the mine rock is at a highly weathered state. The classification of mine rock will be defined using the following criteria:

- Where the total S content is ≤0.01 wt.% the sample is classified as non-PAG
- Where the total S content is >0.01 wt.%, and the NP/AP ratio is greater than or equal to 2, the sample is classified as non-PAG
- Where the total S content is >0.01 wt.%, the NP/AP less than 2, the sample is classified as potentially acid generating
- Monitoring data collected as part of the mine waste monitoring program described below will be screened against these criteria.

2.5.2 Metal Leaching Potential

Both the geochemical characterization program and baseline monitoring of site surface and groundwaters have identified As and U as the primary metals of concern at the Coffee Project site. Accordingly, the metal leaching criteria will be based on intrinsic material properties which indicate the potential for release of these two elements.

2.5.2.1 Arsenic Leaching Potential

Arsenic is released by a combination of sulphide mineral oxidation (e.g., arsenopyrite, arsenianpyrite, and orpiment) and dissolution of oxide minerals (scorodite and yukonite). In pH-neutral aerobic environments the solubility of this metalloid is generally controlled by sorption to Fe-oxide mineral surfaces. Metal leaching testwork of geologic materials from the Project found a consistent relationship between As concentrations, As:Fe molar ratios and pH. This relationship can be described using a semi-empirical equation:

$$As_{(aq)} = m \times As_{(sl)}/Fe_{(Sl)} \times 10^{-8}/H^{+} \qquad (3)$$

Where As(aq) is the concentration of As in mg/L, As(sl) and Fe(sl) are moles of As and Fe in the solid sample, H+ is the molar concentration of H+ in solution (equal to 10-pH) and m is the slope from the linear regressions developed in (m equals 3.14, 2.85 and 3.06 for gneiss, schist and granite, respectively). The most conservative slope of 3.14 is used for defining As leaching potential in all rock types to conservatively simplify As leaching potential classification.

The threshold for high As metal leaching potential in mine waste is determined by the As:Fe molar ratio that can produce As concentrations in excess of the upper case source term for the Alpha WRSF, assuming a pH of 8.3. A majority of mine waste produced by the Project will be stored in the Alpha WRSF, and the upper case source term represents the highest As concentration which has been considered in the site water quality model (WQM). A pH of 8.3 is the upper range of likely pH values produced by mine rock in the absence of lime addition. Since lime addition is expected to create pH conditions in excess of this range, any material that has been amended with lime (e.g., leach tailings) will be considered to have high As leaching potential, irrespective of the As:Fe molar ratio. Based on this understanding, the As leaching potential of mine rock will be classified as follows:

- where As/Fe molar ratio ≥ 4.5 (mmol/mol), material is classified as having a high potential for As leaching
- where As/Fe molar ratio < 4.5 (mmol/mol), material is classified as having a low potential for As leaching
- any material amended with lime, is classified as having a high potential for As leaching, regardless of the As/Fe molar ratio.

Further refinement of this As threshold will be considered upon future refinements to the water quality model and updates to the mine plan.

2.5.2.2 Uranium Leaching Potential

Metal leaching testwork shows that U leaching potential varies with rock type and alkalinity. Geochemical characterization results show that granite and gneiss rock types are enriched in U, while schist has U concentrations that are similar or lower compared to average continental abundance (ACA) values (Price, 2009). Metal leaching testwork shows that schist has a relatively low U leaching potential compared to gneiss and granite, which is consistent with the lack of U enrichment in the schist lithology. Therefore, all schist mine waste is classified as having a low U leaching potential regardless of alkalinity.

The release of U from gneiss and granite lithologies has been shown to be unrelated to the degree of U enrichment; however, U leaching potential can be related to alkalinity concentrations in ambient pore water.

This association between alkalinity and U leaching potential can be seen in laboratory kinetic test results and in site ground water and surface water data (Section 4.2.3.1 of Coffee Mine Project Geochemical Source Term Report, Lorax 2022). The solubility of the U in neutral-pH aerobic environments is dependent on alkalinity, because dissolved CO_3 complexes with the uranyl oxy-cation to form a soluble uranyl-carbonate complex. The primary source of alkalinity in mine waste environments is from carbonate mineral dissolution. In highly weathered material carbonate minerals are often absent, limiting alkalinity and inhibiting U release. Mine rock with inorganic C content below the method detection limit (0.05 wt.%) has been shown to limit U leaching potential, regardless of solid phase U content. Lime addition will cause precipitation of $CaCO_3$ and elevated alkalinity and pH values. Therefore, any granite or gneiss amended with lime (e.g., leach tailings) will be classified as having a high U leaching potential regardless of inorganic C content. Uranium leaching potential is defined as follows:

- where inorganic C < 0.05 wt.%, material is classified as having a low potential for U leaching
- where inorganic C ≥ 0.05 wt.% or has not been verified, U leaching potential will be determined as follows;
  - schist is classified as having a low potential for U leaching
  - granite is classified as having a high potential for U leaching
  - gneiss is classified as having a high potential for U leaching
- any gneiss or granite ore amended with lime (e.g., leach tailings), is classified as having a high potential for As leaching, regardless of inorganic C content.

Waste rock and ore lithologies contain variable amounts of carbonate mineralization. The carbonate mineralization is not included in the block model, so estimates of spatial distribution of this parameter within each mine pit are not available. Therefore, lithology will be the primary factor used to determine U leaching potential during in waste rock and ore.

2.5.3 Potential Sources of ML/ARD

In this section the ML/ARD classifications of various geologic materials that will be produced at the Project site are classified. An overview of the ML/ARD potential is provided in Table 2-6. The classification scheme presented in Table 2-6 is based on existing geochemical characterization of these materials. This classification scheme will be used to define the ML/ARD potential during mine operations. Monitoring data generated during mine operations may be used to re-classify localized areas of mine rock during operations when available.

If monitoring of mine rock or water quality at the mine site indicates that a rock unit has higher ML/ARD potential than expected based on geochemical characterization test work conducted as part of mine permitting, mine rock classification will be reviewed, and potential management strategies will be assessed. In the event that further testing determines that certain rock units are potentially acid producing, mitigation measures as described in the Geochemical Monitoring Plan may be employed to mitigate the development of ARD and associated increases in metal leaching.

Table 2-6 Classification of ML/ARD Potential

Lithology	Waste Rock/Overburden			Ore			Leach Tailings		
	ML Potential		ARD Potential	ML Potential		ARD Potential	ML Potential		ARD Potential
	U	As		U	As		U	As	
Gneiss	High	Block Model[1]	Non-PAG	High	High	Non-PAG	High	High	Non-PAG
Schist	Low	Block Model[1]	Non-PAG	Low	High	Non-PAG	Low	High	Non-PAG
Granite	High	Block Model[1]	Non-PAG	Low	High	PAG	High	High	PAG
In-pit Overburden	Low	Block Model[1]	Non-PAG	-	-		-	-	
Ex-pit Overburden[2]	Low	Low	Non-PAG	-	-		-	-	

1.Block model used to define zones of low and high As leaching potential.
2 Classification only valid for areas that overburden that has been sampled for ML/ARD potential

2.6 Geotechnical Criteria

Newmont will ensure that each WRSF and stockpile is constructed to the appropriate geotechnical design criteria. The geotechnical design criteria for the Alpha WRSF were selected based on guidelines from the British Columbia Mine Waste Rock Pile Research Committee (1991) and experience of the technical experts responsible for the design. The WRSF will be designed to meet or exceed the acceptable design criteria for short-term conditions during operations and long-term closure criteria.

Geotechnical investigation programs were completed to attain the data necessary to undertake detailed design and complete physical stability analyses for the facilities. The stability and settlement analyses for the facilities are described below.

2.6.1 Geotechnical Assessment

Bedrock geotechnical characteristics have been evaluated using diamond drill core primarily near the mineralized zones and open pit areas. Subsequent to the core drilling and logging programs, laboratory strength testing was conducted on select samples of core. With the exception of the oxide materials associated with the gold mineralized structures which are mined out, the bedrock is generally of good geotechnical quality. Table 2-7 contains a summary of bedrock geotechnical data derived from the 2015 pit slope geotechnical drilling program for each of the three primary lithology types (SRK 2016c; JDS 2019).

Table 2-7 Summary of Bedrock Geotechnical Data

Lithology	Pit Area	Average Lab UCS (MPa)[1]	Average RMR[2]	Rock Mass Quality Class (RMR[2])	Average RQD (%)[3]	Total Core Length (m)
Gneiss	Supremo and Double Double	90	64	Good	81	515
Schist	Latte	94	64	Good	87	227
Granite	Kona	130	76	Good	95	96

[1] UCS - Uniaxial Compressive Strength testing, conducted according to ASTM Method D7012.

[2] Rock Mass Rating, according to the Bieniawski 1989 system.

[3] RQD - Rock Quality Designation, according to Deere (1963).

Uniaxial Compressive Strength (UCS) testing was conducted on a total of 65 samples between the 2013, 2015 and 2018 testing programs according to American Society for Testing and Materials (ASTM) Method D7012. Elastic properties (Young's Modulus and Poisson's Ratio) were measured for 20 of the 65 UCS samples. Young's moduli were also calculated for an additional 15 triaxial compressive strength tests as discussed below. The average laboratory UCS results for the combined 2015 and 2018 programs are summarized in Table 2-8 by primary rock type and oxidation zone, along with other laboratory test results.

Table 2-8 Average Intact Rock Properties Derived from Laboratory Test Results

Lithology	Oxide	□ (kN/m^3) [1]	BTS [1] (MPa)	UCS 1,2(MPa)	Ei (GPa) [1]	□ □	mi	□ci [2] (MPa)
Gneiss	All	25.4 (56)	11.9 (19)	81 (31)	26 (22)	0.25 (11)		
	Oxide Transition	24.7 (2) 25.4 (19)	- 8.4 (5)	67 (2) 77 (12)	- 30 (7)	- 0.26 (5)	18	89
	Fresh	25.5 (35)	13.2 (14)	82 (18)	24 (15)	0.25 (6)		
Schist	All	25.4 (31)	7.7 (8)	69 (13)	16 (10)	0.24 (6)		
	Oxide	26.1 (3)	-	58 (2)	12 (1)	0.11 (1)		
	Transition	24.6 (15)	4.6 (5)	66 (6)	16 (7)	0.26 (5)	19	54
	Fresh (valid tests)	26.3 (31)	12.7 (3)	76 (5)	19 (2)	-		
	Fresh (all tests)	26.3 (31)	12.7 (3)	51 (9)[3]	19 (2)	-		
Granite	All	24.6 (8)	7.1 (3)	70 (6)	29 (3)	0.19 (3)		
	Oxide Transition	- 23.9 (4)	- 2.6 (1)	- 41 (4)	- 15 (2)	- 0.14 (2)	-	-
	Fresh	25.2 (4)	9.4 (2)	130 (2)	55 (1)	0.30 (1)		

1 Numbers in parentheses indicate the number of test results available to calculate the average intact rock parameters.

2 'UCS' indicates lab UCS test results while ' ci' represents the intercept of the triaxial strength envelope with the σ3 axis.

3 Excludes breaks where the sample broke along a pre-existing weakness such as healed joints or foliation.

2.6.2 Stability and Settlement

Based on the anticipated foundation material of the proposed WRSF and stockpile design configurations, critical cross-sections were selected for stability analyses. Figure 2-5 shows the location of the two slope stability section traces for the Alpha WRSF, while Figure 2-6 and Figure 2-7 show the geometry of cross sections A and B. The traces of the slope stability cross sections for the ROM Stockpile and the soil stockpile are shown on Figure 2-8 and Figure 2-10, respectively. The location of a possible Supremo in-pit backfill waste rock configuration critical section is shown on Figure 2-10. The cross-section locations were selected to represent idealized worst- case geometries and foundation conditions for the interim and final designs. Additional information regarding the slope stability analysis is provided in Preliminary Slope Stability Analysis Memo (Appendix A). The Preliminary Slope Stability Analysis Memo summarizes the slope stability assessment of the current Alpha WRSF as well as the former Beta WRSF designs.

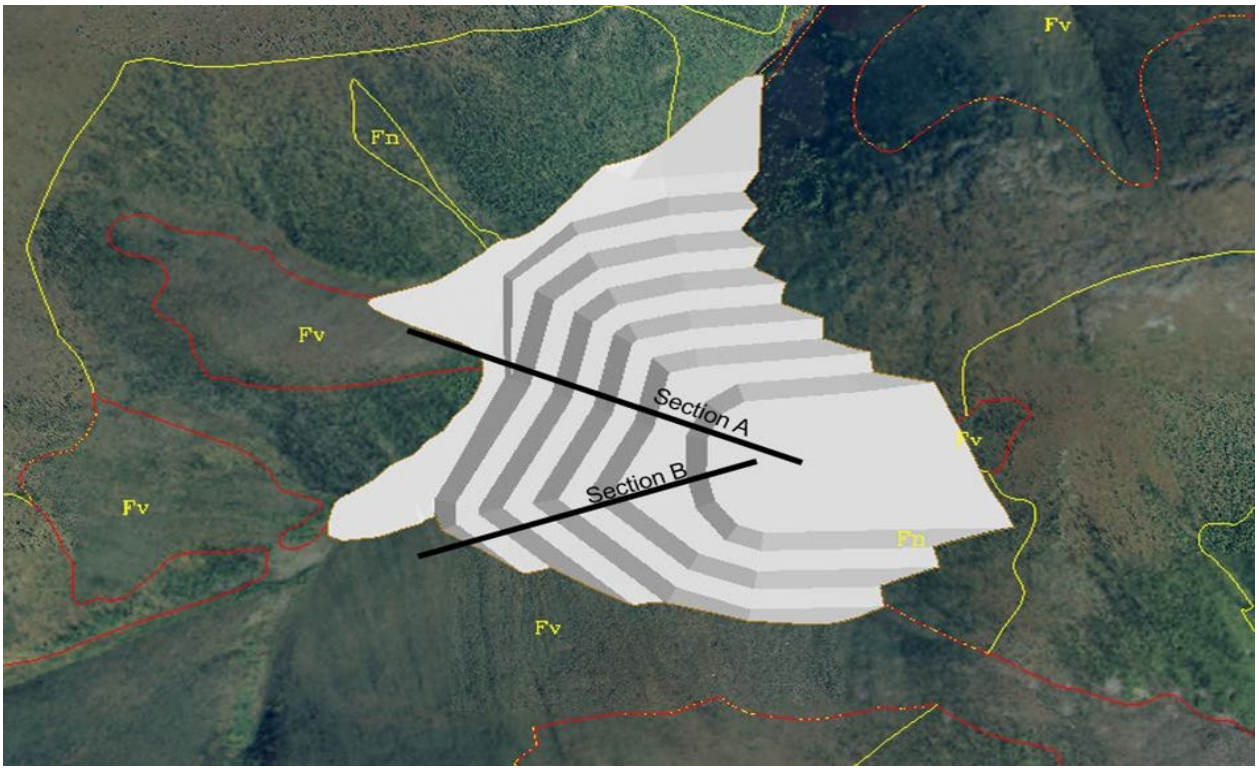


Figure 2-5 Slope Stability Section Traces – Alpha WRSF

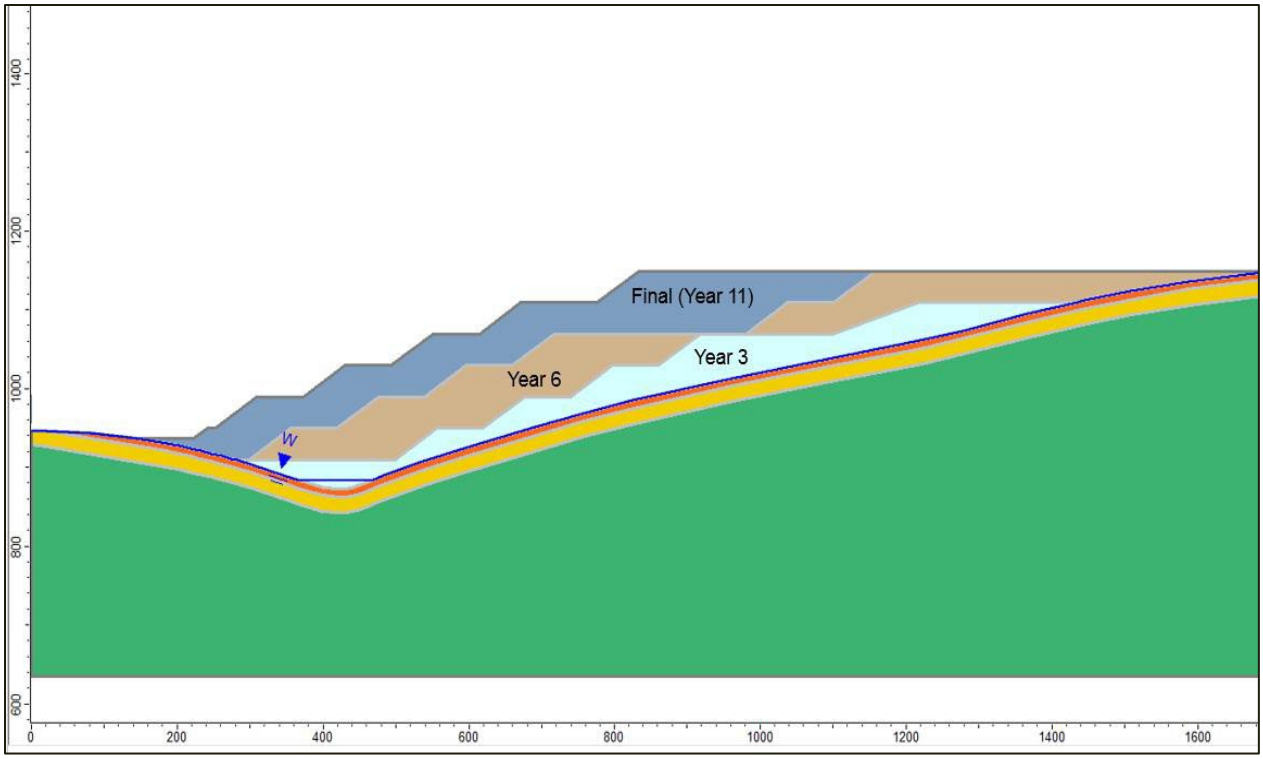


Figure 2-6 Slope Stability Section Traces – Alpha WRSF – Section A

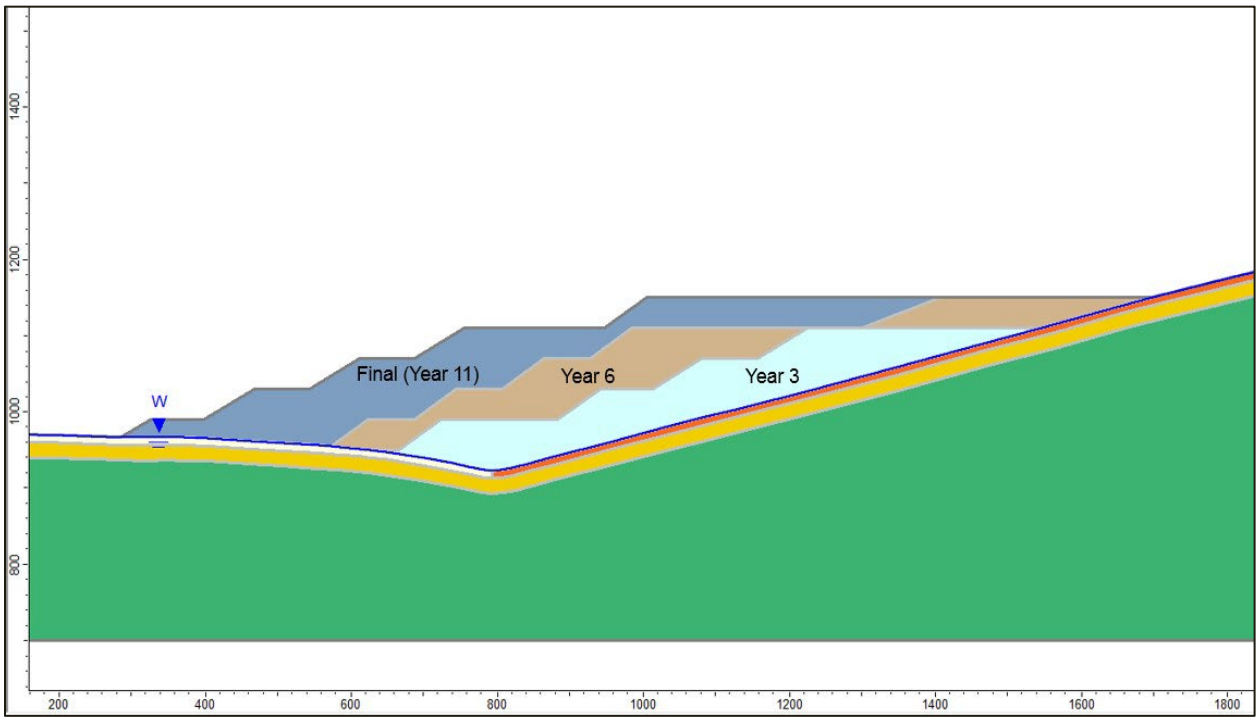


Figure 2-7 Slope Stability Section Traces – Alpha WRSF – Section B

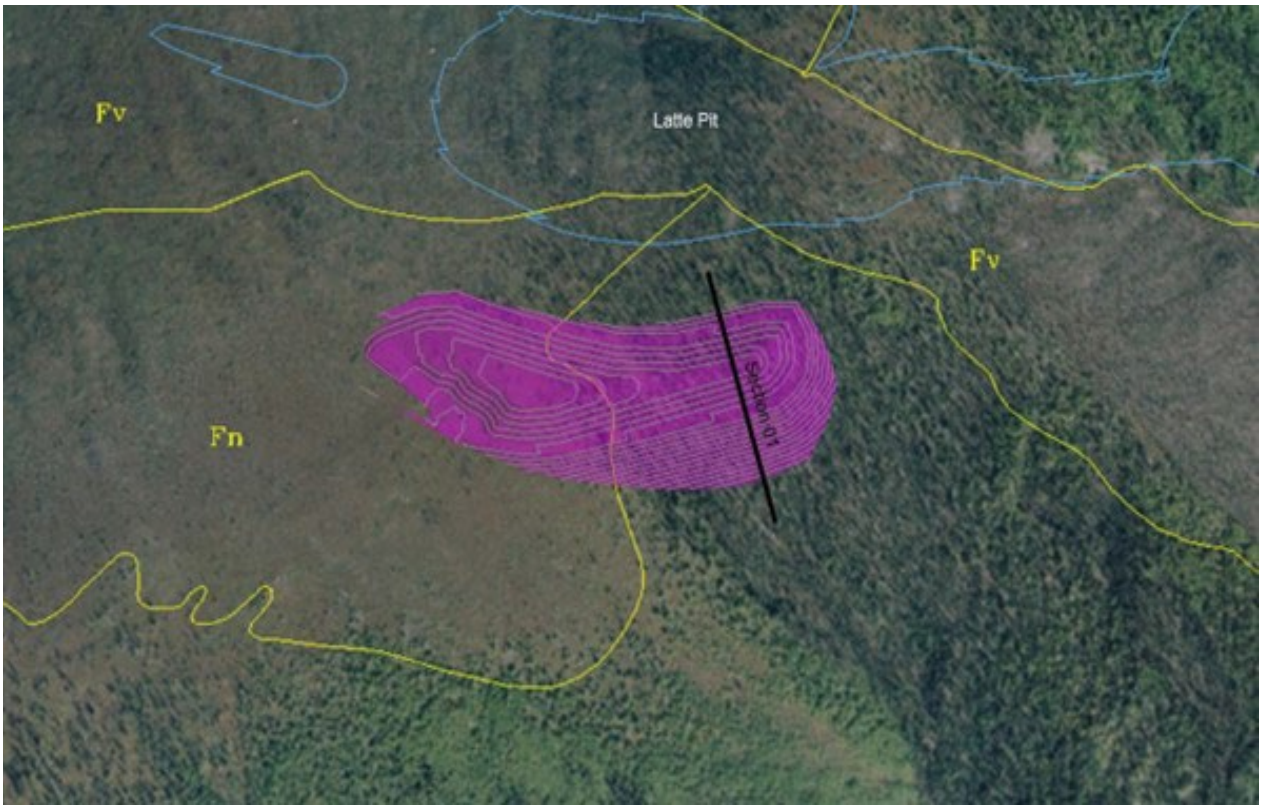


Figure 2-8 ROM Stockpile

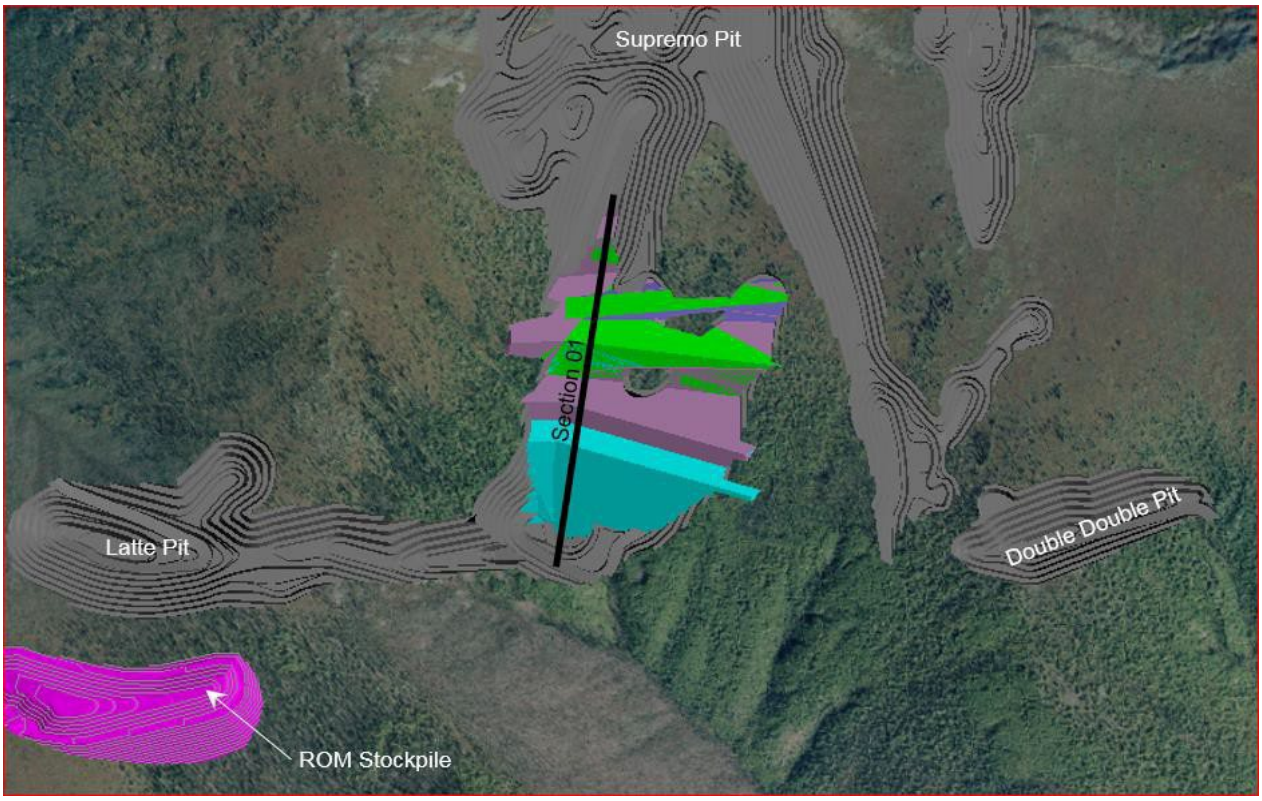


Figure 2-9 Supremo In-pit Backfill Waste Rock Configuration

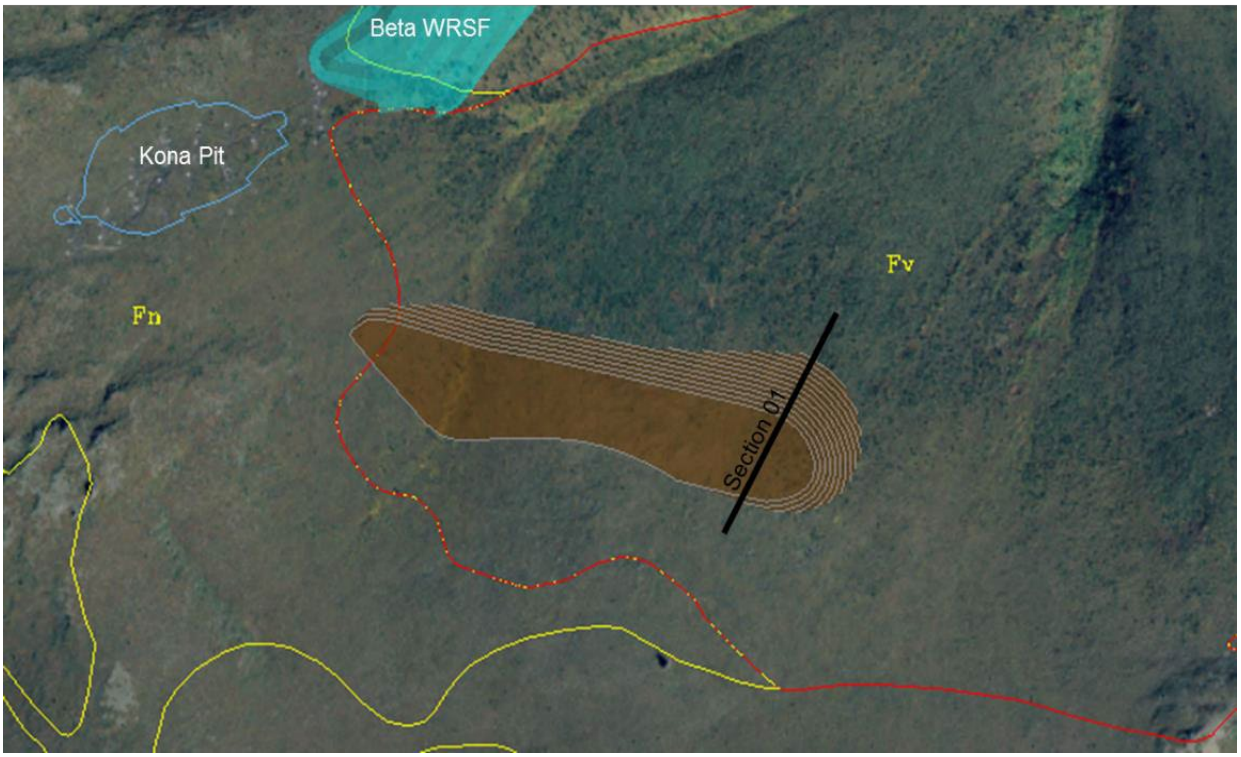


Figure 2-10 Soil Stockpile

The cross-section geometries were loaded into the software program Slide 7.031 (Rocscience 2018). Slide is a two-dimensional, limit equilibrium slope stability analysis program that analyzes slope stability by various methods of slices in terms of safety factors. The analysis results are reported for Spencer's method of slices because it satisfies both force and moment equilibrium, leading to more realistic safety factor calculations.

Each section was analyzed with both static and pseudo static loading conditions. Pseudo static analyses simulate seismic forces in terms of a horizontal acceleration expressed as a coefficient (or percent) of gravity (g). As recommended by the BC Mine Waste Rock Pile Research Committee (1991), the peak ground acceleration (PGA) corresponding to a 1:475-year event (or 10% probability of exceedance in 50 years) was used for the pseudo static stability analyses. Based on the Natural Resources Canada, 2015 National Building Code Seismic Hazard Calculation, a PGA of 0.062 is interpolated for the Coffee site. This value is also consistent with the MINES Group (2015) Seismic Design Report for the project which reports a PGA of 0.067g for a 475-year return period.

When incorporating PGA in a slope stability model, it is common practice to reduce the PGA by a factor of 0.5 based on the research conducted by the U.S. Army Corps of Engineers (Hynes-Griffen and Franklin, 1984). In summary, this reduction in acceleration is justified for earth and rock structures for the following reasons:

- Realization that sustained ground acceleration is typically less than half of the PGA, which is an instantaneous acceleration
- Consideration that earth and rock structures effectively attenuate earthquake-induced accelerations

- Determination that deformations of less than one meter would result with this criterion.

As described in the MINES Group (2015) report and Read & Stacey (2009), Pyke (1997 & 1999) conducted subsequent analyses demonstrating that the seismic coefficient for pseudo static analysis is less than or equal to half of the PGA, in almost all cases. Based on these guidelines, a pseudo static seismic coefficient of 0.03 was selected for the analyses.

Design acceptability criteria for the analyses are based on the "Guidelines for Mine Waste Dump and Stockpile Design" (Hawley & Cunning, 2017). The suggested minimum FoS presented in the guidelines are re-produced in Table 2-9, with each minimum FoS reflecting different levels of confidence in the understanding of site conditions, material parameters, and consequences of instability.

The Alpha WRSF, soil and ROM stockpiles, and in-pit backfill are currently designed to fall within the Moderate Consequence and High Confidence categories. Corresponding minimum recommended factors of safety are 1.2 to 1.3 for static and 1.0 to 1.05 for pseudo static loading conditions according to the guidelines.

Table 2-9 Suggested Stability Acceptance Criteria

Consequence	Confidence	Static Analysis		Pseudo Static	Maximum Allowable Strain
		Minimum FoS	Maximum PoF	Minimum FoS	
Low	Low	1.3 - 1.4	10 - 15%	1.05 - 1.1	≤ 1%
	Medium	1.2 - 1.3	15 - 25%	1.0 - 1.05	≤ 1.5%
	High	1.1 - 1.2	25 - 40%	1.0	≤ 2%
Moderate	Low	1.4 - 1.5	2.5 - 5%	1.1 - 1.15	≤ 0.75%
	Medium	1.3 - 1.4	5 - 10%	1.05 - 1.1	≤ 1%
	High	1.2 - 1.3	10 - 15%	1.0 - 1.05	≤ 1.5%
High	Low	≥ 1.5	≤ 1%	1.15	≤ 0.5%
	Medium	1.4 - 1.5	1 - 2.5%	1.1 - 1.15	≤ 0.75%
	High	1.3 - 1.4	2.5 - 5%	1.05 - 1.1	≤ 1%

FoS: Factor of Safety
PoF: Probability of Failure
Source: Hawley & Cunning, 2017

Results of the stability analysis are summarized in Table 2-10. This table outlines the FoS for each section for static and pseudo static loading conditions.

Table 2-10 Factors of Safety Results

Facility	Critical Section	Slope Analysed	Loading Conditions[2] 1	Year 3	Year 6	Final Design
Alpha WRSF	Section A	Overall	Static	2.2	2.7	2.1
			Pseudo static	2.0	2.4	2.4
	Section B	Overall	Static	1.3[3]	1.3[3]	1.3
			Pseudo static	1.2[3]	1.1[3]	1.1

Facility	Critical Section	Slope Analysed	Loading Conditions[2] 1	Year 3	Year 6	Final Design
ROM Stockpile	Section 1	Toe	Static	-	-	1.2
			Pseudo static	-	-	1.1
		Overall	Static	-	-	1.4
			Pseudo static	-	-	1.3
Soil Stockpile	Section 1	Toe	Static	-	-	1.3
			Pseudo static	-	-	1.2
		Overall	Static	-	-	1.3
			Pseudo static	-	-	1.2
Supremo In-pit Backfill	Section 1	Overall	Static	-	-	1.6
			Pseudo static	-	-	1.5

[1] Toe indicates critical slip surface was localized at the toe of the bottom lift. Overall slope indicates a critical slip surface at least 2 full benches in height.
[2] Pseudo static analyses conducted with 0.03g horizontal seismic coefficient.
[3] Critical failure surface through bottom lift only.

The results of the slope stability analyses of the Alpha WRSF and Supremo backfill indicate FoS that exceed the minimum acceptability criteria of 1.2 to 1.3 for static and 1.0 to 1.05 for pseudo static loading conditions. All cases analyzed meet or exceed the upper bound ranges (1.3 for static and 1.1 for pseudo static analyses) given by Hawley & Cunning (2017). The exception is the ROM stockpile, which yielded safety factors of 1.2. This represents small, localized instabilities at the toe only. Additional iterations of storage facilities will be subjected to slope stability analyses.

To achieve acceptable design criteria, the Alpha WRSF design inter-bench slope angles were reduced from 35° to 24° for portions where the toe will be founded on the ice-rich materials. This localized area of the Alpha WRSF is the only portion of all facilities analyzed that is believed to have potential to be adversely impacted by the ice-rich materials.

Slope stability monitoring will be carried out to mitigate the risk of Alpha WRSF slope failure as outlined within the Physical Monitoring Plan.

2.7 Hydrologic Criteria

The hydrological design criteria for the Project are based on Good Management Practices (GMPs) and engineering and operational judgement. Hydrologic design criteria are presented in Table 2-11. These criteria were used to design conveyances and sedimentation ponds.

Table 2-11 Hydrologic Design Criteria for Formulating Peak Flows

Item	Value	Unit	Source
Average Maximum Daily Snowmelt Rate	26	mm/day	Water Management Plan
Rainfall Distribution	SCS Type I	-	Natural Resources Conservation Service
Minimum Time of Concentration	10	minutes	Engineering Judgement

Item	Value	Unit	Source
Rainfall Depths			
1: 10 Year Return Period	55	mm	Lorax (2016a)
1: 100 Year Return Period	79	mm	Lorax (2016a)
1: 200 Year Return Period	90	mm	Lorax (2016a)

The design of conveyances and sedimentation ponds is described in the Water Management Plan and should be referenced for additional details on the design of water management infrastructure.

2.8 Mine Rock Management Facility Classification

The health and safety, environmental, and cultural hazards of the mine rock management facilities including the Alpha WRSF, open pit backfill, ROM stockpile, and soil and overburden stockpiles have been evaluated based on criteria set out in Yukon Guidelines for Mine Waste Management Facilities (YG 2023). The criteria are intent on defining a hazard classification for the facilities and outlining further guidance for design, planning, and management to help to reduce risks from mine rock management facilities. The guidance provides more stringent requirements for facilities with higher classification levels. In the case of the Coffee mine rock management facilities, the assigned classifications are as follows:

- Alpha WRSF: Class III
- ROM stockpile: Class II
- Open Pit backfill: Class I
- Overburden stockpiles: Class II.

The classification for each mine rock management facility and associated criteria and thresholds is provided in Table 2-12 to Table 2-15. The classification characteristics were assigned based on the peak hazard level at maximum footprint of each facility. The facility closure costs for Alpha WRSF and open pit backfill are based on the planned methodology of progressive reclamation. The materials within the ROM stockpile and the overburden stockpile are anticipated to be removed prior to closure; the facility closure costs for these facilities are therefore based on pad reclamation and/or revegetation activity costs.

Table 2-12 Alpha Waste Rock Storage Facility Classification

ALPHA WRSF CLASSIFICATION: Class III			
Classification Characteristic	Coffee Project Design	Classification	Classification Definition per Yukon Guidelines for Mine Waste Management Facilities
Maximum height above natural ground	Approximately 280 m	Class III	More than 200 meters
Presence of permafrost	Expect ice-rich permafrost on southwestern side of dump	Class III	Ice-rich permafrost present and not fully removed under critical elements of the facility
Geochemistry of waste rock	Due to the low sulphur concentrations and the presence of carbonate minerals, all waste rock types are classified as NAG	Class I	Only NAG waste present
Predicted water quality of waste rock runoff or seepage	Contaminants of concern are predicted to have concentrations less than site-specific water quality objectives.	Class I	Surface runoff and seepage from facility predicted to have contaminant concentrations – exclusive of total suspended solids (TSS) – that are less than 10x applicable receiving water quality guidelines or site-specific water quality objectives for all contaminants of concern (COCs).
Runoff or leachate management requirements	No active or passive water treatment is expected to be required for contaminants of concern (other than sediment) based on water quality predictions	Class I	Protection of receiving water does not require active or passive management of water discharges other than sediments controls during the operations phase
Surface water conditions	Facility located on a stream channel with an upstream catchment less than 10 km^2	Class II	MRMF located on steam channels with a total catchment area upstream of the MRMF of between 1 and 10 km^2.
Human health and safety	No population is at risk, other than the temporary presence of mine workers.	Class I	Other than the temporary presence of mine workers carrying out their duties, there is no identifiable population at risk from a failure of the facility.
Facility closure costs	$393,000	Class I	Less than 10 million dollars

Table 2-13 Run-of-Mine Stockpile Classification

ROM STOCKPILE CLASSIFICATION: Class II			
Classification Characteristic	Coffee Project Design	Classification	Classification Definition per Yukon Guidelines for Mine Waste Management Facilities
Maximum height above natural ground	Approximately 45 m	Class I	Less than 50 m, or waste rock that is geologically contained
Presence of permafrost	Perennially frozen ground – predominantly ice-poor with either non-visible ground ice or visible ice (ice content generally less than 10% by volume). May include smaller patches of ice-rich permafrost and/or unfrozen ground. Isolated areas can be mitigated	Class II	Permafrost present and ice-rich permafrost removed to thaw stable materials under critical elements of the facility. Note: Generally, permafrost not expected to be ice-rich or could be mitigated through pre-thaw.
Geochemistry of waste rock	Potential for PAG ore during mining of Kona Pit.	Class II	Class II: PAG waste present but not placed in any potential water flow path (e.g., stream, runoff or groundwater seepage path)20.
Predicted water quality of waste rock runoff or seepage	Contaminants of concern are predicted to have concentrations less than site-specific water quality objectives.	Class I	Surface runoff and seepage from facility predicted to have contaminant concentrations – exclusive of total suspended solids (TSS) – that are less than 10x applicable receiving water quality guidelines or site-specific water quality objectives for all contaminants of concern (COCs).
Runoff or leachate management requirements	Active water treatment is planned during operations.	Class II	Protection of receiving water requires: (a) active or passive management of water discharges during operations, care and maintenance and active closure; or (b) passive management of water discharges during post-closure phase.
Surface water conditions	Facility will not be located on a stream channel	Class I	MRMF not located on stream channels, or located on steam channels with catchment areas
Human health and safety	No population is at risk, other than the temporary presence of mine workers.	Class I	Other than the temporary presence of mine workers carrying out their duties, there is no identifiable population at risk from a failure of the facility.
Facility closure costs	$744,000	Class I	Less than 10 million dollars

Table 2-14 Open Pit Backfill Classification

IN PIT BACKFILL CLASSIFICATION: Class I			
Classification Characteristic	Coffee Project Design	Classification	Classification Definition per Yukon Guidelines for Mine Waste Management Facilities
Maximum height above natural ground	Less than 50 m. Not expected to be piled above natural ground	Class I	Less than 50 m, or waste rock that is geologically contained
Presence of permafrost	No permafrost is expected to remain due to mining of the open pit	Class I	Class I: No permafrost present under critical elements of the facility
Geochemistry of waste rock	Due to the low sulphur concentrations and the presence of carbonate minerals, all waste rock types are classified as NAG	Class I	Only NAG waste present
Predicted water quality of waste rock runoff or seepage	Contaminants of concern are predicted to have concentrations less than site-specific water quality objectives.	Class I	Surface runoff and seepage from facility predicted to have contaminant concentrations – exclusive of total suspended solids (TSS) – that are less than 10x applicable receiving water quality guidelines or site-specific water quality objectives for all contaminants of concern (COCs).
Runoff or leachate management requirements	No active or passive water treatment is expected to be required for contaminants of concern (other than sediment) based on water quality predictions	Class I	Protection of receiving water does not require active or passive management of water discharges other than sediments controls during the operations phase
Surface water conditions	Facility will not be located on a stream channel	Class I	MRMF not located on stream channels, or located on steam channels with catchment areas
Human health and safety	No population is at risk, other than the temporary presence of mine workers.	Class I	Other than the temporary presence of mine workers carrying out their duties, there is no identifiable population at risk from a failure of the facility.
Facility closure costs	$213,000	Class I	Less than 10 million dollars

Table 2-15 Overburden Stockpile Classification

OVERBURDEN STOCKPILE CLASSIFICATION: Class II			
Classification Characteristic	Coffee Project Design	Classification	Classification Definition per Yukon Guidelines for Mine Waste Management Facilities
Maximum height above natural ground	Approximately 20 m	Class I	Less than 50 m, or waste rock that is geologically contained
Presence of permafrost	Perennially frozen ground – some areas may be ice-rich with ground ice or visible ice (ice content generally ranging between 10 and 50% by volume). May include smaller patches of ice-poor permafrost and/or unfrozen ground.	Class II to Class III	Ice-rich permafrost present and not fully removed under critical elements of the facility Note: Facility is small enough with sufficient flexibility in location selection to minimize impact from permafrost thaw.
Geochemistry of waste rock	Geochemical characterization of overburden samples collected across the mine site show that overburden is NAG	Class I	Only NAG waste present
Predicted water quality of waste rock runoff or seepage	Contaminants of concern are predicted to have concentrations less than site-specific water quality objectives.	Class I	Surface runoff and seepage from facility predicted to have contaminant concentrations – exclusive of total suspended solids (TSS) – that are less than 10x applicable receiving water quality guidelines or site-specific water quality objectives for all contaminants of concern (COCs).
Runoff or leachate management requirements	No active or passive water treatment is expected to be required for contaminants of concern (other than sediment) based on water quality predictions	Class I	Protection of receiving water does not require active or passive management of water discharges other than sediments controls during the operations phase
Surface water conditions	Facility will not be located on a stream channel	Class I	MRMF not located on stream channels, or located on steam channels with catchment areas
Human health and safety	No population is at risk, other than the temporary presence of mine workers.	Class I	Other than the temporary presence of mine workers carrying out their duties, there is no identifiable population at risk from a failure of the facility.
Facility closure costs	$24,000	Class I	Less than 10 million dollars

3.0 STORAGE FACILITY DESIGN

Over the life-of-mine (LOM), a total of 300 – 330 Mt of waste rock will be produced. The following sections describe the permanent and temporary waste rock storage locations that will be utilized at the site, including foundation preparation and construction.

3.1 Alpha WRSF

The Alpha WRSF will be located on the southeastern limb of the Halfway Creek drainage basin. It will contain waste from all open pits and will have an estimated maximum capacity of 250 Mt and a total footprint of 210 hectares (ha). Construction of the Alpha WRSF will begin during pre-stripping and will continue until the end of the Operations Phase (Year 9). The sizing and design of the Alpha WRSF reflects the hydrology of the corresponding drainage and directs WRSF contact waters to sedimentation ponds. Activities associated with WRSF earthworks have the potential to generate dust at the site. Dust suppression measures for earthworks at the Project, including areas within and around the WRSF, are described within Section 5.0 of the Air Quality and Greenhouse Gas Monitoring Plan.

3.1.1 Foundation Design

The Alpha WRSF footprint is located within the Halfway Creek valley and its tributaries, on the valley slopes of primarily northerly, westerly, and easterly aspects with natural slope angles of approximately 3° to 32°. The surface is covered with light brown to green, coarse fibrous moss up to 200 mm thick containing rootlets and wood. Dark brown to reddish brown fibrous peat up to 300 mm thick is found beneath the moss or at the surface in some areas. Vegetation consists of low shrubs and sparse stunted black spruce.

Northern portions of the Alpha WRSF footprint are on west-facing slopes that contain perennially frozen ground, which is predominantly ice-poor (i.e., with no visible ground ice), and on permafrost-free southeast-facing slopes. Western portions of the Alpha WRSF footprint are on east-facing slopes, where the vegetation consists of deciduous trees and low shrubs. These east-facing slopes are interpreted to be mostly permafrost-free terrain with the exception of a tributary valley with northeast-facing slopes which were interpreted to be underlain by moderately to ice-rich permafrost with visible excess ice.

Geotechnical investigations were undertaken to characterize the subsoil conditions within the Alpha WRSF foundation footprint to inform its designs. The area is underlain by poorly to well graded, grey to dark brown silt, sand, gravel, and cobble mixtures. Any of these may be the dominant material. Surface boulders cover up to 30% of the ground.

The extrapolated overburden thickness within the Alpha WRSF footprint ranges from approximately 2.5 m to 3.0 m in the upper slope to approximately 2.0 m in the mid-slope and to approximately 4.0 m to 5.0 m at the toe of the west-facing slope (and at the bottom of the creek valley). It is less than 1 m within the steep lower slope. On the north-facing slope, the overburden thickness ranges from <10 m in the mid slope to 10 m – 13 m in the lower slope (colluvial/loess/organic apron). Additional information regarding foundation conditions within the area of the Alpha WRSF is provided in the following reports:

- Permafrost and Related Geohazard Mapping Within the Coffee Mine Area (Tetra Tech 2016)
- Fall 2016 Geotechnical Site Investigation Data Report (Tetra Tech and SRK 2017)
- Summer 2017 Geotechnical Investigation Data Report (Tetra Tech 2017).

3.1.2 Alpha WRSF Design

The organics will be left in-place within the WRSF footprint to preserve the permafrost conditions, except where foundation soils may require removal to bedrock, near the toe. The first 3 to 5 m of waste rock will be placed during the winter months to preserve the foundation permafrost conditions. Foundation soils greater than a distance of approximately 15 m from the toe (under the WRSF) are anticipated to remain frozen due to being protected by deep waste rock materials.

The Alpha WRSF will be constructed with primarily 40 m high benches or lifts with a 60 m wide safety berm left on each lift, with progressive regrading during the Operations Phase to achieve final slope angles of 3.0H:1V. The slopes of the WRSF are not planned to be re-shaped at the end of mine life. Where appropriate, waste rock benches will be designed to slope inwards away from the inter-bench slope. Benches will be crowned along the centerline of the WRSF. Since the Alpha WRSF will be built bottom-up, the toe of each subsequent lift will be placed on top of waste rock from the previous lift and therefore sub-excavation of soils beneath will not be required.

Runoff will be and concentrated along the toe of each bench and prevented from running over the WRSF face by a series of diversion berms. Water from the Alpha WRSF will be routed to the Alpha Pond, and interim water management structures will be built, as required. These measures will be conducted over the course of the Construction, Operation, and Reclamation and Closure phases.

The Alpha sedimentation pond will be located within Halfway Creek catchment to mitigate sediment loading from mine infrastructure (including Alpha WRSF) into the Halfway Creek receiving environment. An additional sedimentation pond may be constructed higher up within Halfway Creek catchment as a contingency during early Operations Phase depending on operational requirements.

The WRSF site was selected to meet geotechnical and mine design criteria and will be engineered to minimize operational and closure costs and reduce long-term environmental effects. The design of the Alpha WRSF has been engineered to abut the opposite valley wall to improve stability. Waste rock will be concentrated in the Alpha WRSF to minimize the total area of disturbance. An access ramp will be incorporated into the design along the eastern limb of the valley as the WRSF is developed.

Water management practices and sediment and erosion control measures during the construction of the WRSF will include construction sequencing, as well as diversion channels, silt fences, check dams, or other forms of sediment traps. Specific locations for the diversions, with consideration given to the areas that are identified as prone to very high sediment transport, will be provided in construction management plans that will be developed prior to the start of construction. Precipitation and snowmelt that infiltrate the Alpha WRSF will report to the Alpha rock drain and be collected in the Alpha Pond for settling of total suspended solids (TSS). Contact water collected in the Alpha Pond will be subject to Alpha Pond Effluent Quality Standards (EQS), as described in the Water management Plan, and discharged to Halfway Creek via a pumping system and an emergency spillway as well as through foundation seepage. Additional erosion control measures are described in the Erosion and Sediment Control Plan.

Construction of the Alpha WRSF will begin during pre-stripping (Year -1) and will be completed at the end of the Operations Phase. The lowest topographic point of the dump will be 815 masl, and the highest point will be an elevation of approximately 1,150 masl, although the final configuration will be subject to minor revisions during detailed design. The maximum height of waste will be 350 m.

Surficial materials in the waste rock deposits exhibit arsenic concentrations in a similar range to those observed for granitic host rock samples obtained during exploratory drilling (50th percentile arsenic concentration of approximately 120 milligrams per kilogram (mg/kg); 95th percentile concentration of approximately 2,500 mg/kg). Where practical, waste rock will be managed such that the final 1 m of waste rock placed in the WRSF does not exhibit an arsenic concentration that is greater than 60 mg/kg, on average. Where this is not practical, Newmont will review alternative means of deterring human traffic and prolonged use of this facility in closure (e.g., signage). Additionally, care will be taken to ensure that overburden soils not suitable for the soil stockpiles are not concentrated along the WRSF foundation or within the final side slopes of the WRSF.

Due to its coarse particle size, the waste rock material is anticipated to be free draining and will allow water to pass through the waste rock along the native valley invert without buildup of significant pore water pressures. A rock drain has been designed as added insurance that water will efficiently pass through the base of the WRSF. Additional details regarding the Alpha WRSF rock drain as well as surface water diversion channels can be found in the following section and in the Water Management Plan.

3.1.3 Rock Drain and Seepage Design

A rock drain will be established in the base of the Alpha WRSF to allow water flow through the base, as well as to convey surface water and potential seepage beneath the Alpha WRSF to the downstream Alpha Pond. This drain will convey runoff from the upper portion of the Halfway Creek catchment, meteoric water infiltrating through the WRSF, and groundwater discharge to the Halfway Creek channel covered by the WRSF.

The Alpha WRSF rock drain will be established in areas where permafrost may be present. Organic soils will be left in place within the footprint of the rock drains to reduce thermal disturbance. Perennial freezing within the drain is not expected based on thermal modeling conducted by SRK (Appendix B). Results of the thermal modeling are discussed in Appendix B. Localized areas of the drain may freeze during the winter as groundwater seeps into the channel, but this ice will melt during freshet flows. The drains are designed to accommodate up to two times the 100-year, 24-hour flow. Due to the perviousness of the waste rock dump, it is unlikely that ice could form and block flow entirely.

Suitable, competent rock will be placed to a minimum height of approximately 3 m, depending on the final design details of the WRSF and rock drain. Based on industry standards, the material used to construct the rock drain will have a D_{50} of 0.3 m. The rock drain will be constructed by end-dumping and natural segregation of the waste rock. It has also been assumed that the rock drain will have a porosity of 30%. Based on these assumptions, and applying a FoS of 2, the cross-sectional area of the Alpha WRSF rock drain will be 615 m^2. The FoS of 2 is conservative and has been applied to the cross-sectional areas of the rock drain to account for:

- Potential migration of fine-grained materials into the voids in the drain
- Potential freezing of the drain
- Decrease in void ratio over time due to compression
- Potential degradation of the rock drain material over time.

The FoS and these assumptions will be re-evaluated once the drain rock material has been selected during detailed design and once the site-specific conditions of the rock drains are further evaluated.

The WRSF will also incorporate a 'swale' at the base of the facility, near the location of Halfway Creek. If the rock drain becomes 'blinded', the swale will allow for water to flow over the rock drain within the confines of the natural topography. Details regarding surface water management and the design of the rock drains can be found in the Water Management Plan as well as in Water Management Design Basis Report (SRK 2023).

3.2 Open Pit Backfill

Approximately 50 – 80 Mt will be backfilled into mined out pits. Latte and Supremo pits will be partially backfilled in order to create causeways and facilitate ore haulage routes to the crusher, and Double Double and Kona pits will be completely backfilled. The location of the pit areas planned to be backfilled are shown on Figure 1-2.

The Double Double Pit will be backfilled completely during portions of Years 6 through 8. In-pit backfilling will occur in the eastern portion of the Latte Pit to construct a causeway during portions of Year 4. The southern portion of the Supremo Pit will also be backfilled to construct a causeway during Year 6 through Year 9 of the Project. Kona backfill for closure will occur at the end of mine operations.

3.2.1 Open Pit Backfill Design

Waste material will initially need to be placed within an ex-pit waste rock storage facility until mining activities are completed within any of the initial mine phases. Once final pit areas are established, waste material will be placed within the pit limits, backfilling the excavated areas. Waste rock will be backfilled into mined-out Latte, Supremo, Double Double, and Kona pits as required. Placement of material within the in-pit backfills will be prioritized if there is a strategic or economic advantage over an alternative ex-pit site.

Pit backfill material will be deposited from the pit crest or most convenient point that provides safe and efficient access where possible. In-pit backfill side slopes are designed at an assumed 35° angle of repose. Two strategic backfill sites for improved haul access have been identified for the project, Latte north-south backfill and Supremo east-west backfill. Minimum assumed fill width is 50m, ensuring enough room for two-way traffic and contingency for dump crest instabilities.

Foundations for the in-pit backfill will be comprised of the mostly competent bedrock exposed in the pit walls. The pit walls will provide confinement to the sides of the backfill leaving only one full height slope without confinement. Given the competent bedrock foundations, potential failure surfaces will be shallow, slivers of material parallel to the unconfined face. Instabilities such as this typically develop slowly and do not result in a sudden movement of the slope without saturated or near saturated conditions. Instead, tension cracks tend to form parallel to the crest near the face and the sliver of material slowly moves down slope. In such cases, waste rock can be dumped near edges and pushed or dozed out over the crest limiting exposure of the heavy haul trucks.

Where active mining may occur near the toes of the in-pit backfill slopes while material is being placed, waste rock berms will be constructed where practical to contain boulders that may be rolling down the waste rock slopes. Where necessary, rock drains will be constructed in in-pit backfill to promote drainage.

To reduce ARD potential for granite ore to be exposed on Kona pit walls, material from the Supremo pits will be hauled to the Kona pit and placed within the pit limits, covering potentially acid generating (PAG)

material left in the highwall within the Kona pit. Backfilling will occur during winter months to facilitate freezing of the Kona Pit backfill; however, ARD mitigation is not reliant on the re-establishment of permafrost. Approximately 1.95 Mt are anticipated to cover all PAG material.

All granite waste rock generated from Kona Pit will be sub-aerially disposed of in the Alpha WRSF. This will ensure that no granite waste rock is backfilled into mine pits where it may potentially become submerged.

3.3 ROM Stockpile

A ROM stockpile area will allow the storage of mineralized material when the crusher is not running, particularly during the winter months of January through March. The stockpile will be located directly east of the primary crusher as shown on Figure 1-2. The stockpile has been designed with a maximum capacity of 3.0 Mt of ROM mineralized material contained within a design footprint of 13 ha. The ROM pad will be sloped to drain towards the Facility Pond, which will convey excess water toward the Alpha Pond. Collected drainage will be used as process make-up water or as water for dust suppression, which will minimize contact water that reports to the receiving environment.

3.3.1 ROM Stockpile Design

The ROM stockpile will be constructed on top of a graded waste rock pad, from an average elevation of 1,125 masl up to 1,150 masl, resulting in an overall height of approximately 25 m for the ROM material. A 20-m wide safety berm or offset will be left between the crest of the ROM waste rock foundation pad and the toe of the ROM stockpile along the south side where the pad height will reach its maximum of 50 m. This will result in a maximum overall slope angle of approximately 2.0H:1V. The waste rock foundation pad will require approximately 3.6 Mt of material to construct.

Runoff collection trenches and sediment ponds will be constructed along the down-gradient boundary of the ROM stockpile footprint prior to site preparation (i.e., clearing and grubbing) activities. The ROM stockpile will be constructed in an area that is expected to be mostly permafrost-free. Clearing and stripping of organics will be undertaken in as short of a time period as practicable in advance of the initial waste rock foundation pad to limit potential erosion of exposed areas.

Seepage from the ROM will be monitored as part of the seepage monitoring component of the Surface Water Quality Monitoring Program. Water management practices and including sediment and erosion control mitigation procedures during the construction of the ROM stockpile are described in the Water Management Plan and the Erosion and Sediment Control Plan.

3.4 Soil and Overburden Stockpiles

The Project site will have five temporary stockpiles which will be used for stockpiling material until it is needed for site reclamation and revegetation activities. The stockpiles will be located immediately north of the heap leach pad around the pit limits. The soil stockpiles have been designed with a cumulative footprint of 35.9 ha and a maximum capacity of 5.1 Mm^3 with slope angles of approximately 10° to 12°. During mine site construction and over the course of mine operations, overburden material, including organic overburden and mineral overburden, is expected to be removed from the footprints of the four open pits, the HLP, site infrastructure pads and portions of the WRSF footprints, and placed in the soil stockpiles, if suitable as reclamation material. The current estimated total amount of reclamation materials (e.g., organics rich

overburden, silt, and the upper 20 cm of gravel), to be stripped from the site is approximately 2.6 to 2.8 Mm^3. These stockpiled materials are not anticipated to be ice-rich.

Material will be progressively removed from the stockpiles for reclamation purposes as certain areas of the Project are ready to be closed. Up to approximately 600,000 m^3 of additional ice-poor frozen soil may also be stored in the stockpiles for use during progressive reclamation during LOM. The materials placed in the soil stockpiles are not anticipated to be ice-rich. This material will be used for mine reclamation purposes and therefore will be removed during Reclamation and Closure.

3.4.1 Foundation Design

Foundation soils within the footprint of the soil stockpiles are anticipated to consist of relatively shallow residual soil and colluvium over competent bedrock. A thin (up to 200 mm thick), brown to reddish brown, fine to coarse fibrous moss layer containing rootlets and wood was encountered at the surface of all the boreholes. A 100 mm thick bed of silt and peat with trace sand underlies the moss. These thin organic mineral soils are underlain by brown to olive grey sand, silt, cobbles, and rubble up to 2.6 m thick. Trace organics found within the silt and sand layer, at 1.3 m depth, suggest that this site is colluvial.

Well graded subrounded to subangular gravel to cobbles of granite, containing silt and sand that are more abundant at greater depths, underlie the moss layer. The gravimetric moisture content of the overburden material varied from 13% in frozen gravelly sand and silt at a depth of 0.95 m to 73% in frozen silt and peat with trace sand at a depth of 0.30 m.

Permafrost conditions with excess ice were observed in the area. Excess ice content in frozen overburden material ranged from 2% at a depth of approximately 1.9 m to 45% at a depth of approximately 0.4 m. Clear ice inclusions up to 10 mm in diameter and ice lenses up to 8 mm thick were observed in frozen sandy silt within the depth interval of 0.3 m to 1.0. Additional information regarding foundation conditions within the area of the soil stockpiles is provided in the following reports:

- Permafrost and Related Geohazard Mapping Within the Coffee Mine Area (Tetra Tech 2016)
- Fall 2016 Geotechnical Site Investigation Data Report (Tetra Tech and SRK 2017)
- Summer 2017 Geotechnical Investigation Data Report (Tetra Tech 2017).

3.4.2 Soil and Overburden Stockpiles Design

As needed, runoff collection trenches and sediment ponds will be constructed along the down-gradient boundaries of the soil stockpiles prior to the placement of any overburden materials. The soil stockpile foundation will not be cleared and grubbed to avoid disturbing and exposing the permafrost to thawing. Overburden material will be end-dumped directly on the existing ground. Sediment and erosion control measures will be put in place, as appropriate, downslope of the stockpiles during development. Additional details on sediment and erosion control measures for the soil stockpiles are provided in the Erosion and Sediment Control Plan.

Frozen soils will be segregated by type, defined primarily by ice content and grain size, and either placed in appropriate stockpile areas or in the Frozen Soil Storage Area. The stockpiled material will be stored to prevent or limit erosion by wind or rainfall and to permit recovery of materials that will be utilized in reclamation. If quantities are in excess of closure requirements as determined through an updated material

balance evaluation, some of the frozen soil may be co-disposed of in thin horizontal lifts within the WRSF, as discussed in Section 3.1.2.

Frozen soil defined as Type I material (Section 5.7) will be stockpiled with slopes less than the natural angle of repose when placed in the soil stockpiles if recovered from locations close by. Because the ice content is low, it will behave similarly regardless of it being frozen or thawed; therefore, it is suggested that a slope of 2H:1V for the Type I material will be stable in the short and long term.

Water released from thawing of the frozen soils in the soil stockpiles will be filtered through a waste rock berm. Released water quantities are anticipated to be small from these stockpiles because they will primarily contain thawed organic soils, small amounts of frozen organic soils, and the low ice content Type I frozen soils excavated from the HLF. Any water that seeps through the downslope waste rock containment berm will reach the Alpha Pond where further sedimentation will occur before being released to the natural environment.

3.5 Frozen Soil Storage Area

The frozen soil storage area will be located immediately adjacent to and/or on top of the Alpha WRSF (Figure 1-2). Frozen soil that is not immediately re-used as fill will be deposited in the frozen soil storage area. A total of approximately 1.5 Mm^3 of frozen soil is estimated to be excavated during construction of the mine (including bulking), of which approximately 0.2 Mm^3 will likely not be suitable for immediate re-use as fill during construction or reclamation and will require storage in the frozen soil storage area.

In the case of Type II, III, and IV materials as described in Section 5.7, the top of the frozen soil stockpiles should not be elevated above the surrounding waste rock.

3.5.1 Frozen Soil Storage Area Design

Limited site preparation is required for the frozen soil storage area, as the frozen overburden soils will be placed primarily on top of or directly adjacent to the Alpha WRSF to allow free draining of any melt water down through the coarse waste rock. The foundation of the frozen soil storage area is not anticipated to have permafrost and therefore stripping of overburden soils below the organics layer will not be required.

As necessary, waste rock berms will be constructed around the perimeter of this storage area to enhance stability and provide drainage of the stored materials. The waste rock berm will be constructed of coarse waste rock material, will be 2 m high with a side slope ratio of 2H:1V, and will have a filter constructed of well-graded crushed rock placed on the side of the berm adjacent to the contained material. This filter will be 0.5 m thick and tied into competent ground in a key trench, which will be a minimum of 1 m deep. Finished crest width for the berm will be 1.5 m. Where feasible, the berm will be keyed into the side slopes to create interlocking of the fill and side slopes. Eventually all soils placed in this storage facility will be stabilized by the waste rock in the Alpha WRSF, with some relocated for reclamation purposes.

The storage area berms are designed to be flow-through structures that will allow for excess pore water resulting from the thaw of ice-rich materials to drain while containing the fine-grained materials that may otherwise be thaw-unstable. Water released from thawing of the frozen soils in the frozen soil storage area will be filtered through the waste rock and flow down to the sedimentation dam beneath the Alpha WRSF, where further sedimentation will occur before being released to the receiving environment. Additional details

regarding the management of surface water and sedimentation can be found in the Water Management Plan.

Stockpile stability will not be an issue for the frozen and thawing materials located in the frozen soil storage area because they will be surrounded by waste rock on all downhill sides.

3.5.1.1 Sizing

Not all of the Type I material as defined in Section 5.7 will be taken to the frozen soil storage area; a large portion, perhaps as much as 40%, will go to the soil stockpiles north of the HLF and some will be used as general fill. The frozen soil storage area is therefore sized to be able to contain 40% of the total of the Type I material. A maximum Type I stockpile height of 20 m is proposed. The Type I material is expected to be stable in the stockpile. At this stockpile height, a Type I stockpile footprint of 33,800 square metre (m^2) or 3.4 hectares (ha) will be allowed for in the frozen soil storage area.

To add storage contingency in the frozen soil storage area, the amounts of Type II and III materials have been increased by 30%. With an average proposed depth of stockpiled material of 10 m, the Type II and III stockpile footprints are 6,500 m^2 or 0.7 hectares (ha) and 9,700 m^2 or 1.0 ha, respectively. Similarly, the amounts of Type IV materials have been increased by 50%. With an average proposed depth of stockpiled material of 7 m, the Type IV stockpile will have a 17,900 m^2 or 1.8 ha footprint in the frozen soil storage area. Total footprint area for the frozen soil storage area will be 67,900 m^2 or 6.8 ha.

3.6 Water Management Infrastructure

Surface water will be controlled by a series of channels and berms to segregate water that has contacted mine waste and mine related infrastructure (contact water) from water which has not (non-contact water). Contact water will be collected and routed to the Alpha and Facility sedimentation ponds to allow suspended sediment to settle out of the water prior to discharging into the environment. Pond effluent will meet the discharge guidelines for total suspended solids.

A Water Management Plan and Erosion and Sediment Control Pan have been developed to proactively manage suspended sediment and contact water throughout the construction and operation phases of the mine, including the development and operation of the WRSF, soil stockpiles and other storage areas. Key components of the Water Management Plan that will be used during the development, operation and closure of WRSF and soil stockpiles include:

- The Alpha Pond, which will operate as a sedimentation pond collecting runoff and rock drain seepage from the Alpha WRSF
- The Facility Pond which will operate as a sedimentation pond collecting runoff from the ROM stockpile, camp, and process plant areas
- Good management practices for controlling sediment adjacent to roads
- A series of diversion ditches and berms around key infrastructure areas.

Additional details regarding management of surface water can be found in the Water Management Plan.

4.0 STORAGE FACILITY GENERAL CONSTRUCTION

4.1 Construction QA/QC

A construction quality assurance (QA) and quality control (QC) program will be developed for the WRSF, the frozen soil storage area, soil stockpile and the ROM stockpile prior to the commencement of construction to verify that the parameter assumptions and recommendations developed during the design process are achieved as well as to confirm the material type. Elements that will be considered include:

A qualified environmental professional / technician with appropriate knowledge and training will monitor:

- Project construction and closure activities
- Monitoring of cut slopes and fill material
- Salvaging and storing soil material suitable for reclamation
- An evaluation of overburden volumes and, based on soil stockpile dimensions, a determination of whether there is sufficient material for reclamation
- Foundation preparation as necessary for geotechnical and environmental considerations
- Permafrost (and ice-rich material) identification
- Construction of berms, lifts, interceptor trenches and sediment ponds
- Implementation of construction constraints related to climate conditions
- Photographs of the construction process at each stage of construction
- Preparation of construction record drawings signed and sealed by a Professional Engineer registered in Yukon, where appropriate.

During mine operations, confirmatory sampling will take place as mine rock is excavated to confirm the material type and potentially update the ARD classification scheme as described in Section 2.5. The monitoring program is further described in the Geochemical Monitoring Plan.

4.2 Vegetation Clearing

Vegetation clearing activities will occur within the Project footprint prior to earthworks and construction activities and will be carried out using an approach that minimizes the destruction of native vegetation and wildlife habitat outside of the footprint. Construction activities will be restricted to areas that are surveyed, approved, marked, and flagged within the Project footprint, and all personnel will avoid excessive and unnecessary disturbance to existing vegetation.

During mine development, vegetation removal will be conducted through mechanical methods and will follow all safety recommendations and applicable good management practices. During clearing, all vegetation will be felled to the interior boundary of the footprint to protect the surrounding undisturbed vegetation. Materials will either be temporarily stockpiled, burned in place, or processed to optimize future use. An overall site clearing/stripping program will be developed prior to construction to ensure vegetation and overburden materials suitable for reclamation are properly stored for later use. Additional information regarding vegetation clearing activities are provided in the General Mine Development Plan and Vegetation Protection Plan.

4.3 Excavation

It is anticipated that a shovel (excavator) or dozer, equipped with a ripper tooth as necessary, will be employed to excavate most of the frozen and unfrozen soils from within the active layer. Limited drilling and blasting of frozen materials may be required to permit excavation of some frozen soil as there may be localized areas where the level of ice bonding combined with the soil/weathered rock type precludes mechanical excavation.

During construction, excavation activities will be carried out under the supervision of professional geotechnical field staff experienced in identifying soils and rocks in permafrost terrain, and with construction operators and managers experienced in permafrost field conditions. Incorporating site-specific field information collected during the construction process is a key factor for the appropriate handling, storage, and management of the excavated frozen soils (Section 5.7).

A typical sequence for a particular construction area will include:

- Detailed review of construction plans for cutting in a specific area.
- Field assessment of the site-specific terrain to undergo construction including reconnaissance across the terrain to be excavated, along existing road cuts, and to the locations of previous test pits and boreholes.
- Conducting additional site investigations (test pits or probe holes), if needed, in specific areas.
- Implementing erosion and sediment control measures as stipulated in the Erosion and Sediment Control Plan.
- Initiating excavation and material haulage as dictated by cut-and-fill balances specified in facility designs, while classifying and segregating materials for specific uses or storage.
- Implementing adaptive management practices based on the observed performance of excavations and the handling characteristics of the materials.
- During operation, modify the frozen soil classification system (Section 5.6), as needed, to achieve the most efficient, cost-effective and environmentally sound method to manage the excavations and frozen material at site.

The field supervisor (a geologist, engineer, or technician) will record and document their observations prior to and during all excavation activities using standard practices described above. These would include general descriptions of soil and bedrock type, stratigraphy (lateral and vertical extent) of units exposed or as determined by interpolating between boreholes and test pits, soil properties, lateral and vertical extents of ice-bearing soils, including the percentage of ice of each unit or sub-unit as necessary (as per classification shown in Figure 2-3). A primary objective for those supervising excavation will be to characterize the frozen materials into the four classifications described in Section 5.7.

Excavation in frozen ground may lead to soft ground conditions, embankment cut slope instability, and the release of sediment-laden water. Management of excavation operations will therefore be implemented and maintained to ensure that excavations do not result in discharge of sediment-laden water to the receiving environment without adequate controls. Sediment mobilization and erosion will be minimized by using the following measures:

- Limit the extent of land disturbances to the practical minimum

- Excavate cut slopes in frozen materials in the winter whenever practical
- Construct sediment control devices, such as collection and diversion ditches, sediment traps, in-channel energy dissipaters, and sediment basins
- Install rock riprap, channel lining, sediment filters, or other suitable measures in ditches on steep gradients as required
- Direct all sediment-laden runoff to the appropriate sediment control measure
- Construct appropriate temporary best management practices (e.g., silt fences, hay bales) downslope of disturbed sites where more permanent sediment control measures are not appropriate or in combination with permanent measures.

A description of these measures, their construction considerations, and follow-up monitoring are provided in the Erosion and Sediment Control Plan and must be followed for all excavations.

Stability of excavation cut slopes in higher ice content soils (Types II, III, and IV; Section 5.7) will be improved by undertaking the following:

- Create cut slopes at no greater than 2H:1V slope, 2.5H:1V for Type IV material
- Cover cut slopes with a blanket of good quality rockfill to control sloughing, reduce thermal degradation, and act as a filter for any generated thaw water.

4.4 Transport and Handling

Waste rock, ROM mineralized material and overburden soils will be transported from the open pits to the appropriate facilities as discussed in previous sections and end or paddock-dumped. The materials may be spread by dozer.

4.5 Material Availability

Material that will be used for construction of the site facilities and haul roads will include ex-pit overburden, in-pit overburden, waste rock, or borrow source material that is not identified for use as reclamation material. Availability and use of this material will be dependent on results of geochemical testing of the material prior to excavation (Section 5.1) as well as classification and segregation of frozen material (Section 5.7). As construction activities advance, the site-specific construction schedule will be refined to follow a sequence of activities that ensure suitable material will be available for construction of site facilities. Should suitable waste rock from within the pit footprints be required as construction material earlier in the mining sequence than anticipated, this material will be mined for use based on the site development requirements. Similarly, should additional borrow material be required for site development activities (i.e., Alpha pond dam), sources may be accessed from suitable locations within the footprint of mine infrastructure during construction.

For material required for reclamation, soil salvage and stockpiling will be carried out during the Construction and Operations Phases to stockpile material that is suitable for use in reclamation.

5.0 MATERIAL MANAGEMENT

The following sections provide a detailed description of the operational plans for the handling, storage and surveillance of waste rock, overburden, ROM ore, heap leach material, haul roads construction material and pit wall rocks at the Mine Site to minimize the potential for ARD generation and metal leaching into the receiving environment.

5.1 Waste Rock

Waste rock will be stockpiled in waste rock storage facilities or used in haul road construction during mine life. The total mass and time period of activity for the WRSF and in-pit backfill is shown in Table 5-1. Geochemical characterization indicates that all waste rock types are classified as non-PAG. Therefore, no active segregation or management of PAG waste rock is expected during mine operations. If PAG material is identified as part of regular monitoring activities, contingency measures will be adopted as described in Geochemical Monitoring Plan.

Table 5-1 Mass, Spillway Elevation, and Construction Period of the WRSF and in-pit backfill

Waste Rock Destination	Total Mass (Mt)	Spillway Elevation (masl)	Mass Below Spillway (Mt)	Placement Begins	Placement Ends
Alpha WRSF	238.8	NA	0.0	Y-1	Y9
Kona waste to Alpha WRSF	2.8	NA	0.0	Y8	Y9
In-Pit Backfill - Latte	14.0	1035	0.2	Y3	Y4
In-Pit Backfill - Supremo	30.2	920	6.0	Y6	Y9
In-Pit Backfill - Double Double	8.8	1050	2.0	Y8	Y9
In-Pit Backfill - Kona[1]	2.0	1230	1.5 (approx.)	Y9	Y9

[1].Waste rock from Supremo will be direct hauled and backfilled into the Kona pit during Year 9 of mine life

Geochemical testwork indicates that all lithologies and weathering facies of waste rock have little or no potential for acid generation. The low potential for acid generation is, in part, related to the lack of sulphur mineralization, with median total S values in gneiss, granite and schist being 0.01, <0.01 and 0.03 wt.%, respectively. There is some variation in sulphur content between weathering facies within each lithology, with the fresh weathering zone typically showing greater sulphur content then the transition and oxide zones. However, the sulphur content remains relatively low even in unweathered (fresh) waste rock, with median values ranging from <0.01 to 0.11 wt.%. The relative NP in different waste rock types is similar to that of ore, with schist lithology having the highest NP (median of 64 $kgCaCO_3/t$), the gneiss having an intermediate NP (median of 8.8 $kgCaCO_3/t$) and the granite having the lowest NP (median of 1.5 $kgCaCO_3/t$). Due to the low sulphur concentrations and the presence of carbonate minerals, all waste rock types are classified as non-PAG. Given the above, no active segregation or management of PAG waste rock is expected during mine operations. If PAG material is identified as part of regular monitoring activities, contingency measures will be adopted as described in the Geochemical Monitoring Plan

From a metal leaching perspective, there is significant variation in As enrichment between waste rock lithologies and weathering zones. Granite waste rock has the highest As concentrations (median of 119 ppm), compared to schist and gneiss (median values of 24 ppm and 26 ppm, respectively). In schist

and gneiss waste rock arsenic occurrence is positively related to the degree of weathering, with the most oxidized weathering zone (oxide) having 11x-30x greater As enrichment compared to the least weathered weathering zone (fresh). Granite is unique in that median As concentrations are greatest in the fresh weathering zone (1648 ppm), lowest in the transition zone (30 ppm) and intermediate in the oxide zone (228 ppm). The As leaching potential of these rock types is also dependent on the Fe content. Iron concentrations are higher in the schist (median of 2.95 wt.%) compared to gneiss and granite waste rock (median values of 1.29 wt.% and 1.23 wt.%, respectively). Iron shows relatively little variation between weathering zones. For example, the oxide, transition and fresh weathering zones of the schist lithology have median Fe content which ranging from 2.87 wt.% to 3.04 wt.%. The results of 47,972 analysis of Fe and As in waste rock drill core show that 58% of granite, 17% of schist, and 31% of gneiss waste rock is classified as having a high As leaching potential (i.e., As:Fe molar ratio > 4.5 mmol/mol).

In order to affectively manage waste rock with high As leaching potential, zones of high and low As leaching potential have been populated within the Project's block model. The block model is a three-dimensional geologic model of Au bearing structures and surrounding waste rock within the mine pits. The block model contains information regarding weathering type, lithology, Au and As content discretized to unit cells measuring 10 m x 2.5 m x 5 m. In order to use the block model to predict As/Fe molar ratios an estimate of Fe content is required. By assuming median Fe values for each waste rock lithology (gneiss = 1.23 wt.%; schist = 2.95 wt.%; and, granite = 1.29 wt.%), the As:Fe molar ratios can accurately be approximated based on As content alone for the purpose of classifying As leaching potential. By assuming these Fe concentrations, zones of high and low As leaching potential can be defined in the block model using the following criteria:

- where solid phase As is < 78 ppm in gneiss waste rock, material will be classified as having a low metal leaching potential
- where solid phase As is < 178 ppm in schist waste rock, material will be classified as having a low metal leaching potential
- where solid phase As is < 74 ppm in granite waste rock, material will be classified as having a low metal leaching potential.

The As leaching potential is accurately classified in 92%, 95% and 98% of gneiss, granite and schist metal assay samples using these criteria. Therefore, waste rock with an As content greater than the above listed cutoff concentrations in the block model will be considered to have high As leaching potential. Block model figures for the four open pits are provide in Appendix C.

Uranium shows some degree of enrichment in gneiss and granite waste rock, with median U values of 3.7 ppm and 6.5 ppm, respectively. Schist waste rock shows little or no U enrichment, with median values being below that of average continental abundance (median value of 1.7 ppm versus ACA of 2.7 ppm). Inorganic C has been directly measured in 231 waste rock samples and is present above detection limit values (0.05 wt.%) in 33% of granite, 61% of gneiss, and 100% of schist. The results for gneiss and schist are generally supported by the much larger surrogate NP database, where inorganic C content is estimated based on solid phase Ca concentrations measured in approximately 48,000 drill core samples. Based on surrogate NP estimates, the percent of waste rock predicted to have inorganic C > 0.05 wt.% is 1% of granite, 62% of gneiss and 96% of schist.

The surrogate NP and inorganic C measurements are broadly similar for schist and gneiss waste rock, while the surrogate NP predicts significantly lower inorganic C content compared to direct measurements in granite waste rock. Considering the variable occurrence of inorganic C in gneiss and granite waste rock and the lack of information regarding the spatial distribution of carbonate mineralization in the block model, both granite and gneiss waste rock will be assumed to have high U leaching potential.

Upon mine closure, mine pits will partially flood and submerge a portion of the in-pit backfill. An estimated 9.5 Mt (approx.) of waste rock will be placed below mine pit spillway elevations and may become flooded after mine closure (Table 5-1). Saturated kinetic testing shows that reducing conditions inhibits U leaching and promotes As leaching in all rock types. This divergent behaviour is consistent with the redox sensitivities of these two parameters. Particularly, elevated As concentrations were found in baseline groundwater monitoring program in groundwater surrounding mine pits. The highest As concentrations observed across the mine site was in groundwater wells screened in granite around the Kona Pit. Kona Pit groundwater wells screened in granite bedrock produced peak As concentrations of 2.03 mg/L whereas peak concentrations observed in wells screened in gneiss and schist bedrock were 0.080 mg/L and 0.095 mg/L, respectively.

Similarly, the granite saturated columns containing granite waste rock produced significantly greater As concentrations (max of 3.55 mg/L) compared to gneiss or schist columns (max of 0.209 mg/L and 0.0304 mg/L, respectively). These results are consistent with the greater proportion of granite waste being classified as having a high As leaching potential compared to schist or gneiss waste rock. Overall, the implications of these results are that placement of material with high As leaching potential in saturated environments should be avoided, particularly for granite. The management objective for waste rock are as follows:

- Exclude waste rock with high As leaching potential from portions of in-pit backfill that may become flooded by pit lakes at the end of mine life.

Zones of high As leaching potential will be identified using As values in the block model. Sections of in-pit backfill that may become flooded will be defined by the spillway elevation. The spillway elevation and the mass of waste rock which is expected to be placed below the spillway elevation in the WRSF and in-pit backfill is shown in Table 5-1.

5.2 Overburden

Overburden will be stripped and stockpiled or used as fill or construction material during mine development depending on the source, ice content and material type. Most ex-pit overburden will either be stockpiled or used as fill within the mine facility footprint area that the material is sourced from. In-pit overburden will either be stockpiled or stripped as waste rock and disposed of in the WRSF, used in haul road and pad construction, or used as general fill.

Geochemical characterization of overburden samples collected across the mine site show that overburden is non-PAG. Hence, no segregation or special handling of overburden is required to mitigate ARD potential. Overburden represents bedrock in a highly weathered state and the metal leaching potential can generally be expected to be lower than the underlying bedrock. Whenever there are lithology specific metal leaching criteria, the overburden will be classified using the protocol for the lithology of underlying bedrock.

Uranium occurrence in overburden is generally lower than that of waste rock, with only granite overburden showing any enrichment in U compared to ACA values (median of 3.7 ppm). Both schist and gneiss overburden are relatively depleted in U compared to ACA values, with median values of 2.1 ppm and 1.5 ppm, respectively. Due to the highly weathered state of overburden this material type generally lacks carbonate minerals. Inorganic carbon content was measured in 100 overburden samples which overly granite and gneiss bedrock. Of these samples, only 9 of 100 samples (9%) contained detectable inorganic C (≥0.05 wt.%). Out of the 9 samples that inorganic carbon was detectable, 4 were equal to the detection limit value and the other 5 samples ranged from 0.07 to 0.14 wt.%. Owing to the lack of inorganic C, overburden is classified as having a low U leaching potential.

Arsenic occurrence in overburden is variable depending on the location. In general, As enrichment is associated with overburden from mine pits that is adjacent to areas of Au mineralization in bedrock. Hence, significantly higher As concentrations are found in samples of in-pit overburden (median = 94 ppm) compared to ex-pit overburden (median = 14 ppm). Accordingly, in-pit overburden has a greater proportion that is classified as having a high As leaching potential than ex-pit waste rock.

Based on As:Fe molar ratios, 38% (23 of 61 samples) of in-pit waste rock classifying as high As leaching potential while 7.5% (6 of 80 samples) of ex-pit overburden is classified as having a high As leaching potential. The 23 in-pit overburden samples classified as high As leaching potential are generally grouped near or overlying ore zones, while in-pit samples with low As leaching potential generally overly waste rock are around the periphery of mine pits.

In-pit overburden will be segregated using the geologic block model, using the same approach that is described for waste rock. The bulk of the overburden from any one potential borrow area is classified as having low As leaching potential. Based on these results, ex-pit overburden will be classified as having a low As leaching potential.

The U and As leaching potential classifications described in this section are only valid for overburden areas that ML/ARD characteristics have been verified with ABA and metals analysis. The metal leaching potential of any potential sources of ex-pit overburden identified in the future will be verified with geochemical testwork prior to excavation. Management objectives for overburden are as follows:

- Ensure that overburden with high As and U leaching potential is not used as fill or construction material
- Overburden with high As or high U leaching potential will be disposed of in WRSF
- Exclude overburden with high As leaching potential from portions of in-pit backfill that may become flooded by pit lakes at the end of mine life.

5.3 ROM Stockpile

Approximately 60 Mt of ROM ore will be mined from the open pits and taken directly to the HLF or be temporarily stockpiled on the ROM pad. The mass of ore on the ROM pad will fluctuate widely, containing up to 2.7 Mt during mine life. Peak volumes occur during the winter months when ore is still being produced from the pits but no new material is stacked on the HLF, and minimum volumes occur during summer or fall months when ROM material is being removed to the HLF.

The only PAG ore type that will be produced by the project is 0.95 Mt of granite ore from the Kona Pit. Gneiss and schist ore, which makes up the remaining 59 Mt of ore is classified as non-PAG. Tracking of granite ore being temporarily stockpiled on the ROM pad is required to ensure that it is properly managed when it is placed in the HLF. Granite ore will be tracked on the ROM pad as follows:

- The location and volume of ore from Kona Pit will be recorded when placed on the ROM pad
- A qualified person will confirm lithology and proper placement of all material being moved from ROM stockpile to the HLF during years 8 and 9 of mine life when the Kona Pit is active.
- Encapsulate Kona Ore within the HLF, as described in Section 5.4.

The main objective of ore management is to ensure that ore from the Kona Pit, which is considered PAG, is located properly in the HLF facility.

5.4 Heap Leach Facility

Crushed ore will be transported to the lined HLF pad using standard haul trucks and conveyor. Ore will be mixed with lime and irrigated with a sodium cyanide solution to extract gold. The ore will be stacked in nominal 10-meter lifts, reaching its final mass of 60 Mt in year 9 of mine life. After gold has been extracted from the ore, the material is referred to as leach tailings. Leach tailings geochemistry is broadly similar to that of ore, with the exception of an elevated pH and increased carbonate content related to lime addition and increased solubility of metals which from metallo-cyanide complexes (Cu, Cd, Fe, Zn, Hg, etc.).

Leach tailings have a lower acid rock drainage potential compared to ore due additional NP in the form of lime that is added to maintain CN stability. Lime addition will neutralize any water-soluble acidity (e.g., Fe and Al sulphates minerals) that may be present on the ore and can induce carbonate mineralization within the HLF as a result of the high pH environment. Upon mine closure excess lime will either be rinsed from the heap leach facility (HLF) or be re-precipitated as calcite.

For the purposes of mine waste management, the same classifications developed for ore will be applied to leach tailings (i.e., granite leach tailings will be classified as PAG). While lime addition will reduce the ARD potential, special handling will nonetheless be incorporated into mine waste management in order to ensure that granite from Kona is encapsulated within the HLF. Note this rock type makes up less than 2% of total ore stored within the HLF. Due to the small quantity of PAG material being stored in the HLF, the facility as a whole as has little or no potential for the development of ARD. Special handling and placement of granite ore in the HLF will take place to mitigate the potential for ARD and minimize the metal leaching potential. The general mitigation strategy for granite ore is excluded form the base of the HLF. To achieve this granite ore will be handled as follows:

- Exclude granite ore from bottom 10 m lift

Excluding granite ore from the bottom lift will ensure that excess NP associated with the gneiss and schist ores will neutralize any acidity generated from granite ore within the HLF. Because Kona ore is mined later in the mine life, the ability to exclude granite ore from the bottom 10 m lift will likely occur regardless of this special handling requirement. At the end of mine life, a cover will be placed on the HLF and no granite leach tailings will be exposed on the HLF surface. As indicated above, all granite ore (total of 0.95 Mt) is scheduled to be mined during years 8 and 9 of Operations and represents less than 2% of the total heap ore.

Irrigating ore with NaCN solution will dissolve Au and other trace metals which form soluble CN complexes (e.g., Cu, Hg, Cd, Ni, Zn). While this will effect the metal leaching potential of ore during active leaching it will only have a minor impact on total metal abundance, and solid phase metal enrichment in leach tailings will remain similar to ore. Metal leaching potential from the HLF will vary widely at different stages of mine life. During operations, addition of NaCN will increase the solubility metals which form cyano metal complexes (e.g., Cu, Hg, Cd, Ni, Zn). Furthermore, the high pH values created by lime addition will increase the solubility of certain anion forming elements such as Sb, As, Mo and U. The highest potential for metal leaching from the HLF will occur during mine life while the HLF is being actively leached.

After mine closure, metal leaching potential from leach tailings will decline as CN is detoxified and the pH of the facility declines from that of process fluid (pH 9.5 - 11) to more circumneutral neutral values (e.g., < 8.5). Cyanide destruction will occur at the end of mine life, removing residual cyanide from HLF pore water and reducing the metal leaching potential of detoxified leach tailings. Lime is unstable in the presence of water and atmospheric CO_2 and will be either rinsed from the system or re-precipitated as calcite. The metal leaching potential of leach tailings will decline at closure once cyanide detoxification is complete and the pH declines from highly alkaline to more circumneutral values.

All lithologies of leach tailings are classified as having a high As leaching potential owing to lime addition. Similarly, due to lime addition all gneiss and granite leach tailings are classified as having high U leaching potential regardless of inorganic C content.

5.5 Haul Roads

Haul roads will be constructed between year -2 to year 7 of mine life to provide haul truck access between mine pits, the WRSF, the ROM stockpile and HLF. Approximately 12 Mt of material will be required to construct roughly 18 km of haul roads across the site. Construction material will be sourced primarily from waste rock (11.3 Mt) and to a lesser extent overburden produced from road cuts (0.6 Mt). The mass and year of construction for haul roads subdivided by catchment is shown in Table 5-2.

Table 5-2 Approximate Mass Required for Haul Road Construction

Year	YT24 Catchment[1] (Mt)	Latte Creek Catchment[1] (Mt)	Halfway Creek[1] Catchment (Mt)	Waste Rock Available[2]
-3 to -1	-	2.2	3.3	Schist/Gneiss
1	-	1.1	-	Schist/Gneiss
2	0.5	1.1	1.6	Schist/Gneiss
3	0.5	-	-	Schist/Gneiss
4	0.5	-	-	Gneiss
5	0.5	-	-	Gneiss
6	-	-	0.5	Gneiss
7	-	0.1	-	Gneiss
8	-	-	-	Gneiss
9	-	-	-	Gneiss
Total	2	4.5	5.4	

[1]Catchments that haul roads are constructed in

[2]Available waste rock from mine pits per year of mine life

All waste rock and overburden on site is classified as non-PAG. Therefore, no active segregation or management of PAG material during haul road construction is planned for during mine operations. If PAG material is identified as part of regular monitoring activities, contingency measures will be adopted as described in Geochemical Monitoring Plan.

Deposition of waste rock in the WRSF or haul road will not affect intrinsic ML/ARD potential. However, haul roads will have a relatively large footprint (surface area to mass ratio) compared to the WRSF, and haul road runoff has the potential to impact all three catchments (Halfway Creek, Latte Creek, and YT24). Owing to the relatively large surface area and spatial extent of haul roads, material used in haul road construction has a greater exposure than waste rock deposited of in the WRSF. Therefore, segregation criteria will be applied during haul road construction to minimize the impact that metal leaching from haul roads has on site water quality.

High As leaching waste rock is localized to certain areas of the mine pits are predicted by the block model. Zones of low As leaching potential waste rock and in-pit overburden can be identified using the geologic block model, and As leaching potential of all ex-pit overburden will be identified by characterization samples collected prior to excavation of each borrow source. This makes it possible to construct haul roads exclusively with low As leaching potential material.

Uranium leaching potential will be minimized by utilizing schist waste rock and overburden for haul road construction as much as feasible. Constructing haul roads exclusively with low U leaching potential material is not feasible. There are some limitations on when and how schist overburden can be used in haul road construction. Schist is only produced from Y-1 to Y3 of mine life and will not be available for a road construction in later years. Furthermore, owing to clay formation during weathering of this rock type, schist is not suitable for road surfacing, which will require utilization of granite or gneiss waste rock. The specific quantity of schist rock and overburden with low U leaching potential that will be incorporated into haul road construction is yet to be defined. When schist is not available or suitable, granite or gneiss waste rock will be used regardless. These rock types are expected to have high U leaching potential. Overall U leaching potential of haul roads will be minimized by utilizing schist and overburden in haul road construction whenever possible and minimizing the amount of gneiss and granite waste rock used in construction. Management objectives for haul road construction are as follows:

- Exclude waste rock and overburden with high As leaching potential from haul road construction
- Waste rock or overburden with low U leaching potential will be used in haul road construction when suitable for construction needs and when available.

5.6 Pit Wall Rock

Pit wall rock refers to rock exposures within the mining pit itself. This includes the pit floor, benches and fractured blast-damaged rock. Pit walls are expected to be fractured as a result of blasting operations. Fracturing of the pit walls exposes a greater proportion of the wall rock to weathering. Pit wall rock will be composed of a combination of waste rock and ore. Wall rock drainage will have the geochemical signature of the respective exposed rock types. A summary of estimated pit wall rock surface areas is provided in Table 5-3 below. The acid rock drainage and metal leaching potential of pit wall rock exposure is determined by the ore or waste rock lithologies that makeup the pit wall. Note that the only pit wall rock type that is predicted to be PAG is granite ore exposures on the Kona Pit.

Table 5-3 Plan View of Surface Areas of Wall Rock Exposed in Mine Pit

Mine Pit	Primary Lithology	Period	Ore (ha)		Wall Rock (ha)			Total (ha)
			Oxide	Transition	Oxide	Transition	Fresh	
Supremo[1]	Gneiss	Operations	13.4	2.3	7.2	53.5	34.9	111.3
		End of Mine Life	13.4	2.3	7.2	53.5	34.9	111.3
Double Double[2]	Gneiss	Operations	0.4	0.9	0.5	2.4	6.9	11.1
		End of Mine Life	0	0	0	0	0	0
Kona[2]	Granite	Operations	0.5	0.5	0.8	1.0	2.0	4.8
		End of Mine Life	0	0	0	0	0	0
Latte	Schist	Operations	3.0	3.0	4.2	5.8	9.3	25.3
		End of Mine Life	0.9	4.1	2.4	4.1	7.9	19.4

Note: Maximum values show peak wall rock surface areas exposed during mine life, final values are wall rock exposures at the end of mine life.
[1] Supremo pit is backfilled while the pit is still active, allowing peak wall rock exposures to occur after backfill is complete at the end of mine life.
[2] Double and Kona pits are entirely backfilled with waste rock by the end of mine life and so have no rock wall exposures.

The geometry and rock types exposed on pit walls will evolve over mine life as the pits expand. Due to the nature of mining several sequenced pits, opportunities to backfill pits with waste rock have been incorporated into mine planning. This reduces pit wall rock exposures and limits the mass and footprint of Alpha WRSF. During mine life, all pits will receive some waste rock backfill. Backfill will cover a portion of Latte Pit and Supremo Pit, while all of Kona Pit and Double Double Pit will be filled. Kona Pit is the only pit where waste rock is backfilled to mitigate the ARD potential associated with ore exposures on the Kona Pit wall. Management requirements to mitigate the ARD potential associated with Kona Pit wall rock ore exposures are as follows:

- Backfill Kona Pit ore wall rock exposures with waste rock after mining in Kona Pit is complete
- Backfilling mine pits with waste rock will reduce the overall exposure of pit wall and mitigate the ARD potential associated with ore exposures in the Kona Pit.

5.7 Frozen Materials Management

Frozen ground contains varying amounts of ice, and in some cases this can be considered excess ice (as described Section 2.4). Specific management strategies have been developed for the various types of frozen soil. Field description and classification guidelines will be used in the field when preparing for and during excavation activities to classify frozen materials to determine an appropriate management approach.

Frozen soils have been separated into four types based on grain size and ice content for efficient field identification of materials that will require containment when thawed and those that will not require containment. Ice-rich, fine-grained soils will require a containment berm when thawed due to their high moisture contents and tendency to flow. The more granular, unfrozen or ice-poor materials are not expected to require containment and will be separated and stored in the soil stockpiles for use during closure. The four different types of frozen soils as well as the associated management strategies are described in Table 5-4.

Consideration must be given to the thaw behaviour of the materials, and allowances made for adequate drainage and associated erosion and sedimentation control, as well as additional time and effort required for the work. The general and specific strategies for managing drainage and sedimentation with water conveyance and storage infrastructure are described in the Water Management Plan; additional erosion and sediment control measures are detailed in the Erosion and Sediment Control Plan.

Some of the non-organic overburden removed from the open pits that does not meet reclamation criteria will likely be frozen mineral soils and weathered rock. It is expected that this material will all be removed during the drill and blast operation for the creation of the first bench cut for the pits. As such, this frozen soil would be co-mingled with waste rock and would be disposed of in the WRSF.

Table 5-4 Field Identification, Classification and Management of Frozen Soils

Material Classification Type	Soil Type	USCS Soil Types[1]	% Visible Ice	Strategy	Management Approach
I	Fine and/or coarse-grained colluvial soils, or weathered bedrock	GW, GP, GM, GC, SW, SP, SM, SC, ML, CL, MH and CH	No visible to <5% visible ice content (Fn)	Used as fill or stockpiled for closure	Used as general fill or if excess to a local fill requirement, stored for reclamation. Store in either the soil stockpiles north of the HLF or the Type I stockpile in the frozen soil storage area. Recognize that material will settle if placed in a frozen state. As such, it is not suitable for structural fill.
II	Coarse-grained sands and gravels (> 50% retained on No. 200 (0.075 mm) sieve)	GW, GP, GM, GC, SW, SP, SM and SC	Ice content of 5 to15%, moderate visible ice content (lower ice content Fv)	Used as fill once thawed or stockpiled for closure	Exposed and readily thawed and drained and then used as general fill within embankments and pads or stored in the Type II stockpile in the frozen soil storage area. If excess volumes exist over that required for closure, can be co-disposed of in a WRSF.
III	Fine-grained soils (> 50% silts and clays)	ML, CL, MH and CH	Ice content of 5 to15%, moderate visible ice content (lower ice content Fv)	Stockpiled for potential closure if required	Separated and stockpiled in Type III stockpile in the frozen soil storage area. Only used if absolutely required and only after it has thawed and drained. If excess volumes exist over that required for closure, can be co-disposed of in a WRSF.
IV	Fine or coarse-grained soils	GW, GP, GM, GC, SW, SP, SM, SC, ML, CL, MH and CH	Ice content >15% excess ice (higher ice content Fv & Fi)	To ice-rich stockpile location in frozen soil storage area.	Segregated at excavation site based on prior field data / information, and additional observations during excavations. Excavated and hauled to the ice-rich area in the frozen soil storage area located adjacent to the Alpha WRSF.

[1] Organic soils (OH, OL & Pt with or without ice) will be excavated and stockpiled for reclamation purposes.

5.8 Segregation Protocol

Newmont will develop soil stockpile and salvage guidelines for the Project that consider:

- criteria and segregation protocols for maximizing the amount of suitable soil and overburden that can be used for reclamation purposes
- progressively updating the guidelines concurrent with mine development with the objective of ensuring that soil resources are not buried if they can be safely salvaged
- progressive reclamation opportunities, maintaining cost-effective handling options, and minimizing soil loss, degradation, or contamination.

The soil stockpile and salvage guidelines will be updated progressively, concurrent with updates to this Plan or the Reclamation and Closure Plan.

5.8.1 Waste Rock

Geochemical characterization indicates that waste rock is non-PAG, and as such, no special handling to mitigate ARD potential will be required. If PAG material is identified as part of regular monitoring activities, contingency measures will be adopted as described in the Geochemical Monitoring Plan.

5.8.2 Overburden

Frozen soils (both ice-rich and non-ice-rich) will be identified using previous data, confirmed in the field during clearing, grubbing, and general earthworks activities. Mineral soil and weathered rock excavated from within the active layer may be frozen depending on the time of excavation, however these substrates will not likely have excess visible ice. If excavated during the winter, they would likely be classified as Type I material, whereas if excavated in the summer they would be unfrozen. Soils excavated from below the permafrost table may contain excess visible ice and will be classified as Types I to IV depending on ice content. Frozen soils will be managed as described in Section 5.7.

Continuous salvage and stockpiling of reclamation material will be carried out throughout the Construction and Operations Phases to provide reclamation material for the site components that are planned to be covered with material in closure. Effective soil salvage will ensure that soil resources will not be buried if they can be safely salvaged and provide suitable material to restore ecosystems and reduce infiltration. Newmont will develop soil stockpile and salvage guidelines for the Project that will be optimized throughout operations based on material volumes and quantities. The guidelines will include strategic stockpile placement based on source and use locations to reduce costs associated with long haul distances and re-handling, and will also contain the following details:

- Segregate organics rich overburden from mineral overburden to the extent practical. Segregation will be informed by thickness of the organic rich horizon:
  - if greater than 30cm, can be segregated from mineral overburden below.
  - if less than 30cm, segregation may not be practical using equipment available at the site.
- To not bury soil resources if they can be safely salvaged
- Salvage all salvageable soil and act on opportunities to increase salvage volumes as they arise
- Progressively update the guidelines concurrent with mine development.

Qualified personnel will be on-site during site preparation activities to guide material segregation and management. Stockpiles may be segregated in multiple lifts if overburden material conditions allow. Maintenance measures to reduce erosion of the stockpiles will be implemented as described in the Erosion and Sediment Control Plan.

Organic rich and mineral overburden that has been stripped from the footprints of mine facilities may be used as a growing medium for vegetation at the end of mine life. Suitable overburden will be used as fill within the mine facility footprint area where the material originated or stored in the frozen stockpile area. Storage of overburden will vary depending on where it is excavated and will be optimized based on progressive reclamation opportunities. Soil stockpiles will be managed as described in Section 3.4.

Geochemical characterization of overburden samples collected across the Mine Site show that overburden is non-PAG and has low metal leaching potential. Hence, no segregation or special handling of overburden is required to mitigate metal leaching and ARD potential. If PAG material is identified in overburden during the mine waste monitoring program, contingency measures will be adopted, as will be described in this Plan as well as in the Geochemical Monitoring Plan.

5.8.3 Mineralized Material

Approximately 60 Mt of mineralized material mined from the open pits will either be taken directly to the HLF or temporarily stockpiled on the ROM stockpile. The mass of mineralized material on the ROM pad will fluctuate, with peak volumes occurring during the winter months when mineralized material is still being produced from the pits, but no new material is stacked on the HLF.

With the exception of granite from the Kona Pit, which is classified as PAG for the purposes of mine waste management, the majority of mineralized material is expected to be non-PAG. While there is no drainage being directly discharged from the ROM stockpile, tracking of granite mineralized material being temporarily placed in the ROM stockpile is required to ensure that it is properly managed when it is placed in the HLF. Alternately the granite mineralized material will be crushed and directly placed on the HLF. Granite mineralized material will be tracked on the ROM stockpile as described in Section 5.3.

5.9 Materials for Reclamation

With the exception of the Type III and Type IV materials, the majority of the stored materials will be used during reclamation. Type I materials may be used as general fill once thawed but may require some moisture conditioning. Some of the Type II materials, once thawed and drained, could also be used as general fill. The depth of material in the stockpiles, the time of year the material is placed in the stockpiles, and whether the materials are thawed or frozen when placed, will significantly impact whether the materials will be frozen or not at the time of extraction for use in reclamation.

When used for reclamation, the materials will ideally be in a thawed state and with moisture contents close to optimum moisture for compaction. Since some of the materials may be frozen in the stockpile at the time of reclamation activities, it is possible that they will have to be recovered from the stockpile using a sequential thaw-and-strip approach. Once thawed, materials may have to be moisture-conditioned to reduce moisture contents to usable levels. Moisture conditioning will be accomplished by stockpiling the materials in windrows that will promote drainage due to gravity and drying on the surface. Once the surface materials become dry, the windrowed materials can be turned over to expose another layer of soil to the atmosphere.

6.0 MONITORING PROGRAM AND REPORTING

Visual observations of the Alpha WRSF, overburden stockpiles, sedimentation pond dams and pit slopes will be carried out and will be the most frequent and most important method of monitoring their geotechnical performance. The purpose of the inspections will be to identify apparent physical changes to the facilities that may indicate future instability and to allow the conditions to be mitigated prior to an instability event occurring. The geotechnical performance of the waste rock and overburden stockpiles, as well as the frozen soil storage area will be monitored via three types of visual inspections: Routine inspections, annual inspections, and event-driven inspections. Further information regarding these inspections and the geotechnical monitoring program is described in the Physical Monitoring Plan.

Additional monitoring as it relates to environmental conditions is described in the Environmental Monitoring and Adaptive Management Plan.

Waste rock and overburden management as it relates to milestones that are identified to measure progress will be included in the annual reports, along with results of the ML/ARD and physical monitoring programs. Additional progress reporting as the material management meets these milestones may also be provided through regular scheduled discussions.

7.0 ADAPTIVE MANAGEMENT

Adaptive management of the metal leaching and ARD potential of waste rock and overburden storage facilities are based on the outcomes of monitoring outlined within the Geochemical Monitoring Plan. Adaptive management includes possible mitigation measures in the event that material is potentially acid producing. These mitigations include:

- Mixing potentially acid generating material with acid consuming material
- Subaqueous disposal by placing mine waste in areas of mined out pits that will be flooded at the end of mine life.

With respect to the subaqueous disposal mitigation option, it should be noted that the potential for acid generation at the site is very limited and confined to the Kona material which is mined later in the mine life in Year 8. At that time, a number of pit voids (e.g., SU1, SU2, Latte W, SU3) are completed mining and filling with meteoric water. These pits therefore offer the opportunity of direct placement of any ARD material underwater immediately upon extraction. As such, there is little to no risk of onset of ARD as subaqueous disposal will eliminate the potential for sulphide oxidation.

Surface water quality and aquatic life adaptive management triggers are set to provide reasonable reaction time to possibly adverse changes without being overly sensitive. Additional details regarding surface water quality and aquatic life adaptive management for the Mine Site are provided in the Environmental Monitoring and Adaptive Management Plan.

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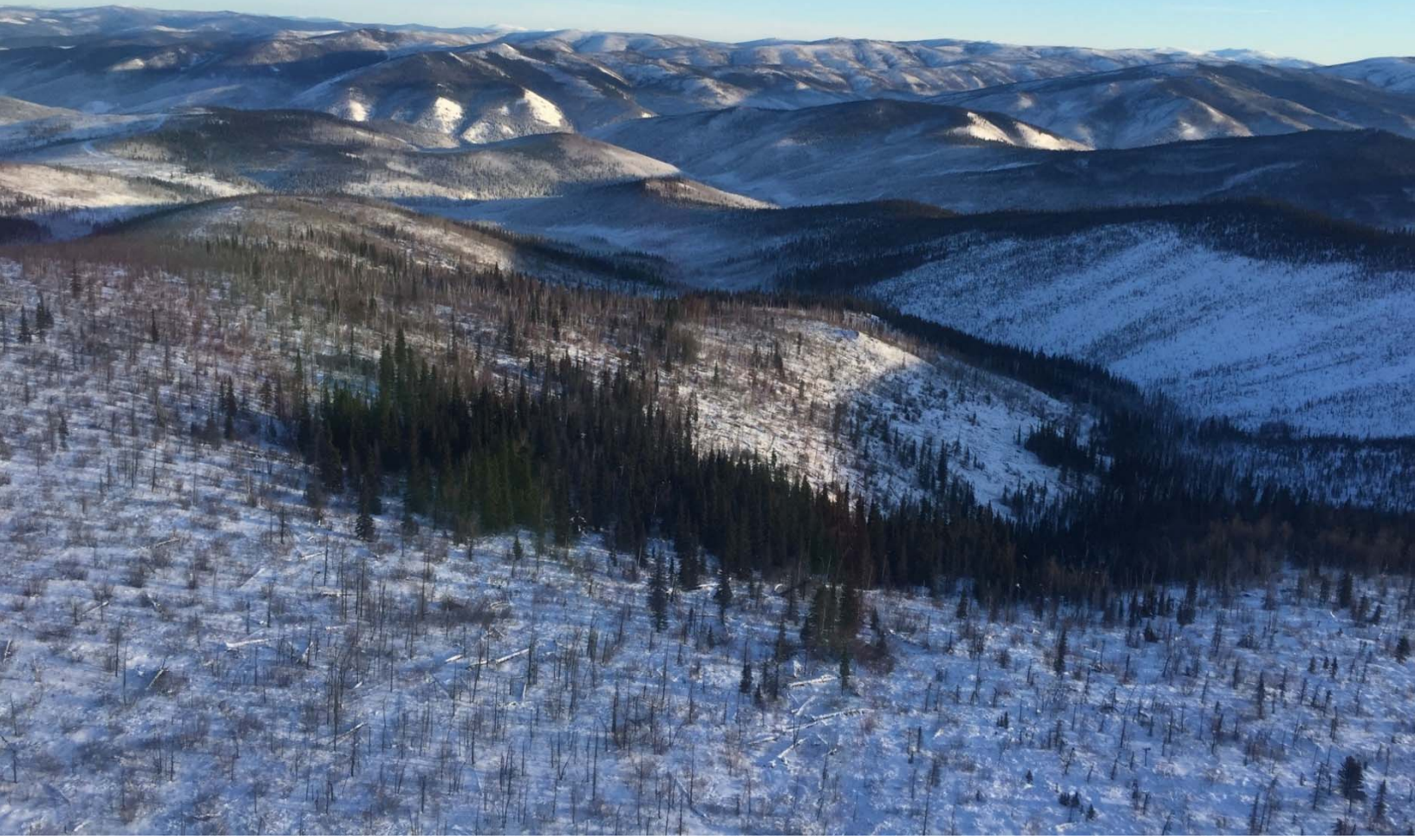
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APPENDIX A
WRSF Stockpile Stability Analysis

NEWMONT COPORATION
COFFEE GOLD PROJECT

PRELIMINARY SLOPE STABILITY ANALYSIS WASTE ROCK STORAGE FACILITES AND STOCKPILES

REPORT DATE: AUGUST 10, 2023



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Table of Contents

1 Facilities Overview 1-1
1.1 Alpha WRSF 1-1
1.2 Run of Mine Stockpile 1-1
1.3 Temporary Organics Stockpile 1-2
1.4 In-pit Backfill 1-2
2 Foundation Conditions 2-1
2.1 Alpha WRSF 2-1
2.2 Run of Mine Stockpile 2-3
2.3 Temporary Organics Stockpile 2-3
3 Geotechnical Material Properties 3-1
3.1 Waste Rock 3-1
3.2 Ice-poor Colluvium 3-3
3.3 Ice-rich Colluvium 3-3
3.4 Organic Soils 3-5
3.5 Weathered Bedrock 3-5
3.6 Fresh Bedrock 3-5
3.7 Pore Water Pressures 3-5
4 Slope Stability Analysis 4-1
4.1 Model Methodology 4-1
4.2 Design Acceptability Criteria 4-6
4.3 Slope Stability Modeling Results 4-8
5 Conclusions 5-1
6 Closure 6-1
7 References 7-1

List of Tables

Table 4-1: Suggested WRSF Stability Acceptance Criteria 4-6
Table 4-2: Factors of Safety Results 4-8

List of Figures

Figure 1-1: Site Layout 1-3
Figure 2-1: Location of Geotechnical Drillholes and Permafrost Mapping 2-2
Figure 3-1: Plot of Waste Rock Material Strengths 3-2
Figure 3-2: Location of Ice-rich Soil Slope 3-4
Figure 4-1: Alpha WRSF Critical Slope Stability Sections 4-1
Figure 4-2: Geometry of Alpha WRSF: Cross-Section A 4-2
Figure 4-3: Geometry of Alpha WRSF: Cross-Section B 4-2
Figure 4-4: ROM Stockpile Critical Slope Stability Section 4-3
Figure 4-5: Temporary Organics Stockpile Critical Slope Stability Section 4-4
Figure 4-6: Location of Supremo In-pit Backfill Critical Slope Stability Section 4-5

List of Appendices

Appendix A: Preliminary Slope Stability Model Results

INTRODUCTION

Newmont Corporation (Newmont) requested that JDS Energy & Mining, Inc. (JDS) conduct a Preliminary Slope Stability Analysis of the for the Coffee Gold Project proposed waste rock and stockpile facilities. This report summarizes the slope stability assessment of the proposed Alpha Waste Rock Storage Facility (WRSF) design, Temporary Organics Stockpile and Run of Mine (ROM) Stockpile. Additional slope stability analyses and reporting will be undertaken by JDS once the final mine plan is completed by Newmont.

This work was originally completed by JDS in 2018 and this update considers the results from the summer 2018 geotechnical field investigation which was completed after the 2018 analysis. Relevant details from the 2018 program are summarized in Section 2. Newmont has indicated that the original designs used for the 2018 analysis are still current.

The JDS scope of work pertains strictly to the physical stability of the WRSFs and overburden stockpile. Other design aspects of design such as geochemistry, water management and other environmental considerations are being assessed by others.

1 FACILITIES OVERVIEW

1.1 Alpha WRSF

The Alpha WRSF will be located on the southeastern limb of the Halfway Creek drainage basin (Figure 1-1). It will have an estimated minimum capacity of 245 Mt and a total footprint of 210 hectares. Construction of the Alpha WRSF will begin during pre-stripping and will continue until the end of LOM.

The Alpha WRSF will be built in a series of 40 m lifts in a bottom-up approach. A haul road will be developed along the east side of the WRSF. The toe of each lift is planned to be set back a minimum of 60 m from the crest of the previous bench, resulting in a final overall angle of 3.0 H:1V. The lowest elevation of the dump will be 815 m above sea level (masl), and the highest point will be 1,150 masl. The total maximum vertical stack of waste rock above the natural ground surface will be approximately 175 m.

The 40 m inter-bench slopes are designed at the natural angle of repose (35°) except for along the southern edge, where potentially ice-rich soils are anticipated. Inter-bench slopes in this area will be reduced to 26° (2H:1V) to reduce potential instabilities of the lower bench. The 26° slope angle will require shaping with dozers during placement.

For the purposes of effective water management, a rock drain will be developed beneath the Alpha WRSF. This drain will convey runoff from the upper portion of the Halfway Creek catchment, meteoric water infiltrating through the WRSF, and groundwater discharge to the Halfway Creek channel covered by the WRSF.

1.2 Run of Mine Stockpile

The Run of Mine (ROM) Stockpile will be located directly east of the primary crusher (Figure 1-1) and will store up to approximately 2.42 Mt of ROM mineralized material. The facility will have a footprint of approximately 14.4 ha. The amount of ROM material stored at the facility will fluctuate, with peak volumes occurring during the winter months of January to March when the crusher is not running. Seepage from the ROM stockpile will be collected in the Facility Pond and used as makeup water in the heap leach process. The ore stockpiled will be processed during the mine life and therefore the ROM stockpile will not remain at closure.

The ROM Stockpile will be constructed on top of a graded waste rock pad which will require approximately 3.6 Mt of material to construct. The waste rock pad will have a maximum slope height of approximately 60 m at the southeast corner and the ROM material will be stacked on top of the rock pad to a maximum height of approximately 30 m. The waste rock and ROM material slopes will be at their natural angle of repose (approximately 1.5H:1V) with a 12-m-wide safety berm between the two. This will result in a maximum overall slope height of approximately 90 m and overall slope angle of approximately 1.7H:1V.

1.3 Temporary Organics Stockpile

The Temporary Organics Stockpile will be located immediately north of the heap leach pad, near the top of a northeast facing slope. It will hold topsoil which will be removed from the Open Pits, heap leach pad, site infrastructure pads and portions of the WRSF footprints. The material will be progressively removed from the stockpile for reclamation purposes as certain areas of the Project are ready to be closed. The organic materials are not anticipated to be ice-rich.

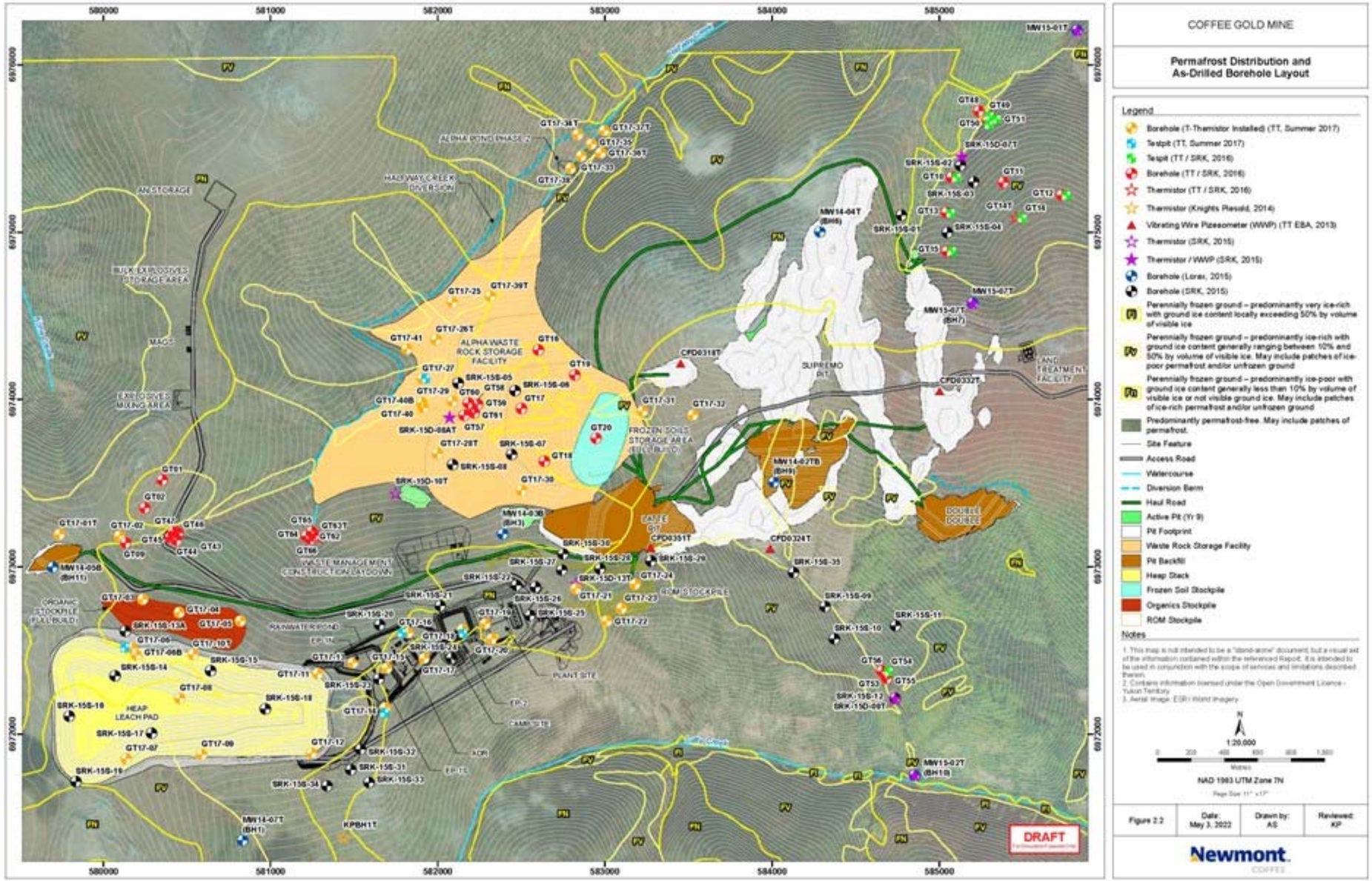
The Temporary Organics Stockpile has been designed with a footprint of 16.3 ha and a maximum capacity of 2.1 Mm^3. The stockpile has a maximum height of approximately 60 m with side slopes at approximately 2H:1V. Angle of repose for the organic materials is expected to be significantly lower than the waste rock because of their finer grain size. Minimal shaping or dozing is expected to achieve the 2H:1V design slope angle. The current estimated total amount of organics to be stripped from the site is approximately 1.5 Mm^3, assuming a 15% bulking factor.

1.4 In-pit Backfill

Approximately 50 Mt of waste rock will be backfilled into mined out pits at Latte (13 Mt), Supremo (27 Mt) and Double Double (10 Mt) in order to create causeways and facilitate ore haulage routes to the crusher (Figure 1-1).

In-pit backfilling will occur in the eastern portion of the Latte Pit to construct a causeway during Years 3 and 4. The southern portion of the Supremo Pit will also be backfilled to construct a causeway during Year 6 through Year 10 of the Project. The Double Double Pit will be backfilled completely during Years 10 and 11.

Figure 1-1: Site Layout



Source: Newmont (2023)

2 FOUNDATION CONDITIONS

2.1 Alpha WRSF

The west-facing slope (east side of Alpha WRSF) and portions of the southeast-facing slopes (northwest side Alpha WRSF) are interpreted to be mostly ice-poor or unfrozen. The area ranges from permafrost-free terrain on predominantly south-facing slopes to perennially frozen ground on slopes with less southern exposure, but also typically ice-poor.

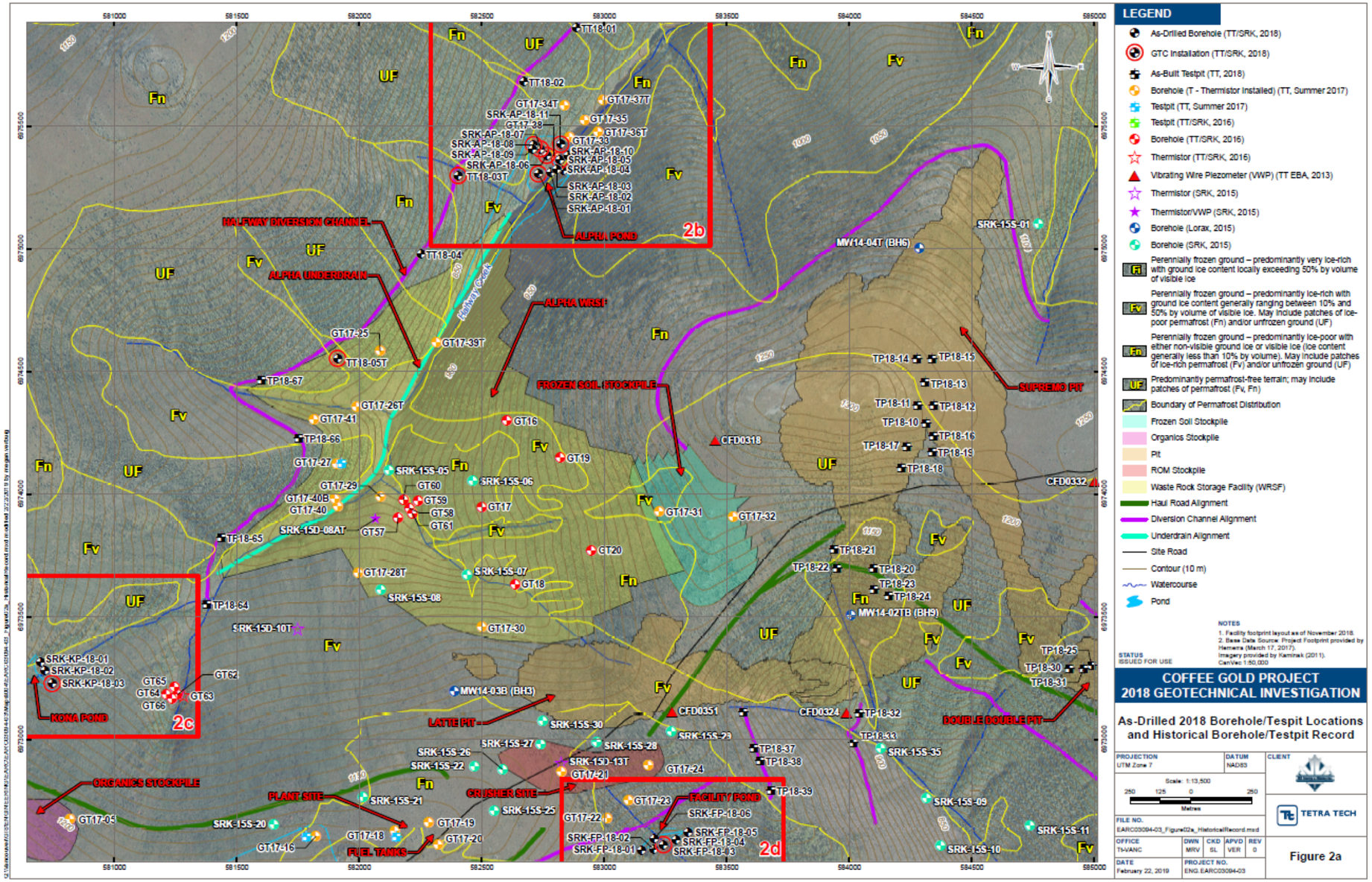
Drillholes GT-16 through GT-20 were drilled during the 2016 Tetra Tech drilling program and targeted the east side of the facility (Figure 2-1). A thin, dark brown fibrous moss organic layer was encountered at the surface of all the boreholes. The thin organic veneer in this area is underlain by relatively thin layers of perennially frozen sandy and gravelly colluvium with depths of up to 3.7 m. Bedrock gneiss was encountered at all the boreholes in this area except near the western terminus of the slope, where bedrock is composed of granite instead.

Drillholes GT17-25, GT17-26T and GT17-27 were drilled during the 2017 Tetra Tech drilling program and targeted the northwest side of the facility, across Halfway Creek. Light brown to green, coarse fibrous moss up to 200 mm thick was encountered at the surface. Dark brown to reddish brown fibrous peat up to 300 mm thick was found beneath the moss or at the surface in some areas. Poorly to well graded, grey to dark brown silt, sand, gravel, and cobble mixtures make up the remainder of the overburden. These drillholes encountered granite or gneiss bedrock at depths of between 1.0 to 3.4 m.

Drillhole GT18-05T was drilled during the Tetra Tech 2018 program to confirm the presence of ice-rich materials in a small drainage valley feeding into Halfway Creek. The hole indicated a similar organic cover and overburden soil materials as GT17-25, GT17-26T and GT17-27 but also encountered ice rich soils to a depth of 4 m below ground surface.

Drilling and test results indicate the north facing slope (beneath the south side of Alpha WRSF) has significantly deeper colluvium and ice-rich materials. Overburden soils from 7 m up to 32.6 m deep were encountered in drillholes GT17-29 and GT17-28T (Figure 2-1), respectively, in this area during the Tetra Tech (2017) drilling program. Although generally coarse grained, the soils are ice-rich within the upper approximately 2.5 m and were noted to contain ice down to bedrock. Ground temperatures of approximately -2° C were measured in a thermistor string installed in drillhole GT17-28T which is among the coldest ground temperatures recorded at the site. The deep soils, high ice content and cold ground temperatures are believed to be a result of the slope facing directly north.

Figure 2-1: Location of Geotechnical Drillholes and Permafrost Mapping



Source: Tetra Tech (2018)

2.2 Run of Mine Stockpile

The ROM Stockpile foundation is expected to be mostly permafrost-free on south facing slopes near the ridgetop. Slopes are southeast- to east-facing and dip 12° to 19° towards Coffee Creek. The area is vegetated in spruce with moss/shrubs-covered forest floor. One drillhole (GT17-24) and two test pits (TP17-25 and TP17-26) were completed within the facility footprint during the 2017 field investigation (Tetra Tech, 2017). The drillhole and test pits indicated permafrost-free conditions, which was also confirmed by a single bead thermistor installed by Tetra Tech in 2017 at nearby drillhole GT17-22.

Bedrock is very shallow beneath the proposed ROM Stockpile. The area typically has a thin veneer of organics over approximately 0.5 m of gravelly colluvium. Bedrock is heavily weathered down to a depth of approximately 1.2 m.

2.3 Temporary Organics Stockpile

Natural slope angles beneath the proposed Temporary Organics Stockpile are approximately 10° to 12°. Three drillholes (GT17-03, GT17-04 and GT17-05) and two test pits (TP17-01 and TP17-02) were completed within the footprint during the 2017 field investigations (Tetra Tech, 2017). Permafrost conditions were encountered in all three drillholes and both test pits. Warm (-0.4°C measured on October 4, 2017) permafrost was confirmed by single-bead thermistor installed at a depth of 7.1 m in GT17-03.

A thin (up to 200 mm thick), brown to reddish brown, fine to coarse fibrous moss layer was encountered at the surface. These thin organic mineral soils are underlain by brown to olive grey sand, silt, cobbles, and rubble up to 2.6 m thick, as found in GT17-25. Trace organics found within the silt and sand layer, at 1.3 m depth in GT17-05, suggest that this site is colluvial.

Granite bedrock was encountered in all three drillholes. Bedrock recovered from the drillholes was completely to moderately weathered and medium to coarse grained. Rust colored staining is apparent throughout the granite. Excess ice (Vx 2%) in frozen soil material infilling bedrock fractures was observed in GT17-04.

3 GEOTECHNICAL MATERIAL PROPERTIES

Based on the results of the various site geotechnical field and laboratory investigations (SRK 2016a, Tetra Tech 2016, 2017 and 2018) the foundation materials were divided into five different material types:

- Waste rock;
- Ice-poor colluvium;
- Ice-rich colluvium;
- Weathered bedrock; and
- Fresh bedrock.

3.1 Waste Rock

The waste rock material that will be stored in the Alpha WRSF is anticipated to consist mostly of competent gneiss and schist. A portion of the schist bedrock has potential to be anisotropic with the foliation forming a plane of weakness in some cases. The gneiss generally does not break preferentially on the foliation planes. UCS testing carried out as part of the SRK (2016b) pit slope evaluation indicated average UCS values of 90 and 94 MPa for the gneiss and schist, respectively.

Due to the large particle size of typical waste rock materials, laboratory testing is very rarely able to be carried out at the actual particle size as the overall test sample size required would greatly exceed the size and loading capacities of conventional testing equipment. Research investigations conducted by Linero and Palma (2007), Marsal and Resendiz (1975), Leps (1970) and others have carried out large-scale testing of dumped rock fill samples and demonstrated that, for high rock fill dumps such as the Alpha WRSF, the shear strength envelope is non-linear, being more frictional at lower confinement stresses (or depths) and more cohesive at higher confinement. This non-linear shear strength relationship is commonly represented using the two-component power law:

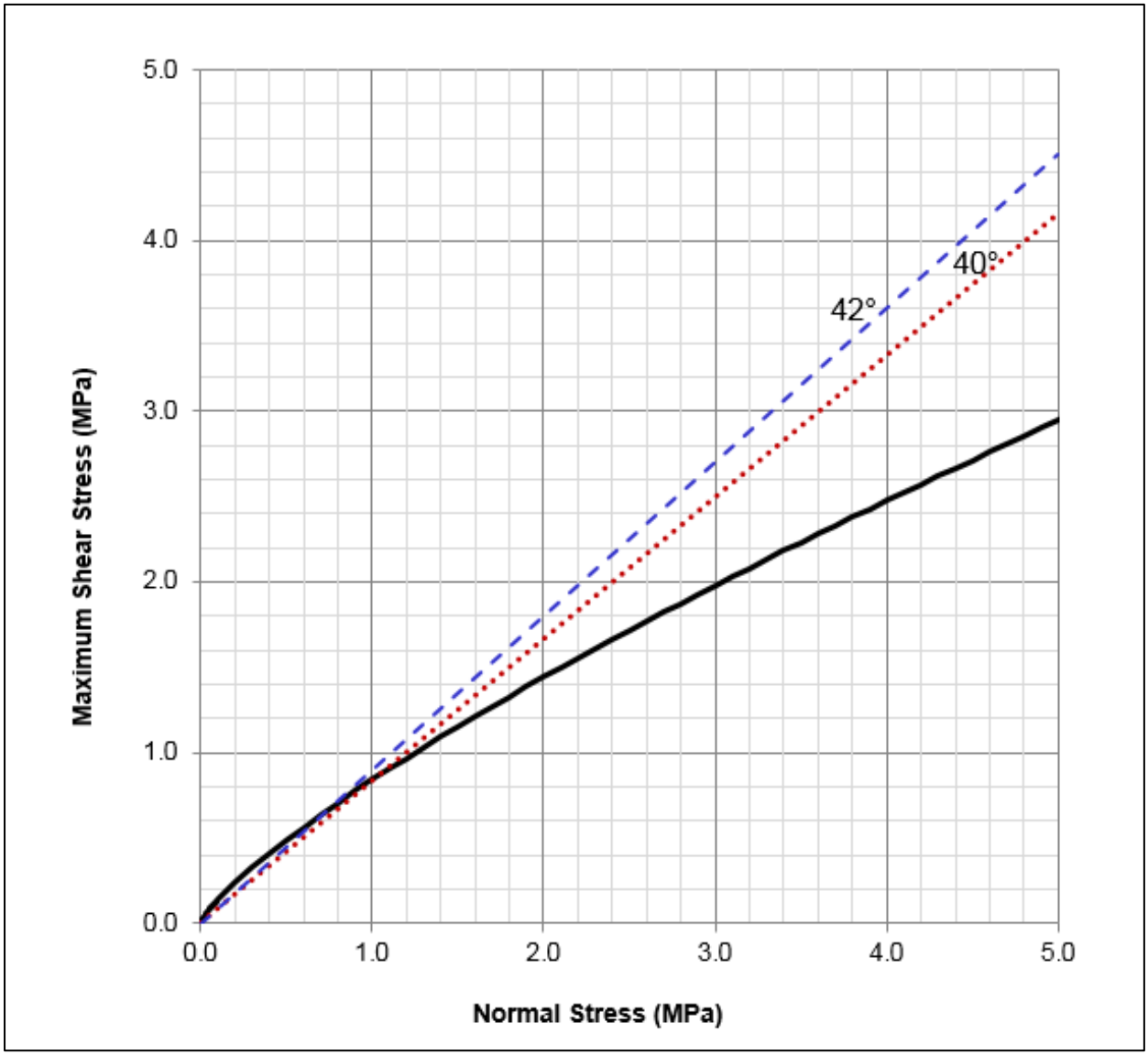
$$\tau = A\,\sigma_n{}^{b}$$

where τ is the shear strength (MPa), σ_n is the normal stress (MPa) and A and b are material constants which are estimated based on triaxial or direct shear test results.

Two small-scale triaxial shear strength tests (consolidated undrained) were completed on crushed waste rock samples by Knight Piésold and Co. (KP) (2015). The tests resulted in effective stress friction angles of 40° and 42°, for the granite and gneiss waste rock, respectively. The results are linear and likely representative of the shear strength at low confinement but may overestimate shear strengths at higher confinement levels where fracturing or shearing of waste rock particles may occur. As such, a non-linear shear strength curve was developed based on

the Linero and Palma (2007) research and the KP triaxial test data with an A value of 0.84 and b value of 0.78. The non-linear shear strength envelope developed is shown graphically on Figure 3-1 along with the two KP triaxial test results.

Figure 3-1: Plot of Waste Rock Material Strengths



Source: JDS (2018)

3.2 Ice-poor Colluvium

Most of the Coffee site is covered by approximately 0.5 to 3 m of colluvium soils with soil depths of up to approximately 8 m measured in drainage bottoms and valley inverts. The colluvium is typically coarse grained and consists of poorly to well-graded, grey to dark brown silt, sand, gravel. Cobble mixtures make up the remainder of the overburden. Any of these may be the dominant material. Subangular to angular granite and schist gravel and cobbles make up the coarse component. The upper approximately 20 to 30 cm typically contains organic materials.

For the JDS stability analysis, the colluvium layer was conservatively modeled as a 10 m thick layer, parallel to the native (pre-mine) ground surface for the Alpha WRSF. Similarly, a layer 2 to 3 m thick was used for the Stockpiles, based on specific drillhole and test pit information at the respective facilities.

Friction angles for the colluvium are based on five direct shear strength tests reported in SRK (2016a) and Tetra Tech (2016 and 2017). The tests were completed on relatively undisturbed silt colluvium samples with resulting friction angles ranging between 29° and 42° with 0.5 to 77 kPa cohesion, respectively. These tests are considered to be representative of ice-poor, thaw stable colluvium materials.

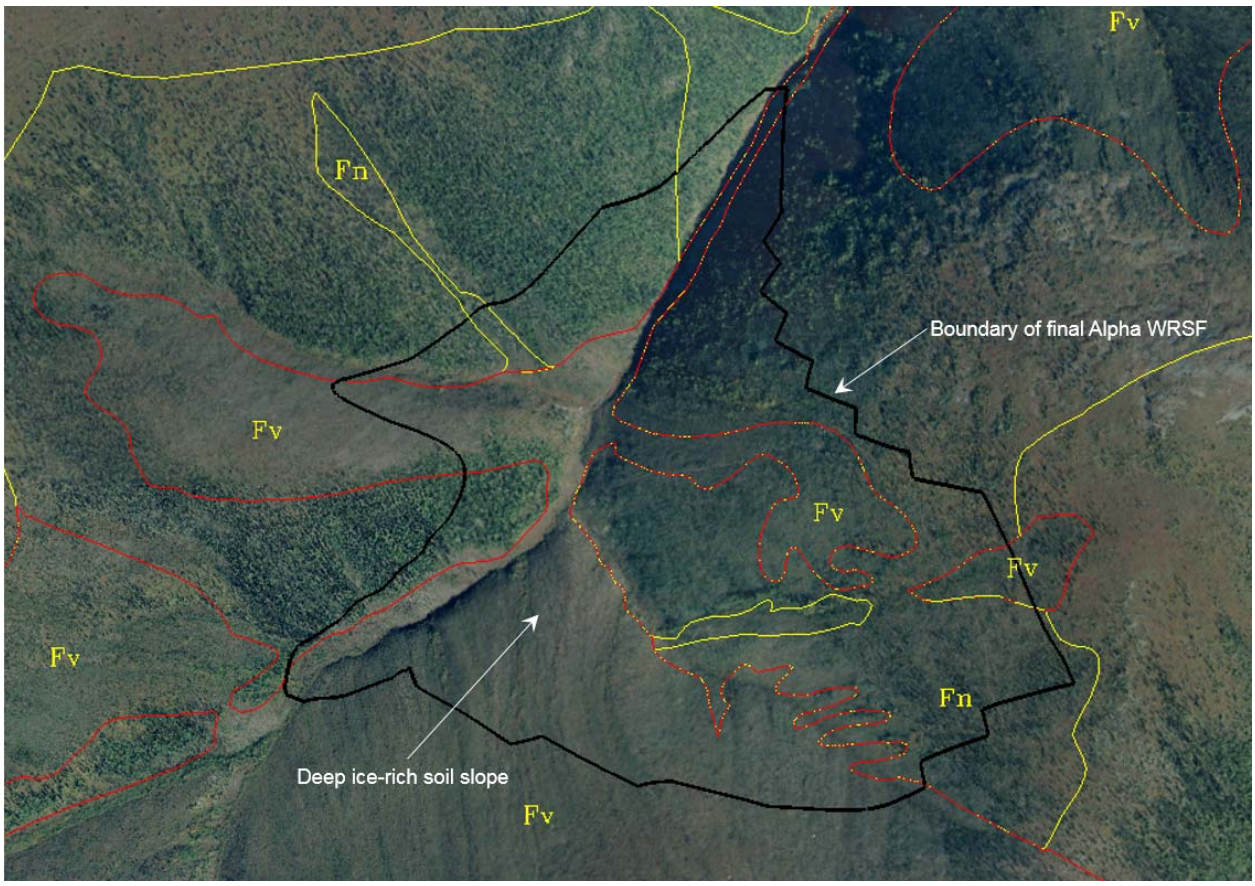
A conservative friction angle of 34° with zero cohesion was selected to represent the ice-poor colluvium material using a linear, Mohr-Coulomb shear strength criteria. This value is considered to be conservative because the initial 3 to 5 m of waste rock will be placed during the winter months when freezing of the waste rock is expected to occur, preserving the frozen foundation materials beneath. Frozen materials are expected to have considerably higher shear strength than a thawed material of the same composition.

3.3 Ice-rich Colluvium

Ice-rich soils at the Coffee site commonly occur in localized areas within drainage or valley bottoms and are relatively shallow. It is anticipated that most of the ice-rich materials in the foundation area will remain frozen, provided the foundation is covered with waste rock during the winter months as is currently planned. Anticipated long-term climate warming may thaw the ice-rich materials. However, long-term thawing is expected to occur at a sufficiently slow rate that pore water pressures created by thawing of the ice will be able to dissipate adequately and not lead to instabilities.

Unlike other areas across the Coffee site, the north facing slope located beneath the south side of the ultimate Alpha WRSF footprint (Figure 3-2) has significantly deeper colluvium and ice. Overburden soils from 7 m up to 32.6 m deep were encountered in drillholes GT17-29 and GT17-28T, respectively, in this area during the Tetra Tech (2017) drilling program. Although generally coarse grained, the soils are ice-rich within the upper approximately 2.5 m and were noted to contain ice down to bedrock. Ground temperatures of approximately -2° C were measured in a thermistor string installed in drillhole GT17-28Twhich is among the coldest ground temperatures recorded at the site. The deep soils, high ice content and cold ground temperatures are believed to be a result of the slope facing directly north.

Figure 3-2: Location of Ice-rich Soil Slope



Source: JDS (2018)

The materials in this slope were conservatively modeled using a zero friction, undrained shear strength of 80 kPa. This value is based on published shear strength test results for clayey silts and silty clays with high or medium ice content at a temperature of approximately -2° C (Johnson, 1981).

The design inter-bench slope angles are reduced from 35° to 24° for portions of the WRSF founded on this material. Angle of repose for the organic materials is expected to be significantly lower than the waste rock because of their finer grain size. Minimal shaping or dozing is expected to achieve the 2H:1V design slope angle. The Alpha WRSF is the only one of the facilities analyzed herein that is believed to potentially be impacted by ice-rich materials.

3.4 Organic Soils

The materials in the Temporary Organics Stockpile were modeled assuming a linear, Mohr-Coulomb shear strength envelop with 32° friction and 5 kPa cohesion.

3.5 Weathered Bedrock

Bedrock beneath the colluvium is typically heavily weathered for a depth of approximately 2 to 4 m and up to 13 m in Halfway Creek. This zone was assumed to consist of broken bedrock that is highly friable and readily breaks down to sand and gravel. The weathered bedrock zone can be variable in its thickness and geotechnical characteristics. The weathered bedrock zone was conservatively assumed to be a 20 m thick layer, beneath the colluvial soils for the Alpha WRSF analyses. A layer 3 to 4 m thick was used for the Stockpiles, based on specific drillhole and test pit information at the respective facilities.

Weathered bedrock shear strength was modeled using a linear, Mohr-Coulomb envelop with a friction angle of 45° and 20 kPa cohesion. This strength was developed using the Generalized Hoek-Brown criterion (Hoek, et al, 2002).

3.6 Fresh Bedrock

A fresh bedrock strength was used in the models of 46° and 1,300 kPa cohesion based on the available rock mass characteristics summarized in the SRK (2016b) pit slope geotechnical report. Significantly less emphasis was placed on determining a fresh bedrock strength than the overburden soils because, given the dramatic differences in strength between the in-situ fresh bedrock and the overburden soils/waste rock above, critical slip surfaces generated by the model will be through the overburden soils and possibly weathered bedrock. This was confirmed in the modeling results.

3.7 Pore Water Pressures

The near surface colluvial soils are commonly saturated during the late spring and summer months due to shallow seasonal thawing and the presence of underlying permafrost that hinders drainage. The piezometric surface was assumed to be coincident with the native (pre-mine) ground surface. The piezometric surface was used in the model to calculate hydrostatic pore water pressures within all foundation materials. It has been assumed for the analyses that the waste rock is sufficiently coarse to drain freely without the building of pore water pressures. However, a static water level approximately 10 m above the Halfway Creek invert was conservatively assumed for the Alpha WRSF Section A model. The use of an elevated water level in this area of the of the model is intended to simulate a reasonably high potential increase in pore water pressures, if the rock drain does not convey water as rapidly as anticipated from its design.

JDS notes that the reported piezometric levels represent an artificial and isolated occurrence which is relevant to the stability evaluation; however, this local water table does not represent the regional groundwater table.

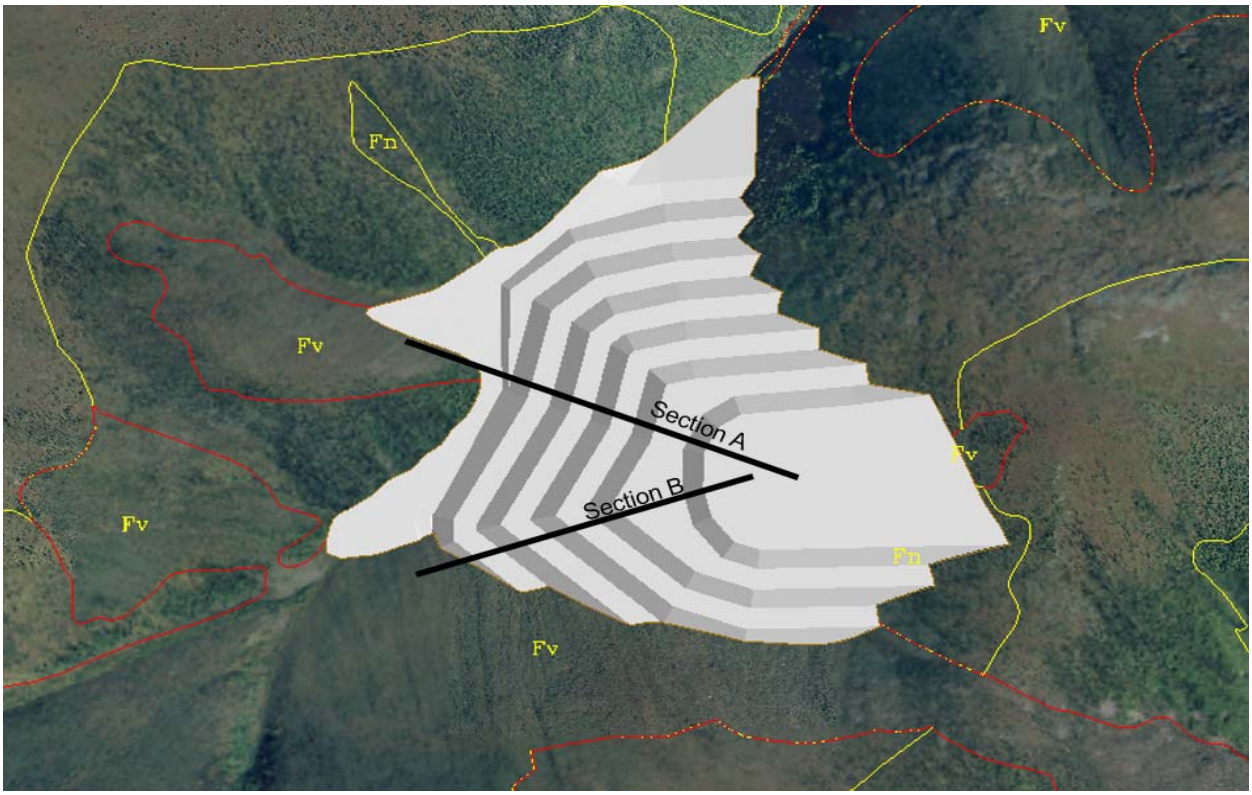
4 SLOPE STABILITY ANALYSIS

4.1 Model Methodology

Based on the anticipated foundation materials, the proposed interim and ultimate WRSFs and stockpile design configurations, critical cross-sections were selected for stability analyses. Two sections were developed and analyzed for the Alpha WRSF and one each for the Temporary Organics Stockpile and the ROM Stockpile. The cross-section locations were selected to represent idealized worst-case geometries and foundation conditions for the interim and final designs.

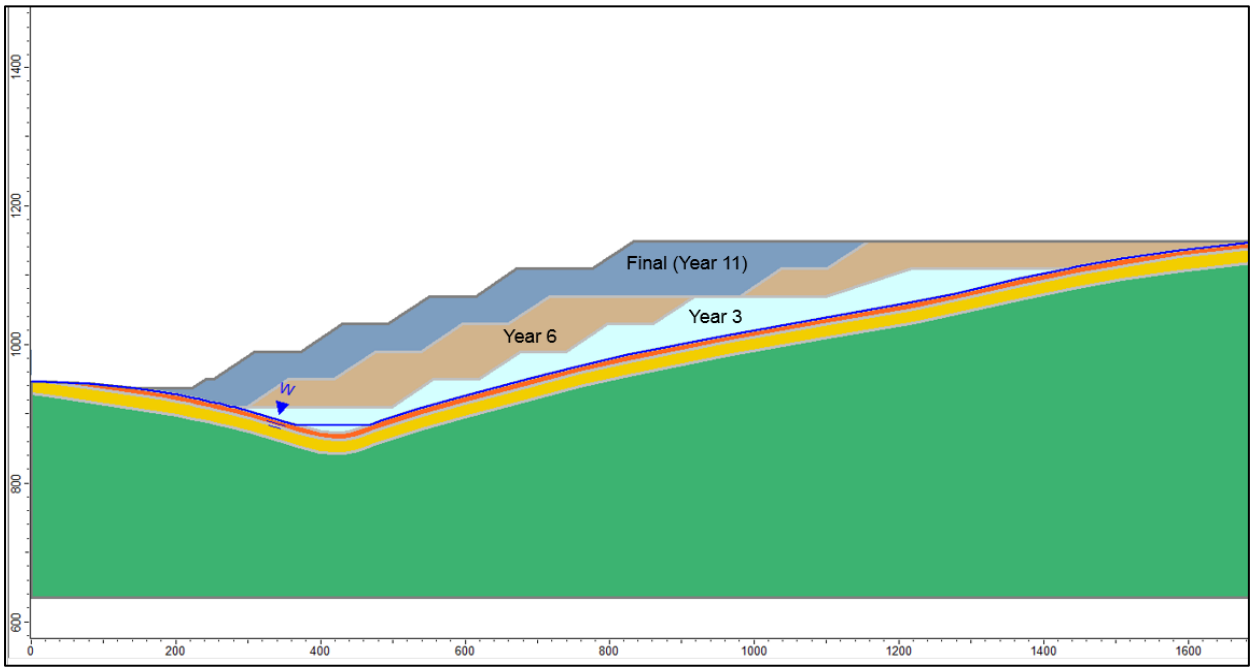
Figure 4-1 shows the location of the two slope stability section traces for the Alpha WRSF while Figure 4-2 and Figure 4-3 show the geometry of cross sections A and B, respectively. The traces of the slope stability cross sections for the ROM Stockpile and Temporary Organics Stockpile are shown on Figure 4-4 and Figure 4-5, respectively. The location of the Supremo in-pit backfill critical section is shown on Figure 4-6.

Figure 4-1: Alpha WRSF Critical Slope Stability Sections



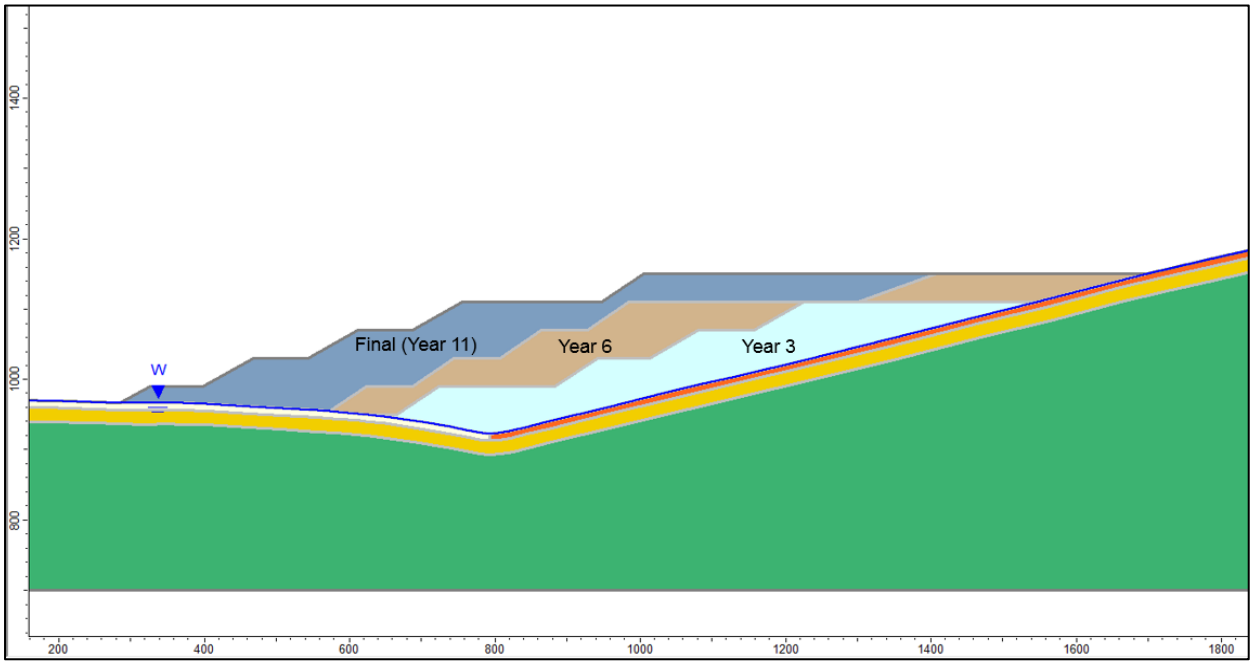
Source: JDS (2018)

Figure 4-2: Geometry of Alpha WRSF: Cross-Section A



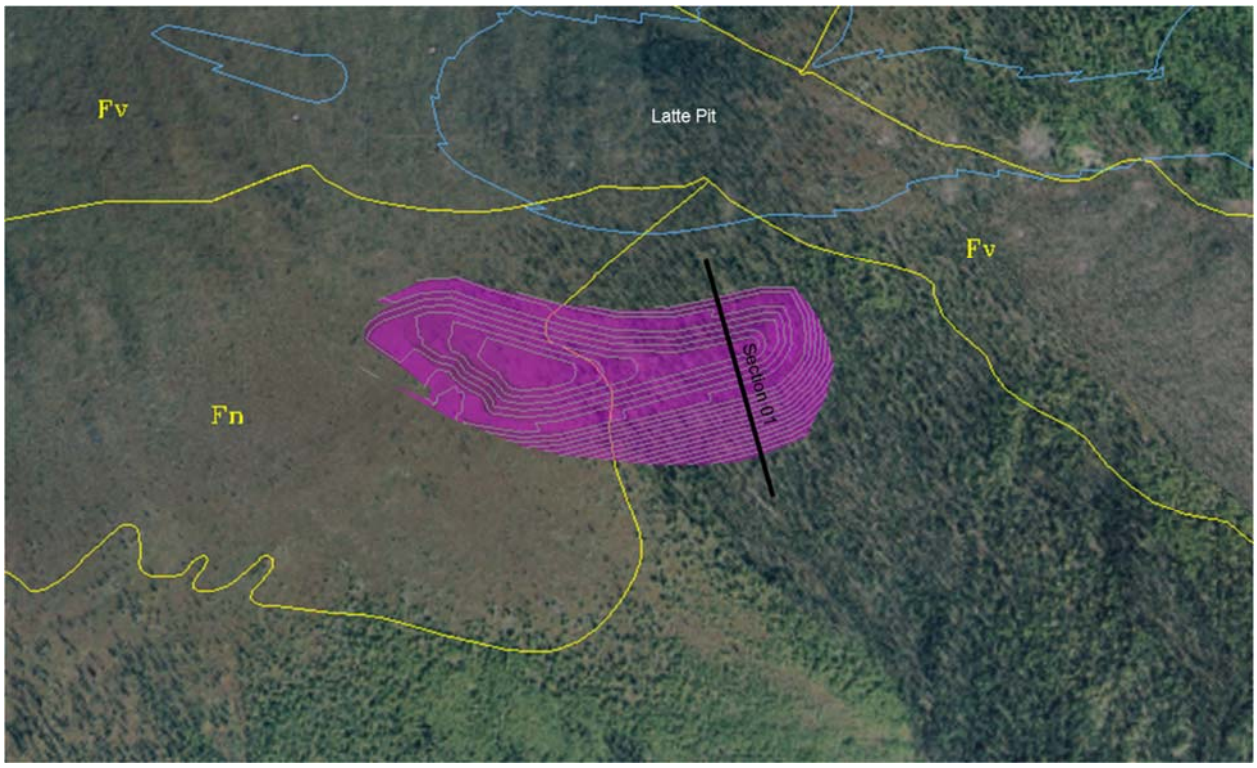
Source: JDS (2018)

Figure 4-3: Geometry of Alpha WRSF: Cross-Section B



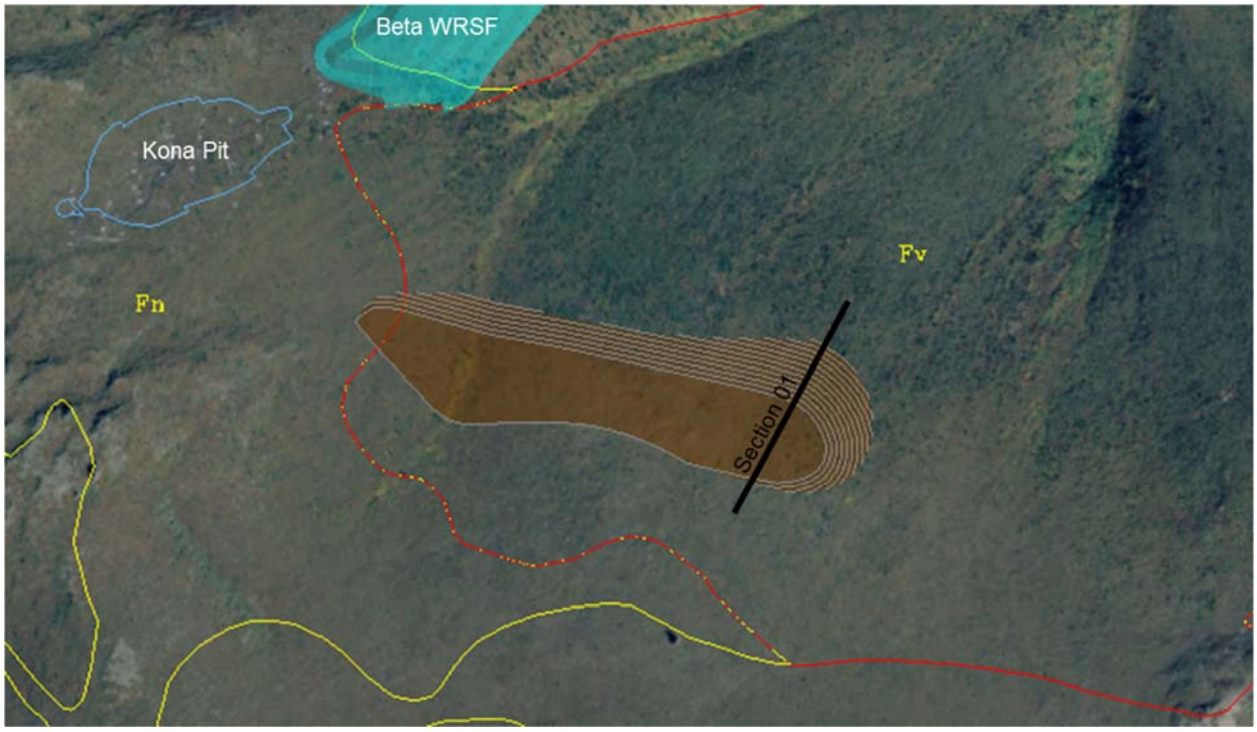
Source: JDS (2018)

Figure 4-4: ROM Stockpile Critical Slope Stability Section



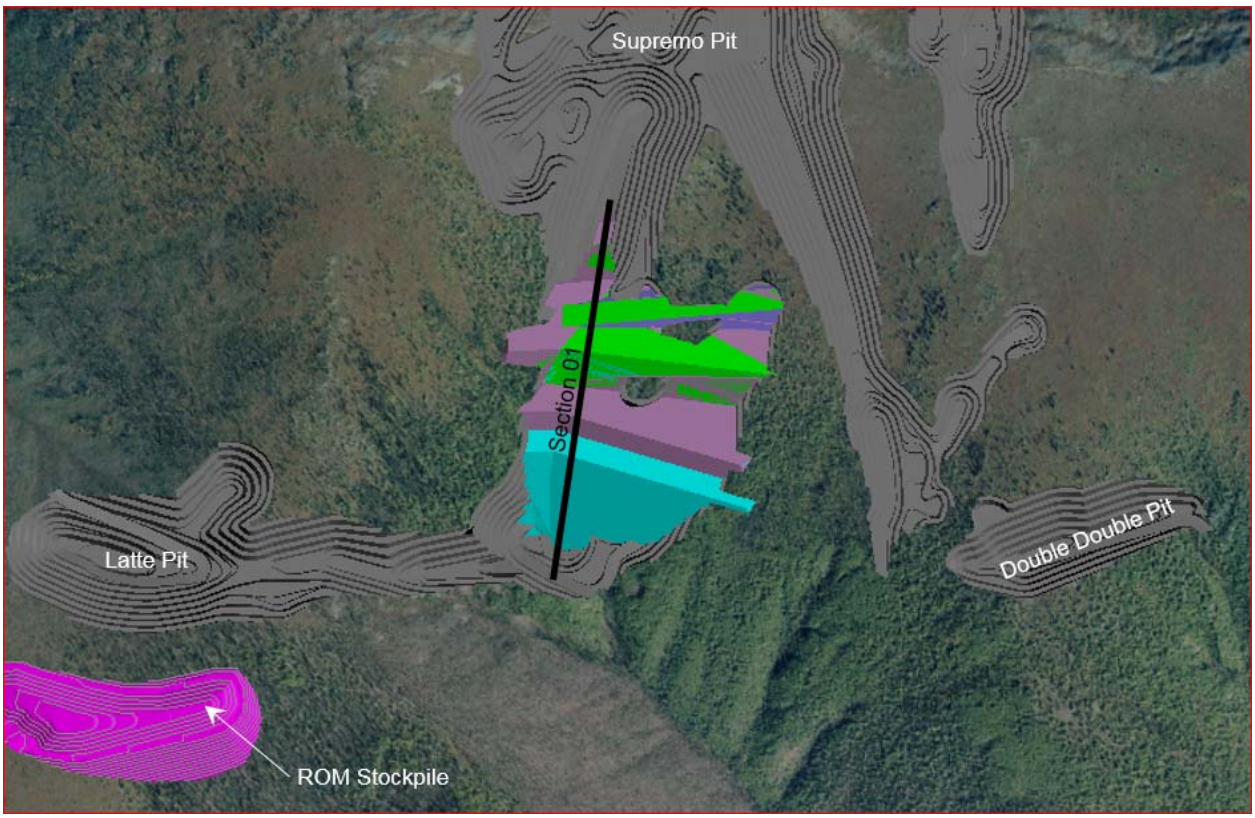
Source: JDS (2018)

Figure 4-5: Temporary Organics Stockpile Critical Slope Stability Section



Source: JDS (2018)

Figure 4-6: Location of Supremo In-pit Backfill Critical Slope Stability Section



Source: JDS (2018)

The cross-section geometries were loaded into the software program Slide 7.031 (Rocscience, 2018). Slide is a two-dimensional, limit equilibrium slope stability analysis program that analyzes slope stability by various methods of slices in terms of safety factors. The analysis results are reported for Spencer's method of slices because it satisfies both force and moment equilibrium, leading to more realistic safety factor calculations.

Each section was analyzed with both static and pseudostatic loading conditions. Pseudostatic analyses simulate seismic forces in terms of a horizontal acceleration expressed as a coefficient (or percent) of gravity (g). As recommended by the B.C. Mine Waste Rock Pile Research Committee (1991), the peak ground acceleration (PGA) corresponding to a 1:475 year event (or 10% probability of exceedance in 50 years) was used for the pseudostatic stability analyses. Based on the Natural Resources Canada, 2015 National Building Code Seismic Hazard Calculation, a PGA of 0.062 g is interpolated for the Coffee site. This value is also consistent with the MINES Group (2015) Seismic Design Report for the project which reports a PGA of 0.067 g for a 475 year return period.

When incorporating PGA in a slope stability model, it is common practice to reduce the PGA by a factor of 0.5 based on the research conducted by the U.S. Army Corps of Engineers (Hynes-

Griffen and Franklin, 1984). In summary, this reduction in acceleration is justified for earth and rock structures for the following reasons:

- Realization that sustained ground acceleration is typically less than half of the PGA, which is an instantaneous acceleration;
- Consideration that earth and rock structures effectively attenuate earthquake-induced accelerations; and
- Determination that deformations of less than one meter would result with this criterion.

As described in the MINES Group (2015) report and Read & Stacey (2009), Pyke (1997 & 1999) conducted subsequent analyses demonstrating that the seismic coefficient for pseudostatic analysis is less than or equal to half of the PGA, in almost all cases. Based on these guidelines, a pseudostatic seismic coefficient of 0.03 was selected for the analyses.

4.2 Design Acceptability Criteria

Design acceptability criteria for the analyses are based on the "Guidelines for Mine Waste Dump and Stockpile Design" (Hawley & Cunning, 2017). The suggested minimum Factor of Safety (FoS) presented in the guidelines are re-produced in Table 4-1, with each minimum FoS reflecting different levels of confidence in the understanding of site conditions, material parameters, and consequences of instability.

JDS considers the WRSFs and Stockpiles as currently designed to fall within the Moderate Consequence and High Confidence categories. Corresponding minimum recommended factors of safety are 1.2 to 1.3 for static and 1.0 to 1.05 for pseudostatic loading conditions according to the guidelines.

Table 4-1: Suggested WRSF Stability Acceptance Criteria

Consequence[1,3]	Confidence[2,3]	Static analysis		Pseudostatic	Maximum Allowable Strain
		Minimum FoS	Maximum PoF	Minimum FoS	
Low	Low	1.3 - 1.4	10 - 15%	1.05 - 1.1	≤ 1%
	Medium	1.2 - 1.3	15 - 25%	1.0 - 1.05	≤ 1.5%
	High	1.1 - 1.2	25 - 40%	1.0	≤ 2%
Moderate	Low	1.4 - 1.5	2.5 - 5%	1.1 - 1.15	≤ 0.75%
	Medium	1.3 - 1.4	5 - 10%	1.05 - 1.1	≤ 1%
	High	1.2 - 1.3	10 - 15%	1.0 - 1.05	≤ 1.5%
High	Low	≥ 1.5	≤ 1%	1.15	≤ 0.5%
	Medium	1.4 - 1.5	1 - 2.5%	1.1 - 1.15	≤ 0.75%

Consequence[1,3]	Confidence[2,3]	Static analysis		Pseudostatic	Maximum Allowable Strain
		Minimum FoS	Maximum PoF	Minimum FoS	
	High	1.3 - 1.4	2.5 - 5%	1.05 - 1.1	≤ 1%

Source: Hawley & Cunning (2017)

Notes:

1. Consequence

   Low Consequence: waste dumps and stockpiles with overall fill slopes less than 25° and less than 100 m high and repose angle slopes less than 50 m high. No critical infrastructure or unrestricted access within potential runout shadow. Limited potential for environmental impact. Long-term (> 5 years) exposure for sites subject to very low to low (< 350 mm) annual precipitation; medium-term (1-5 years) exposure for sites subject to moderate (350-1000 mm) annual precipitation; short-term (< 1 year) exposure for sites subject to high (1000-2000 mm) annual precipitation; dry season construction/operation only for sites subject to very high (> 2000 mm) annual precipitation or intensive rainy season(s).

   Moderate Consequence: waste dumps with overall fill slopes less than 30° and less than 250 m high, or with repose angle slopes less than 100 m high. No critical infrastructure or unrestricted access, or robust containment/mitigative measures to protect critical infrastructure and access within potential runout shadow. Potential for moderate environmental impact, but manageable. Long-term (> 5 years) exposure for sites subject to moderate (350-1000 mm) annual precipitation; medium-term (1-5 years) exposure for sites subject to high (1000-2000 mm) annual precipitation; short-term (< 1 year) exposure for sites subject to very high (> 2000 mm) annual precipitation or intensive rainy season(s).

   High Consequence: waste dumps with overall fill slopes more than 30° and more than 250 m high, or with repose angle slopes more than 200 m high. Critical infrastructure or unrestricted access within potential runout shadow with limited runout mitigation/containment measures. Potential for high environmental impact that would be difficult to manage. Long-term exposure (> 5 years) for sites subject to high (1000 – 2000 mm) annual precipitation; medium (1-5 years) exposure for sites subject to very high (> 2000 m) annual precipitation or intensive rainy season(s).

2. Confidence

   Low Confidence: limited confidence in foundation conditions, waste material properties, piezometric pressures, analysis technique or potential instability mechanism(s). Poorly defined or optimistic input parameters; high data variability. For proposed structures, investigations at the conceptual level with limited supporting data. For existing structures, poorly documented or unknown construction and operational history; lack of monitoring records; unknown or poor historical performance.

   Moderate Confidence: – moderate confidence in foundation conditions, waste material properties, piezometric pressures, analysis technique or potential instability mechanism(s). Input parameters adequately defined; moderate data variability. For proposed structures, investigations at the pre-feasibility level with adequate supporting data. For existing structures, reasonably complete construction documentation and monitoring records; fair historical performance.

   High Confidence: high confidence in foundation conditions, waste material properties, piezometric pressures, analysis technique or potential instability mechanism(s). Well-defined, conservative input parameters; low data variability. For proposed structures, investigations at the feasibility level with comprehensive supporting data. For existing structures, well documented construction and monitoring records and good historical performance.

3. In cases where the guidance for consequence or confidence conflicts or is unclear, selection of the appropriate level should be based on judgment, and the rational for the selection should be documented.

4.3 Slope Stability Modeling Results

Results of the stability analysis are summarized in Table 4-2. This tables outlines Factors of Safety for each section for static and pseudostatic loading conditions. Graphical outputs of each of the sections and cases are contained in Appendix A.

Table 4-2: Factors of Safety Results

Facility	Critical Section	Slope Analyzed [A]	Loading Conditions[B]	Year 3	Year 6	Final Design
Alpha WRSF	Section A	Overall	Static	2.2	2.7	2.1
			Pseudostatic	2.0	2.4	2.4
	Section B	Overall	Static	1.3[C]	1.3[C]	1.3
			Pseudostatic	1.2 [C]	1.1 [C]	1.1
ROM Stockpile	Section 1	Toe	Static	-	-	1.2
			Pseudostatic	-	-	1.1
		Overall	Static	-	-	1.4
			Pseudostatic	-	-	1.3
Temporary Organics Stockpile	Section 1	Toe	Static	-	-	1.3
			Pseudostatic	-	-	1.2
		Overall	Static	-	-	1.3
			Pseudostatic	-	-	1.2
Supremo In-pit Backfill	Section 1	Overall	Static	-	-	1.6
			Pseudostatic	-	-	1.5

Source: JDS (2018)

Notes:

[A] Toe indicates critical slip surface was localized at the toe of the bottom lift. Overall slope indicates a critical slip surface at least 2 full benches in height.

[B] Pseudostatic analyses conducted with 0.03 g horizontal seismic coefficient.

[C] Critical failure surface through bottom lift only.

5 CONCLUSIONS

The results of the updated slope stability analyses of the Alpha WRSF indicate factors of safety that exceed the minimum acceptability criteria of 1.2 to 1.3 for static and 1.0 to 1.05 for pseudostatic loading conditions. With the exception of two cases, all of the other cases analyzed meet or exceed the upper bound ranges (1.3 for static and 1.1 for pseudostatic analyses) given by Hawley & Cunning (2017). The one exception is the static analysis of the toe of the ROM Stockpile, which yielded a safety factor of 1.2 but represents a small, localized instability at the toe only.

To achieve acceptable design criteria, the Alpha WRSF design inter-bench slope angles will be reduced from 35° to 24° for portions where the toe will be founded on the ice-rich materials (Figure 3-2). This localized area of the Alpha WRSF is the only portion of all of the facilities analyzed that is believed to have potential to be adversely impacted by the ice-rich materials.

6 CLOSURE

Analyses and recommendations presented herein are based on ultimate waste rock storage facility and stockpile designs as described in this report, and, as such, any significant changes to mine plans or design configurations should be reviewed by JDS to verify that recommendations will remain valid for the new plans.

JDS is pleased to have the opportunity to be of service to Newmont and trusts that we have addressed the pertinent issues related to the Coffee feasibility pit slope update at this time. Should you, however, have any queries or comments on our visit or on the contents of this report, please do not hesitate to contact us.

Signed on this 10th day of August 2023.

PROFESSIONAL ENGINEER
YUKON TERRITORY
MICHAEL E. LEVY
8/10/2023

Michael Levy, P.Eng.
Geotechnical Manager

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Tetra Tech Canada Inc. (2016) *Fall 2016 Geotechnical Site Investigation Data Report, Coffee Mine Site, Coffee Gold Project*. Report prepared for Goldcorp Inc. dated March 20, 2017.

Tetra Tech Canada Inc. (2017) *Summer 2017 Geotechnical Investigation Data Report, Coffee Mine Site, Coffee Gold Project*. Report prepared for Goldcorp Inc. dated November 30, 2017.

The MINES Group Inc., (2015). *Coffee Gold Project Seismic Design Report*. Report prepared for Kaminak Gold Corporation dated August 10, 2015.

APPENDIX A

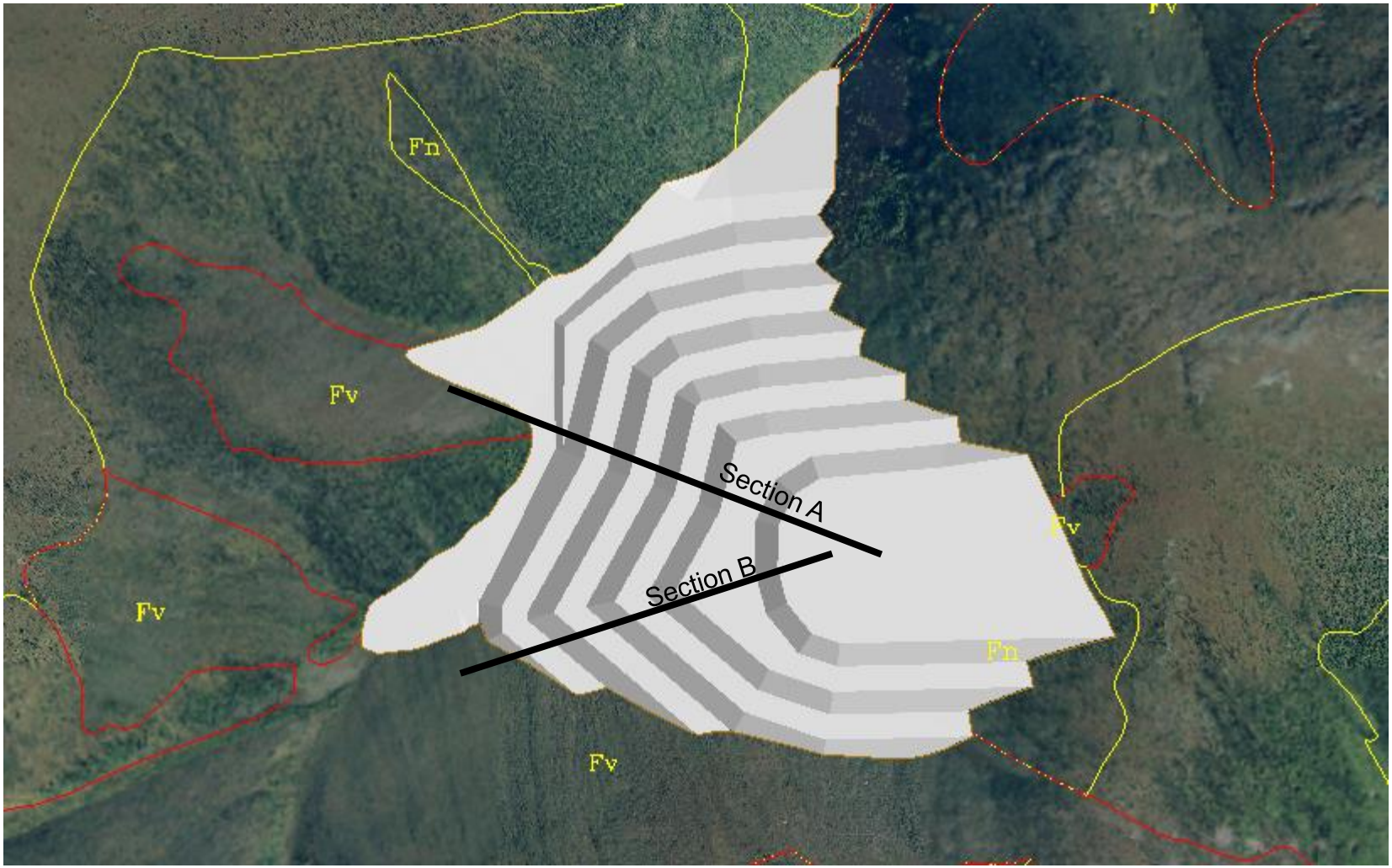
PRELIMINARY SLOPE STABILITY MODEL RESULTS



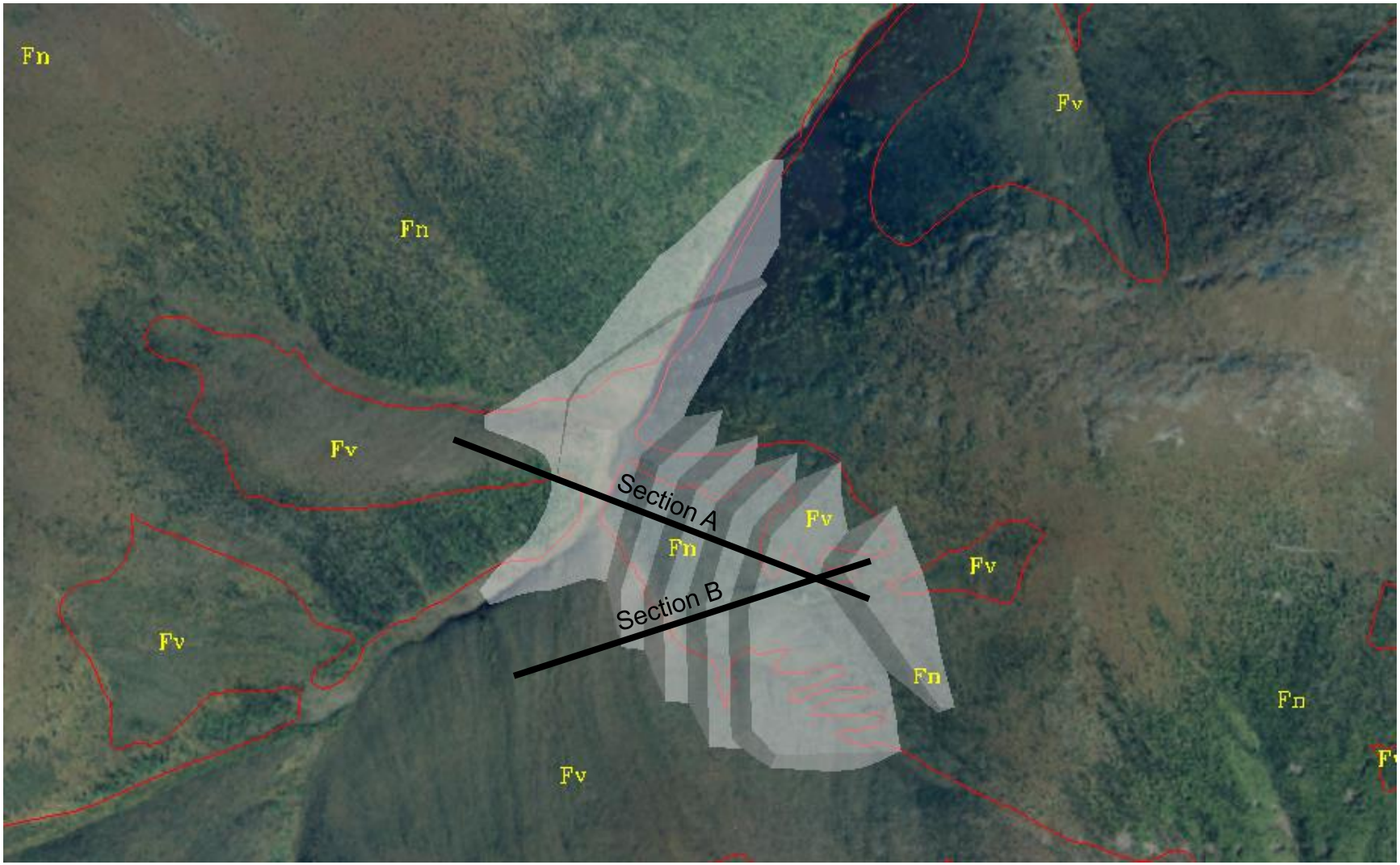
Coffee Gold Project

Appendix A: Preliminary Slope Stability Analysis Results for WRSF & Stockpile

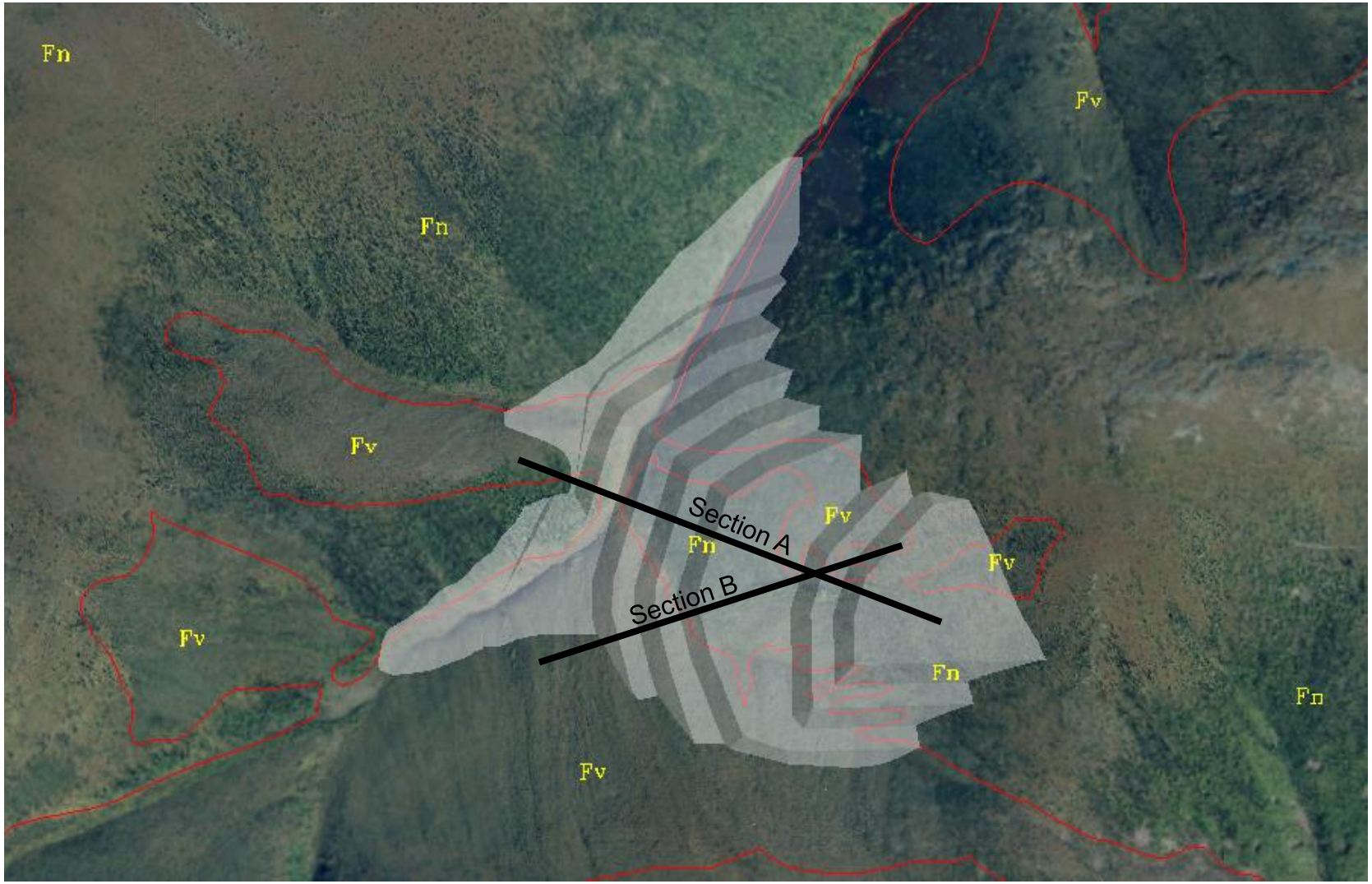
Location of slope stability cross-sections: Alpha



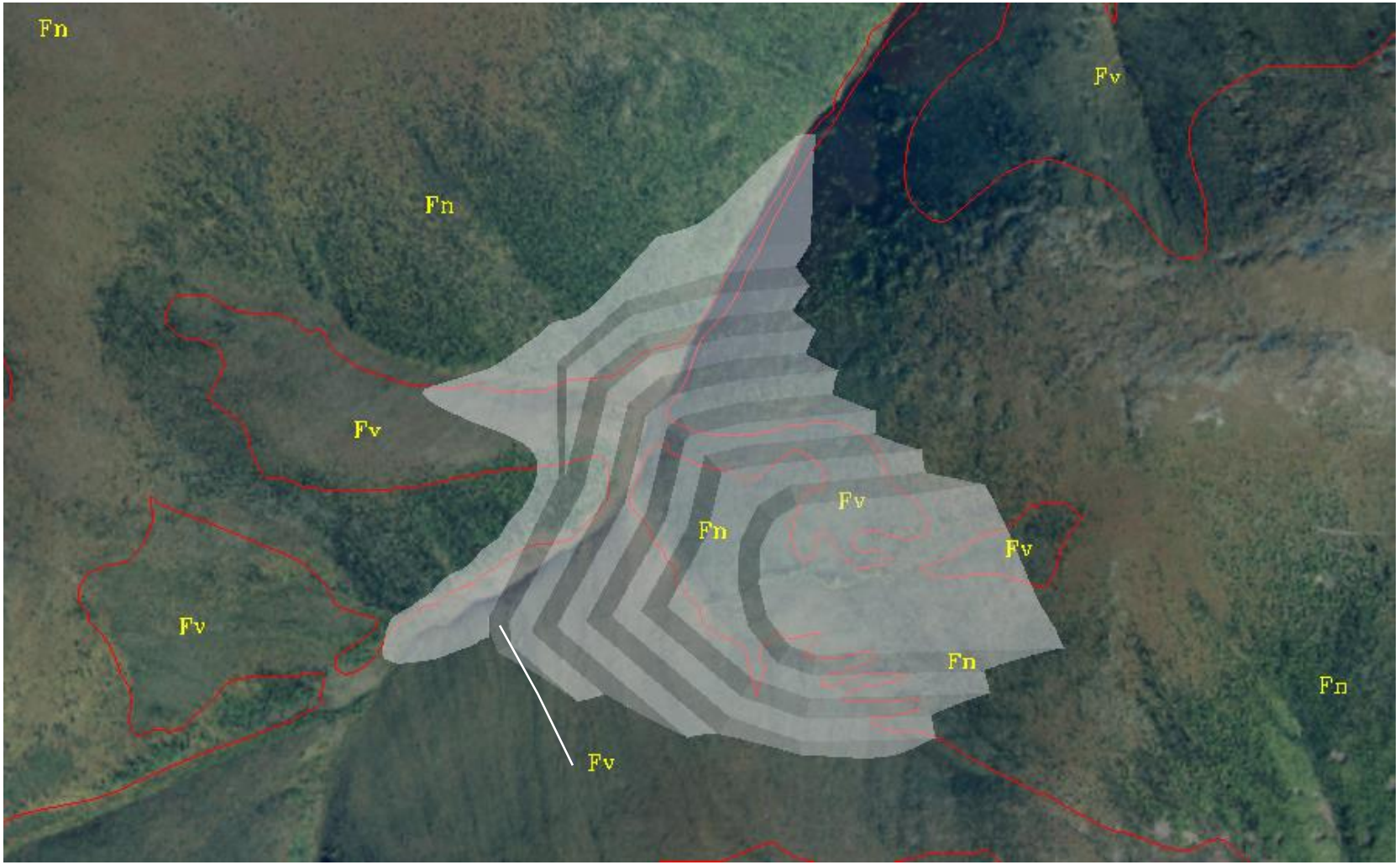
Year 3



Year 6

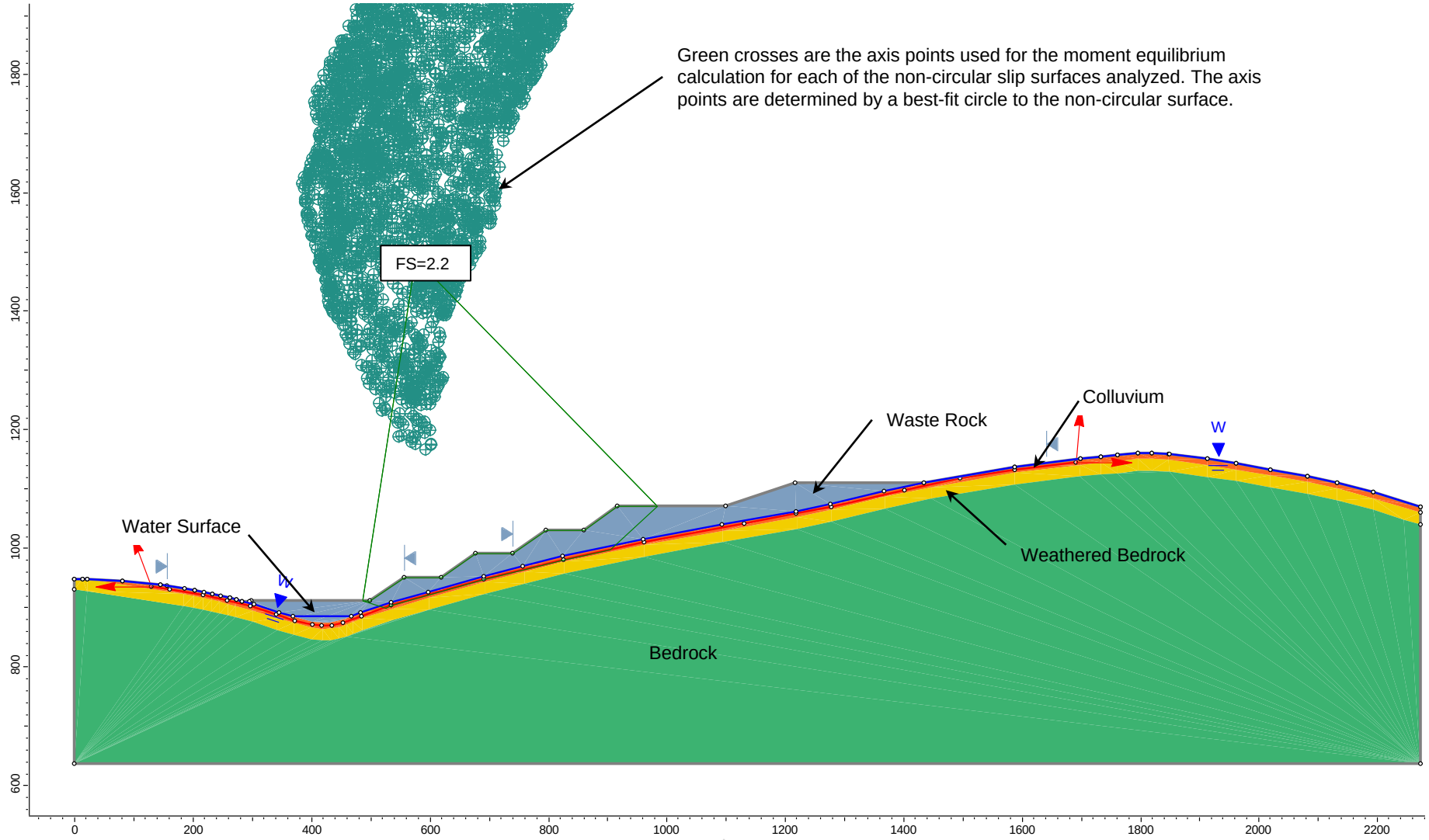


Year 11 (Final Design)

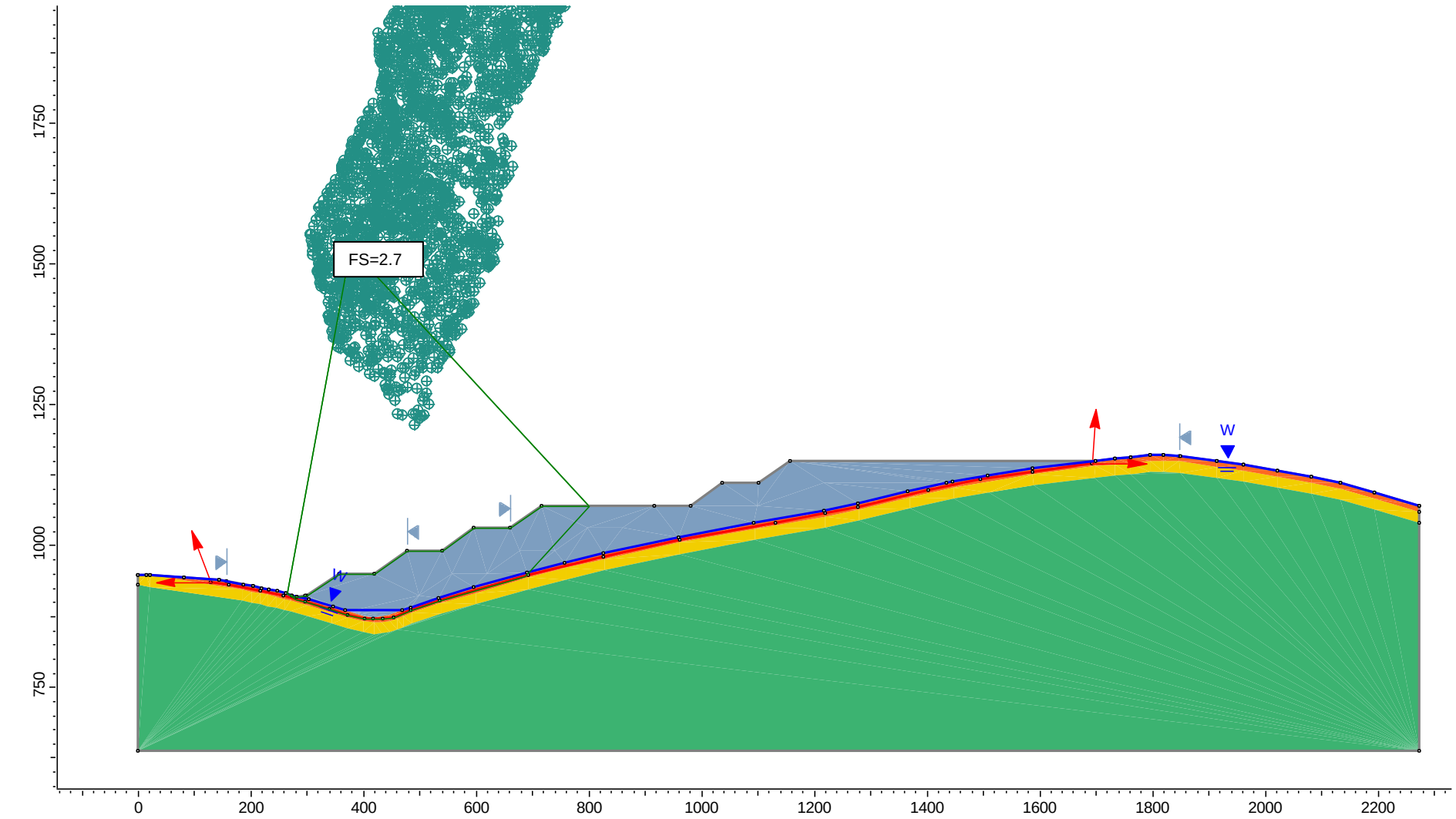


Alpha WRSF Section A Results

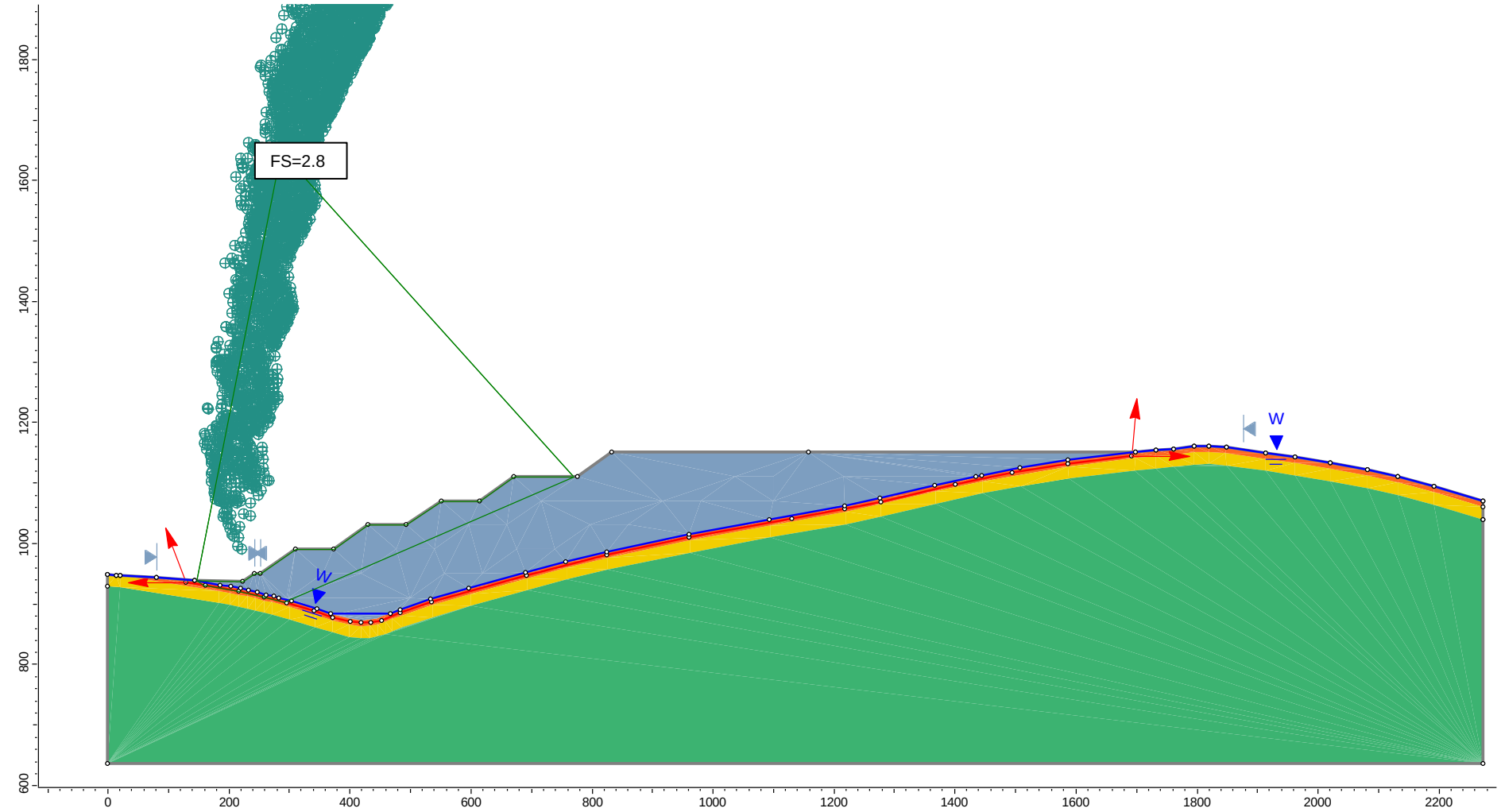
Alpha WRSF Section A, Year 3, Static



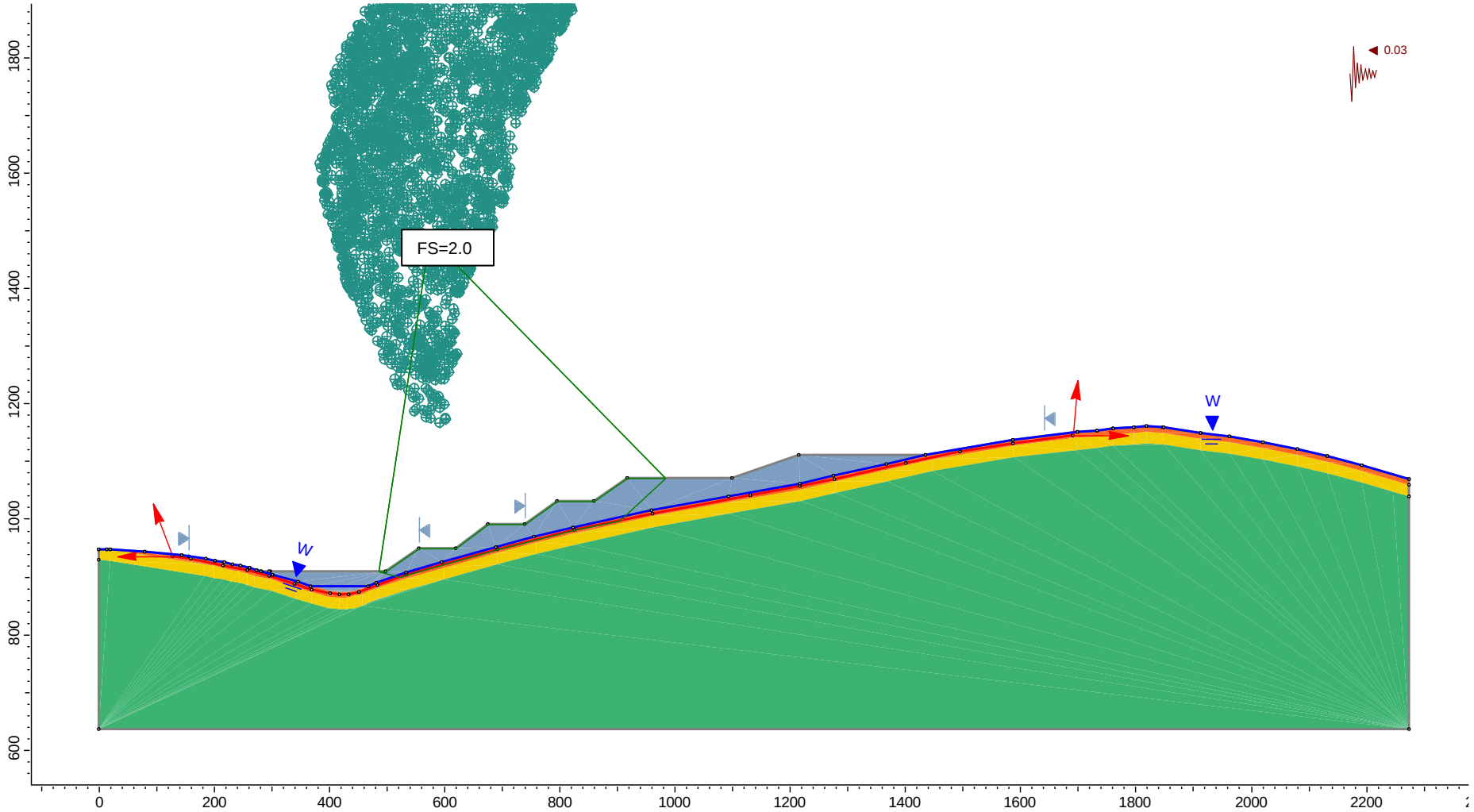
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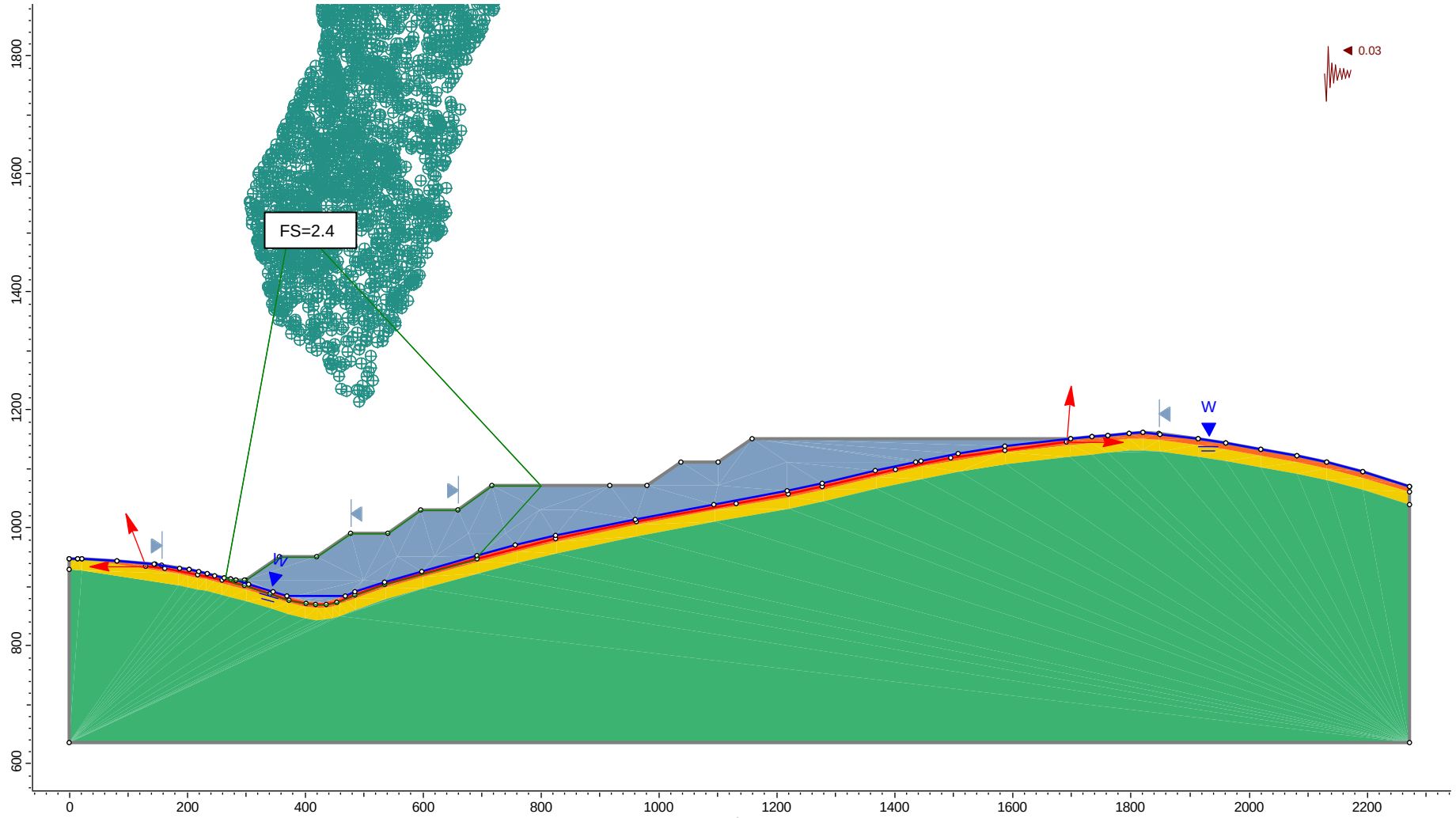
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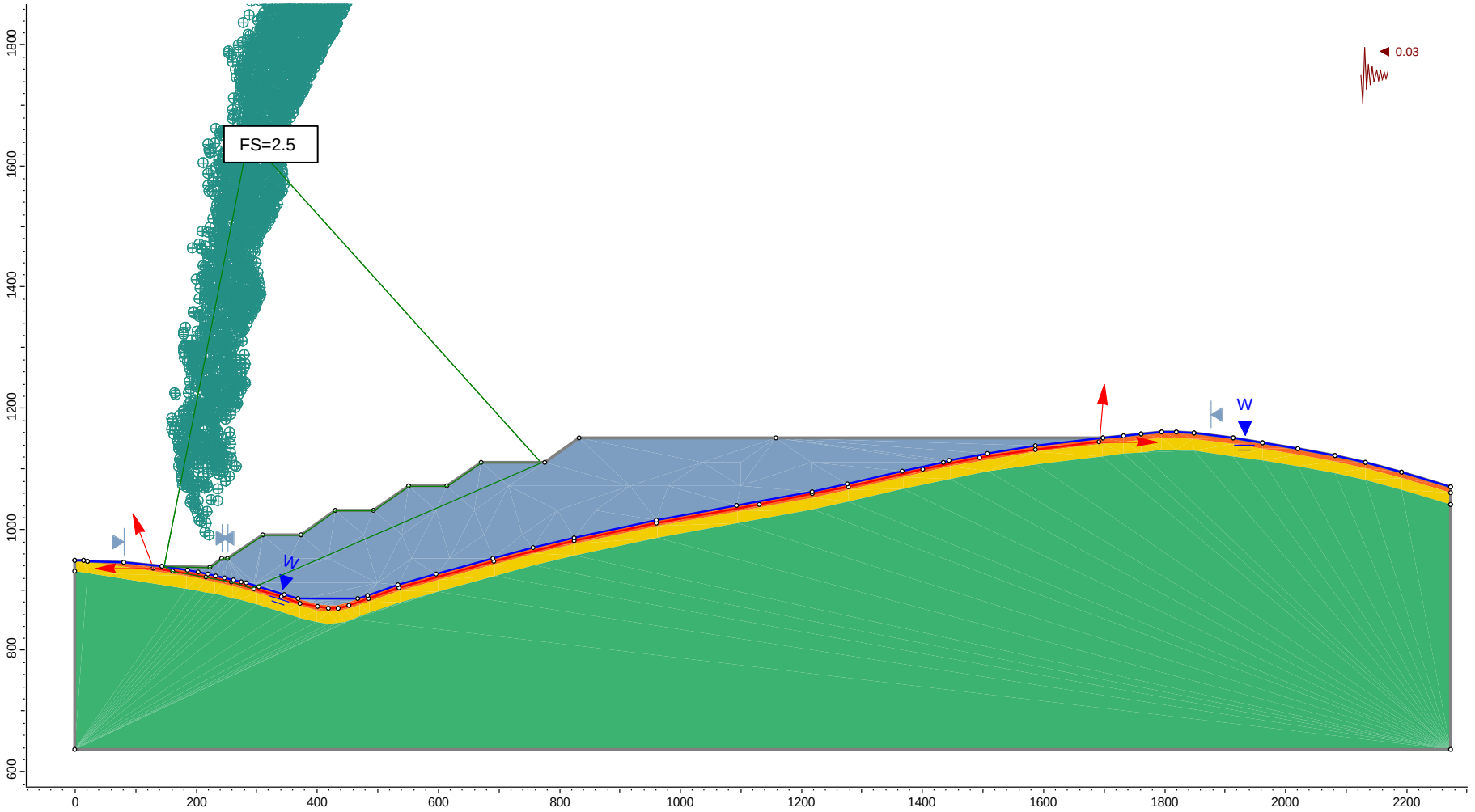
Alpha WRSF Section A, Year 3, Pseudostatic



Alpha WRSF Section A, Year 6, Pseudostatic

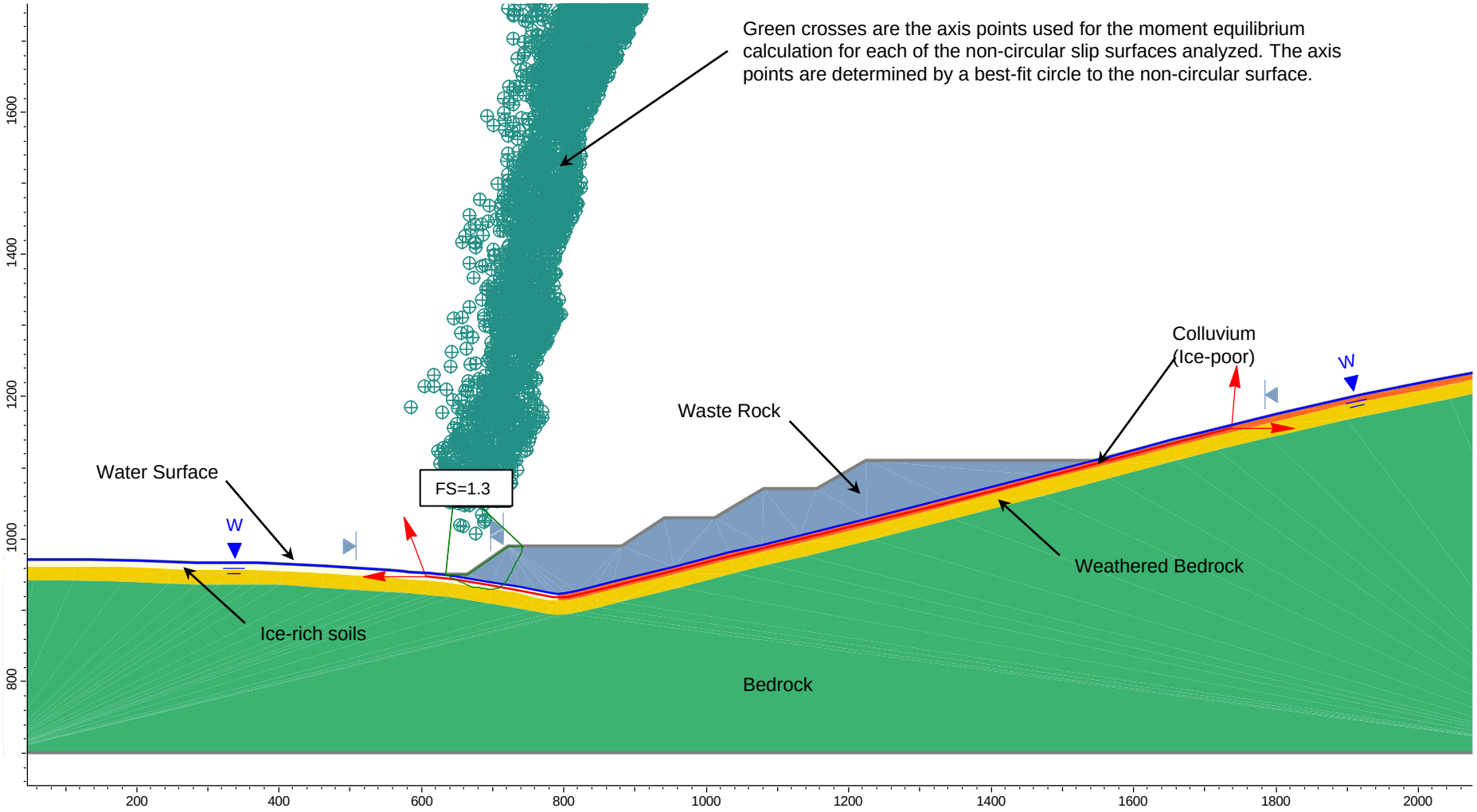


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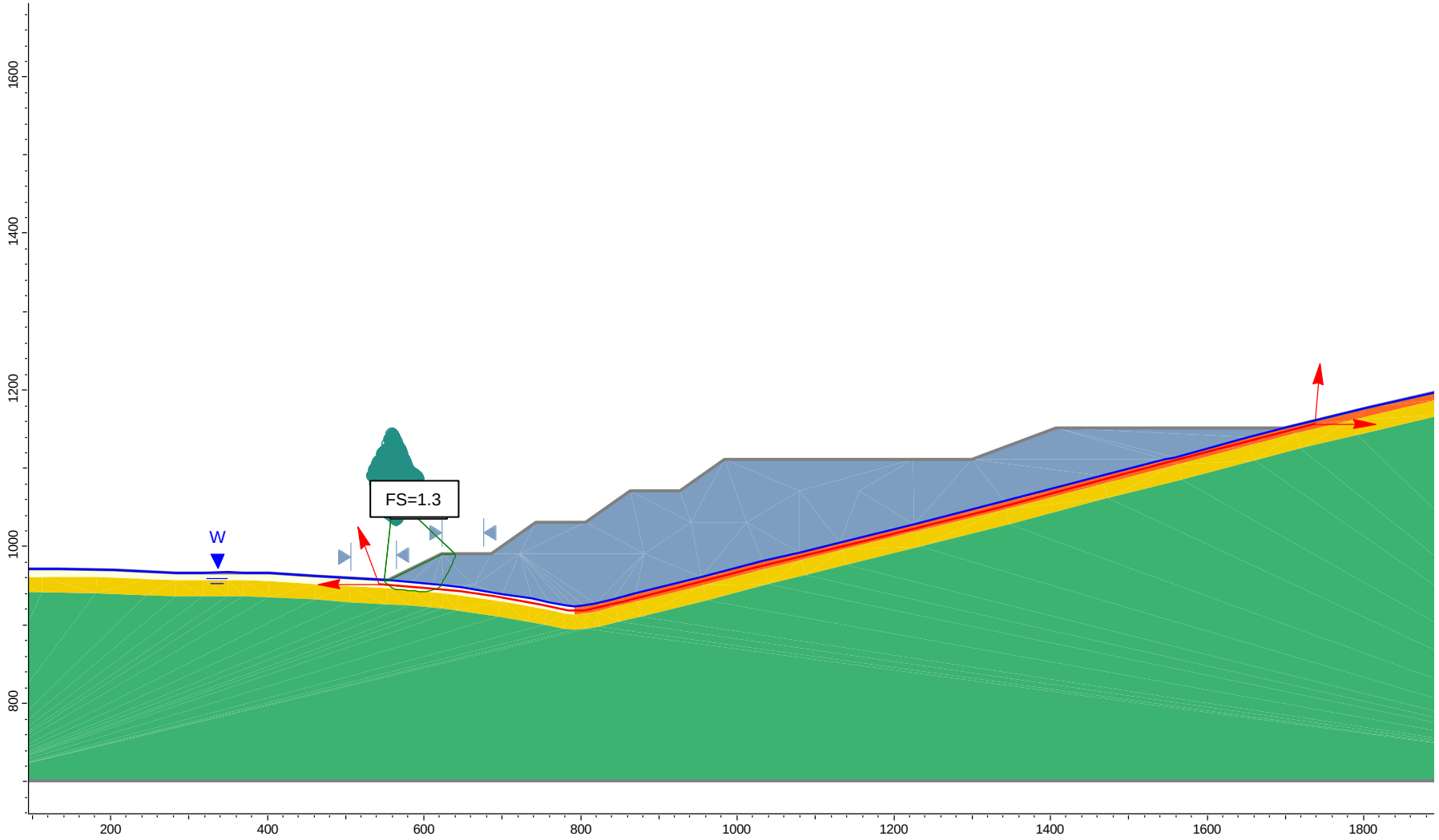


Alpha WRSF Section B Results

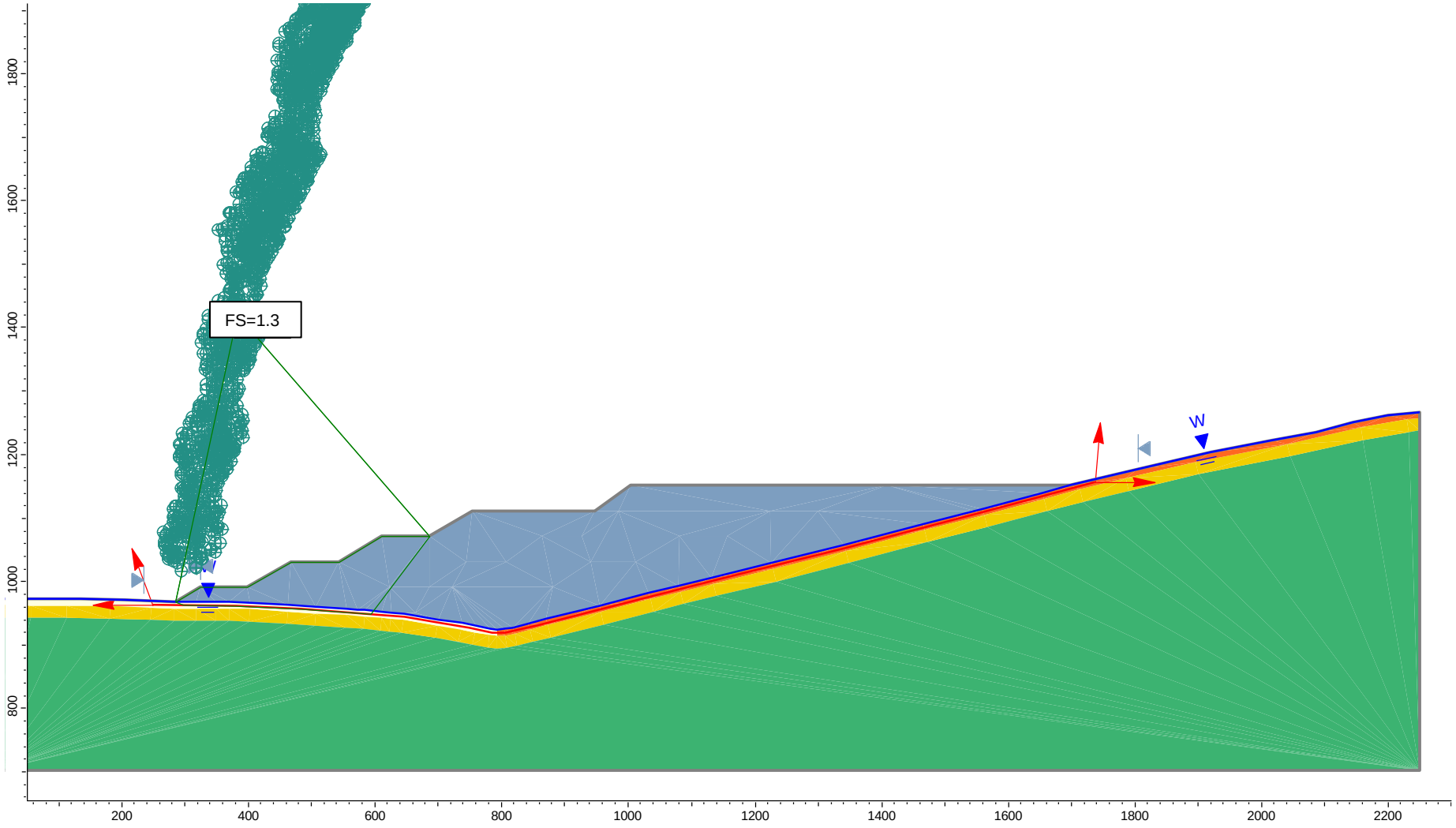
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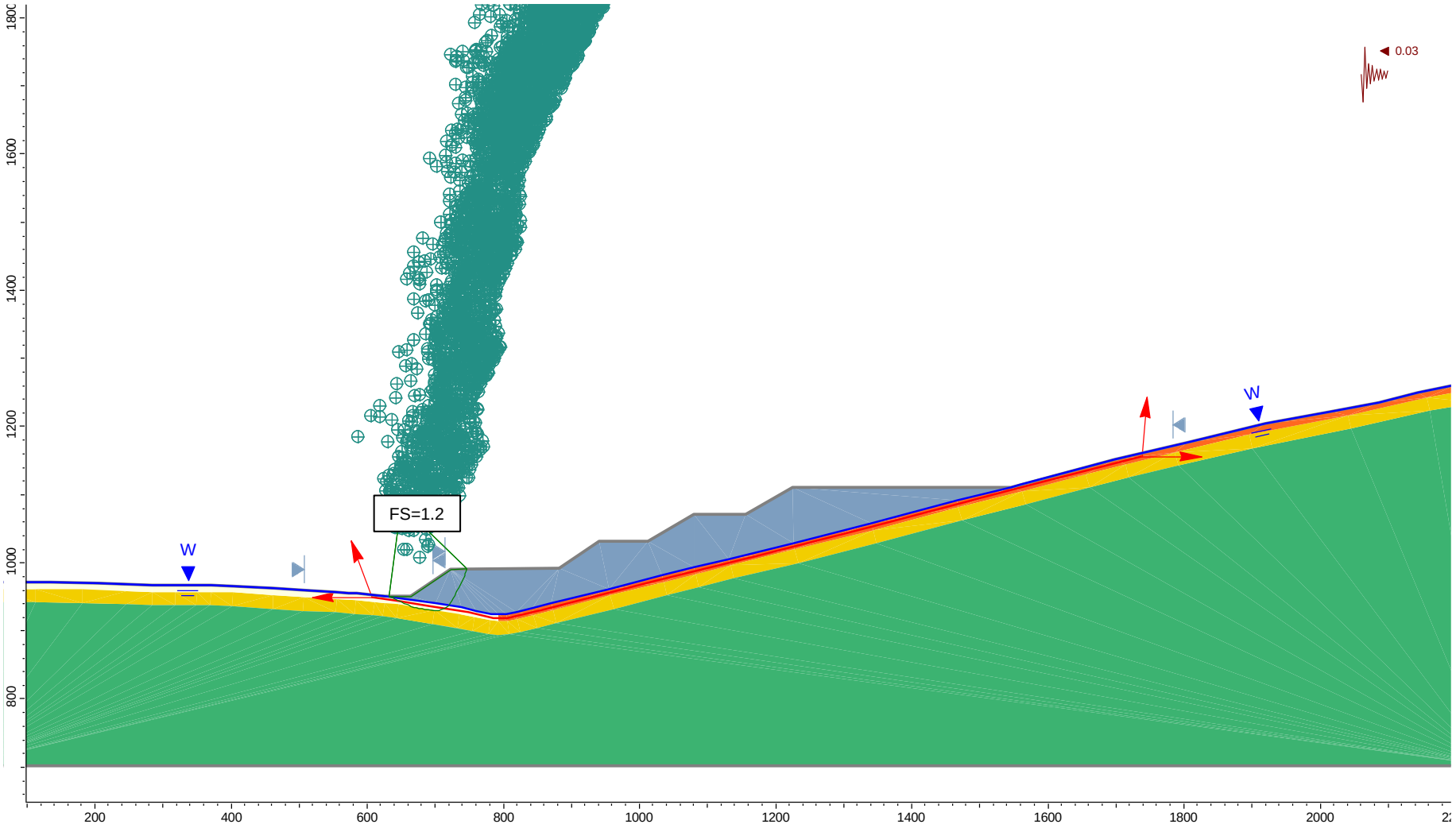
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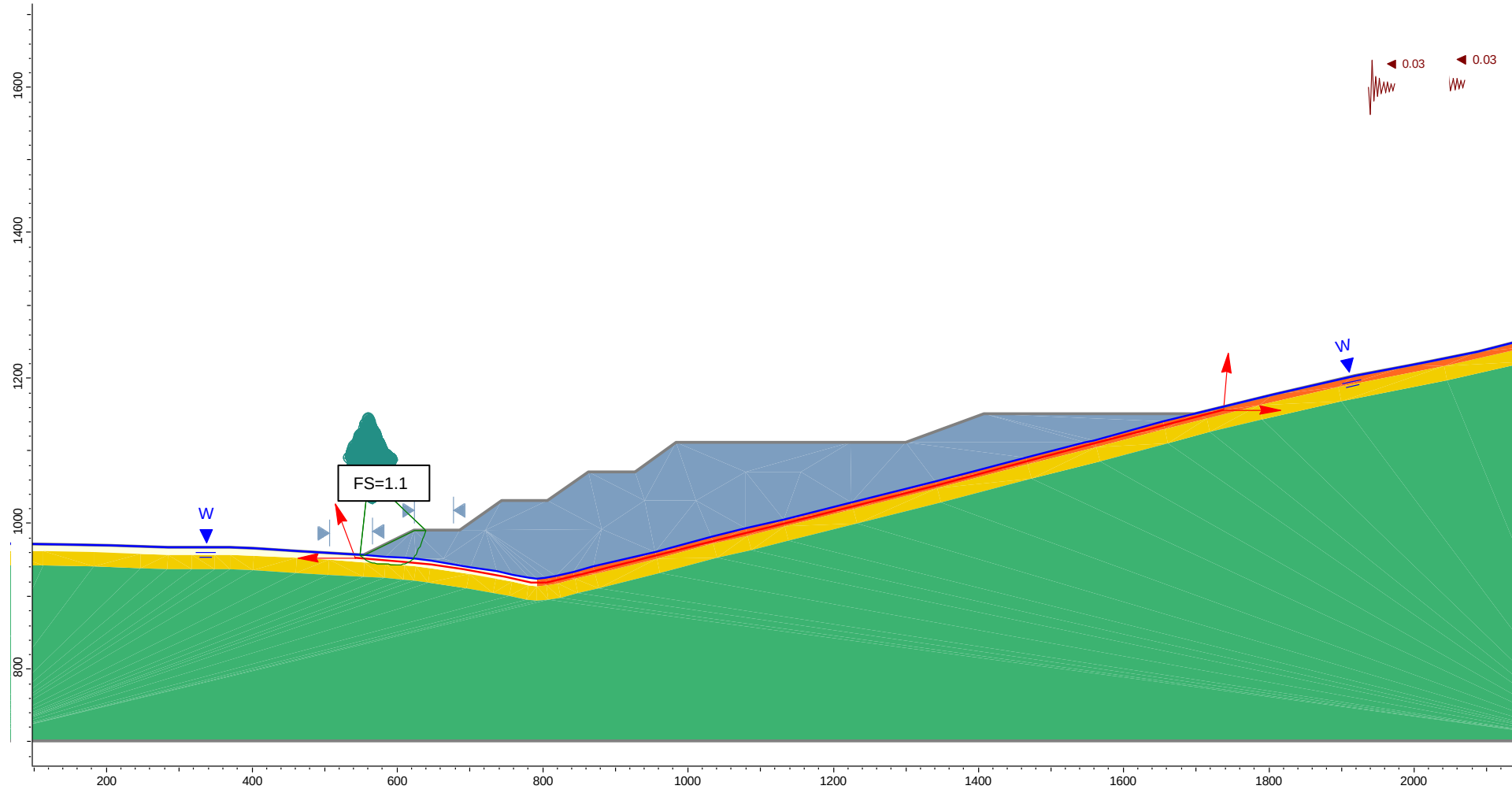
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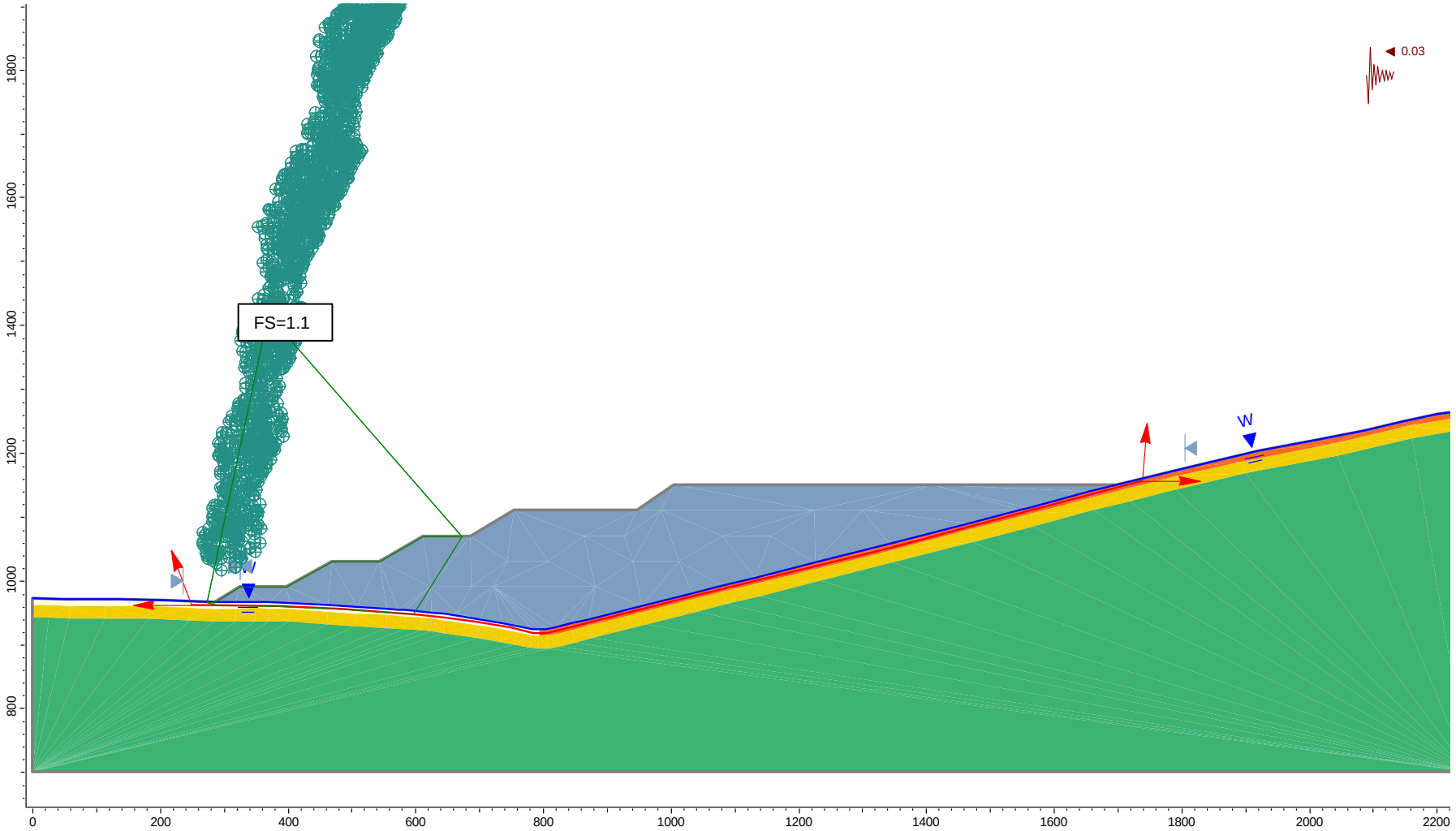
Alpha WRSF Section B, Year 3, Pseudostatic



Alpha WRSF Section B, Year 6, Pseudostatic

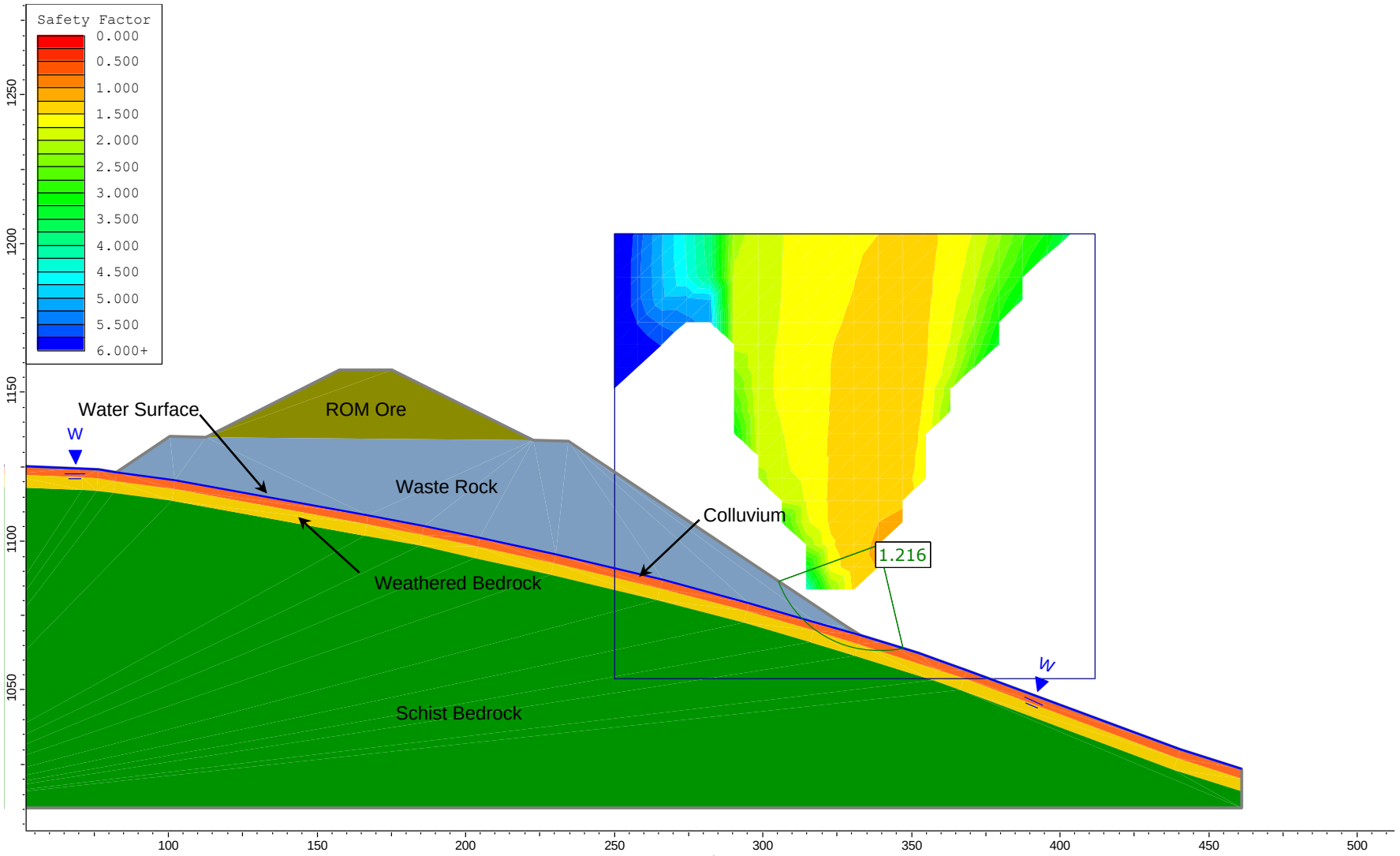


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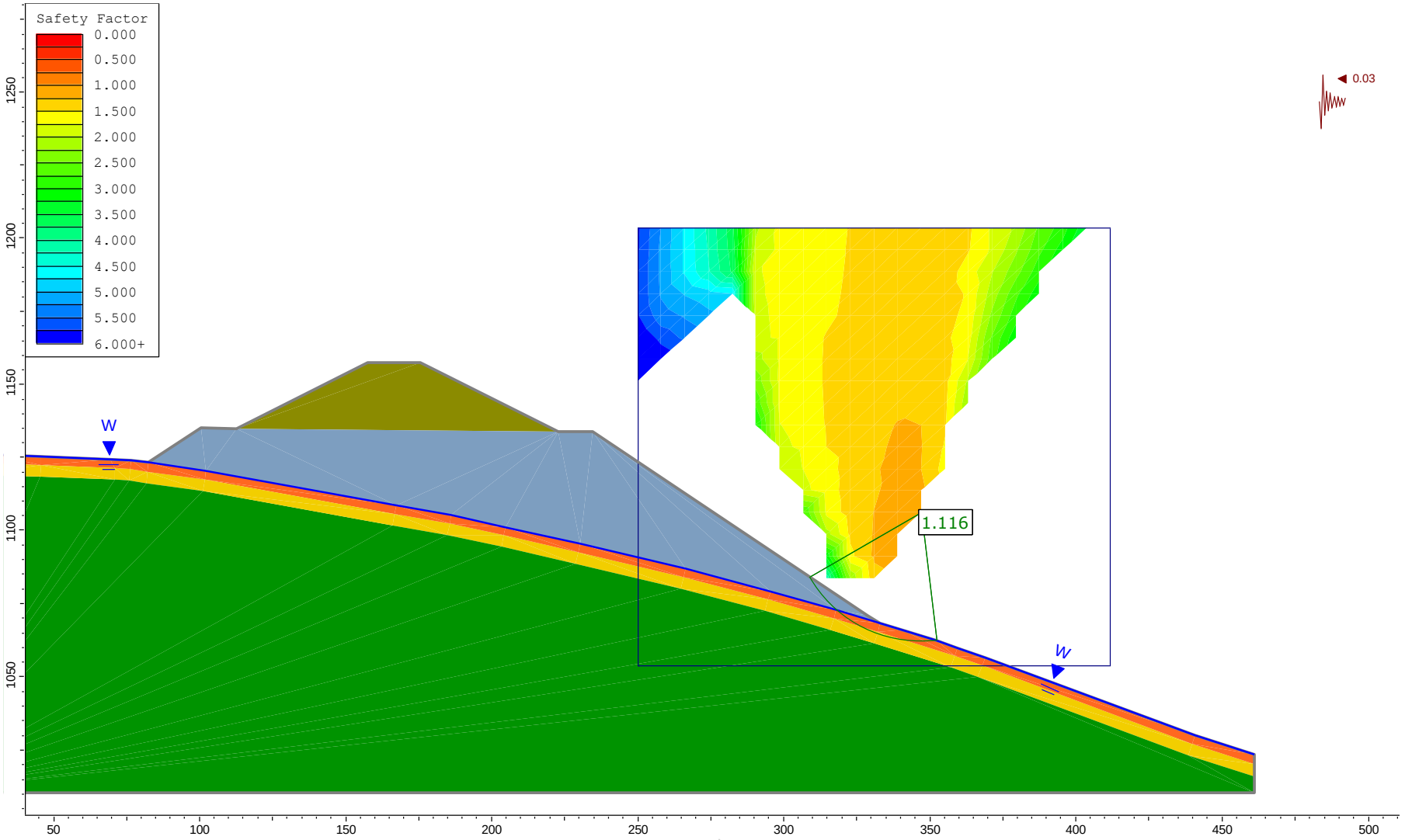


ROM Stockpile Results

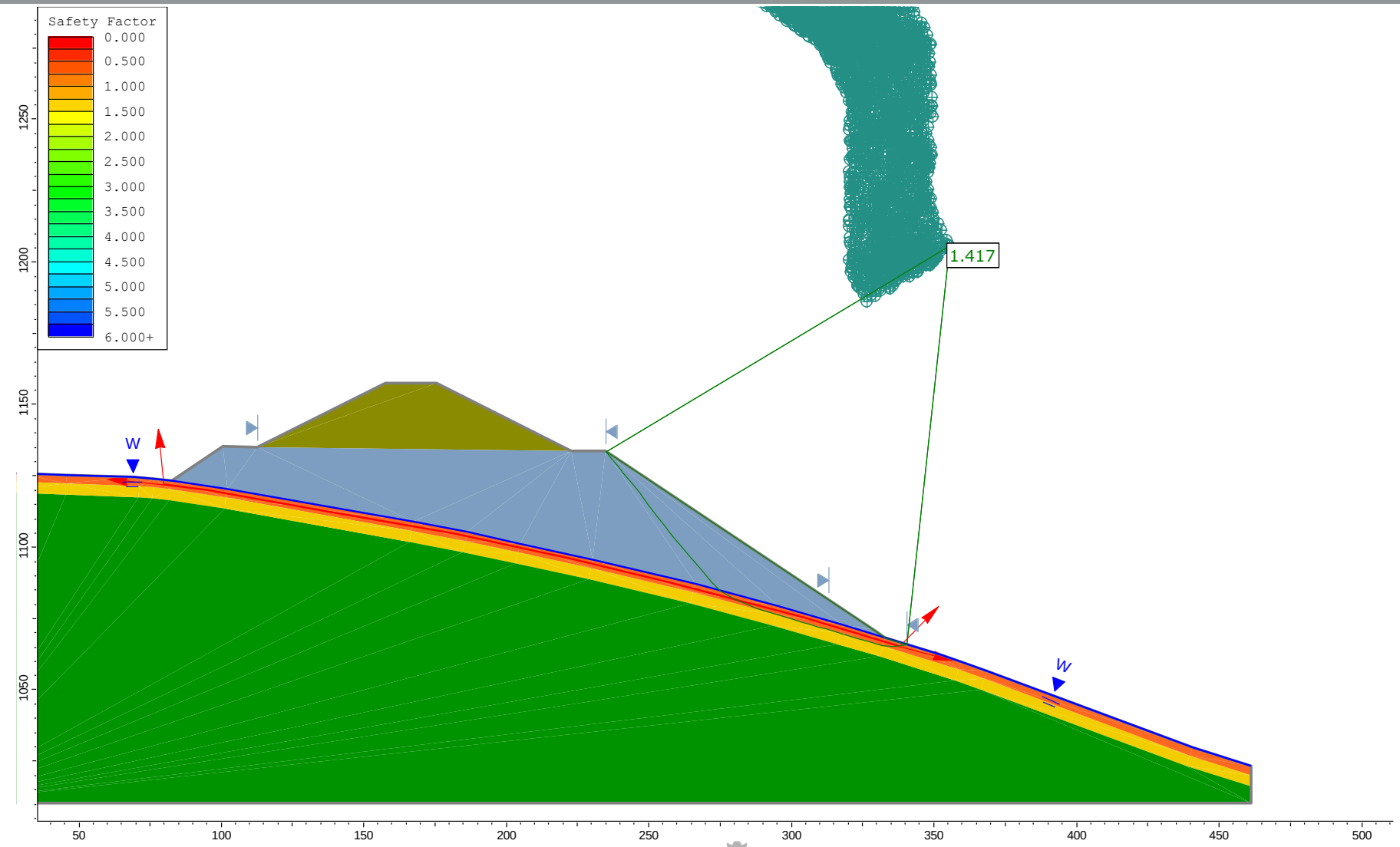
ROM Stockpile Results, Static (Toe)



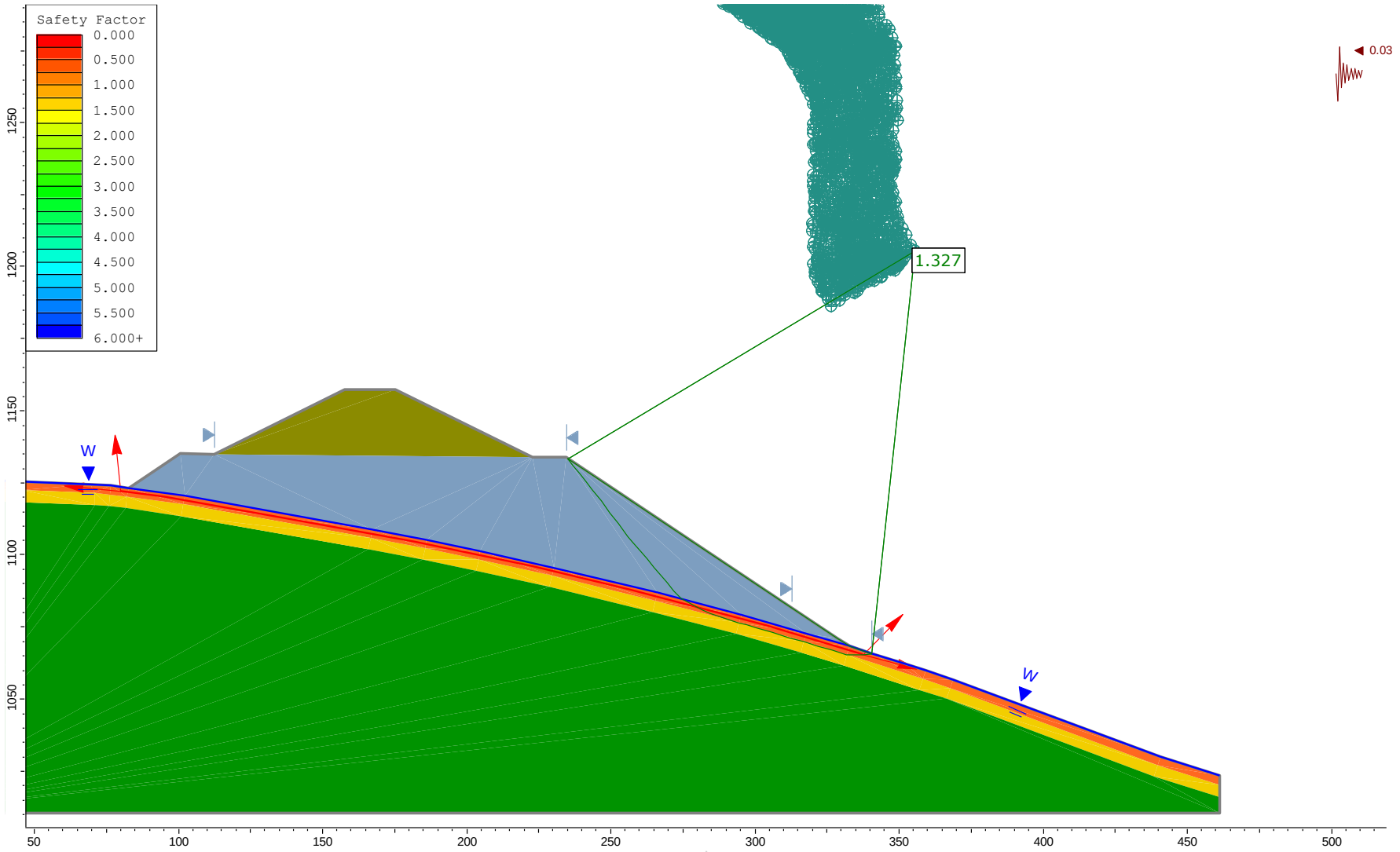
ROM Stockpile Results, Pseudostatic (Toe)



ROM Stockpile Results, Static

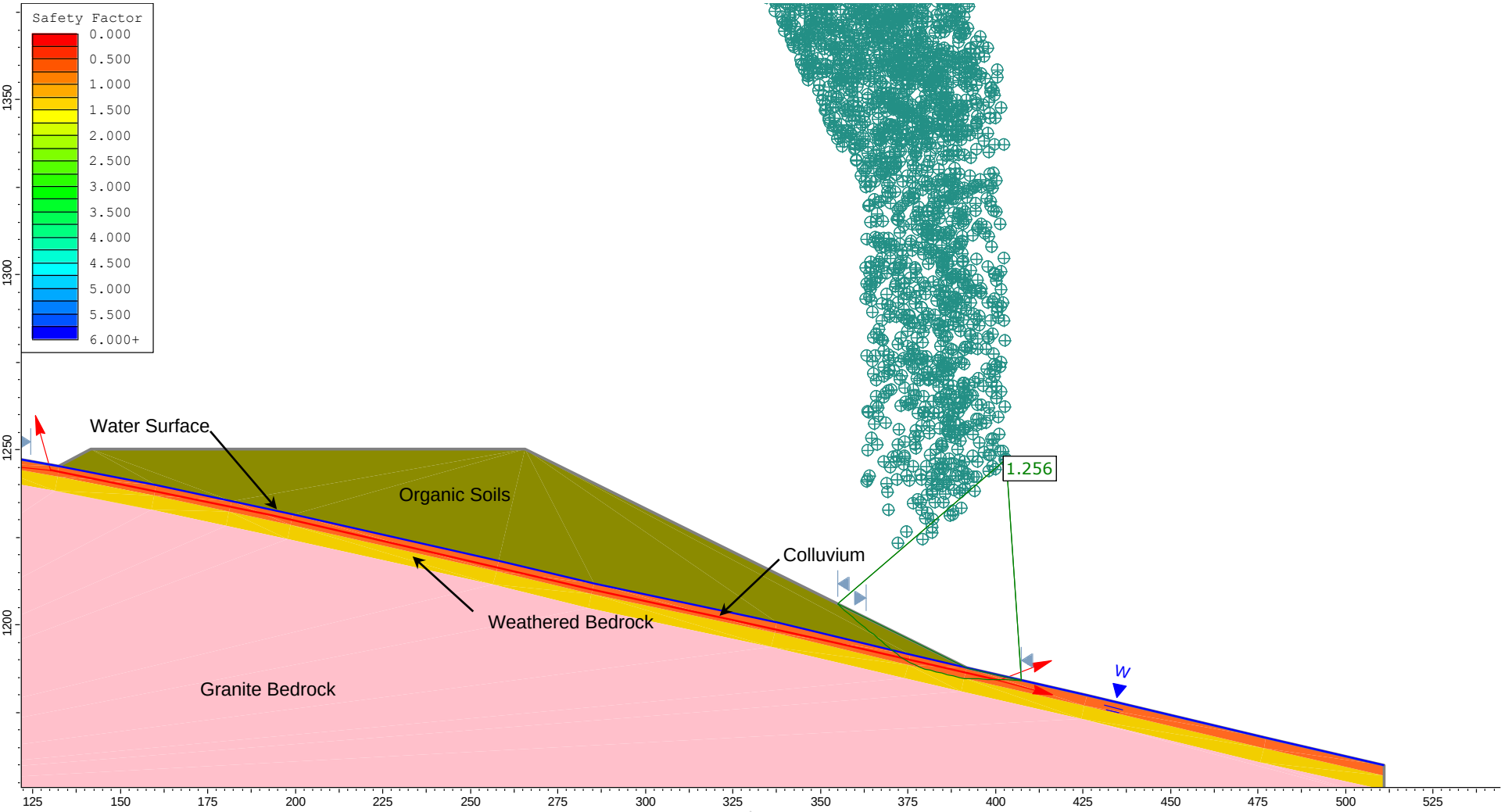


ROM Stockpile Results, Pseudostatic

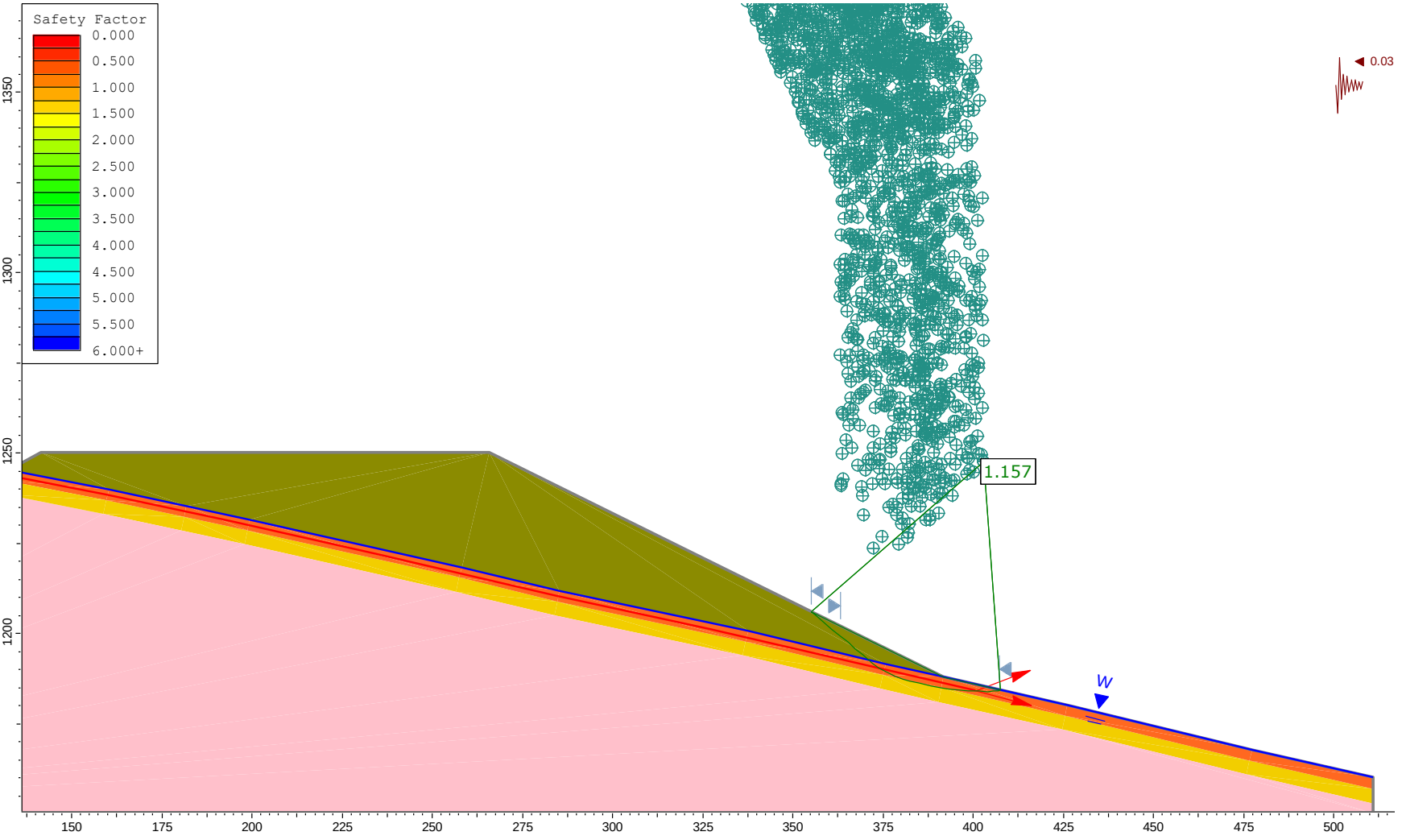


Temporary Organics Stockpile

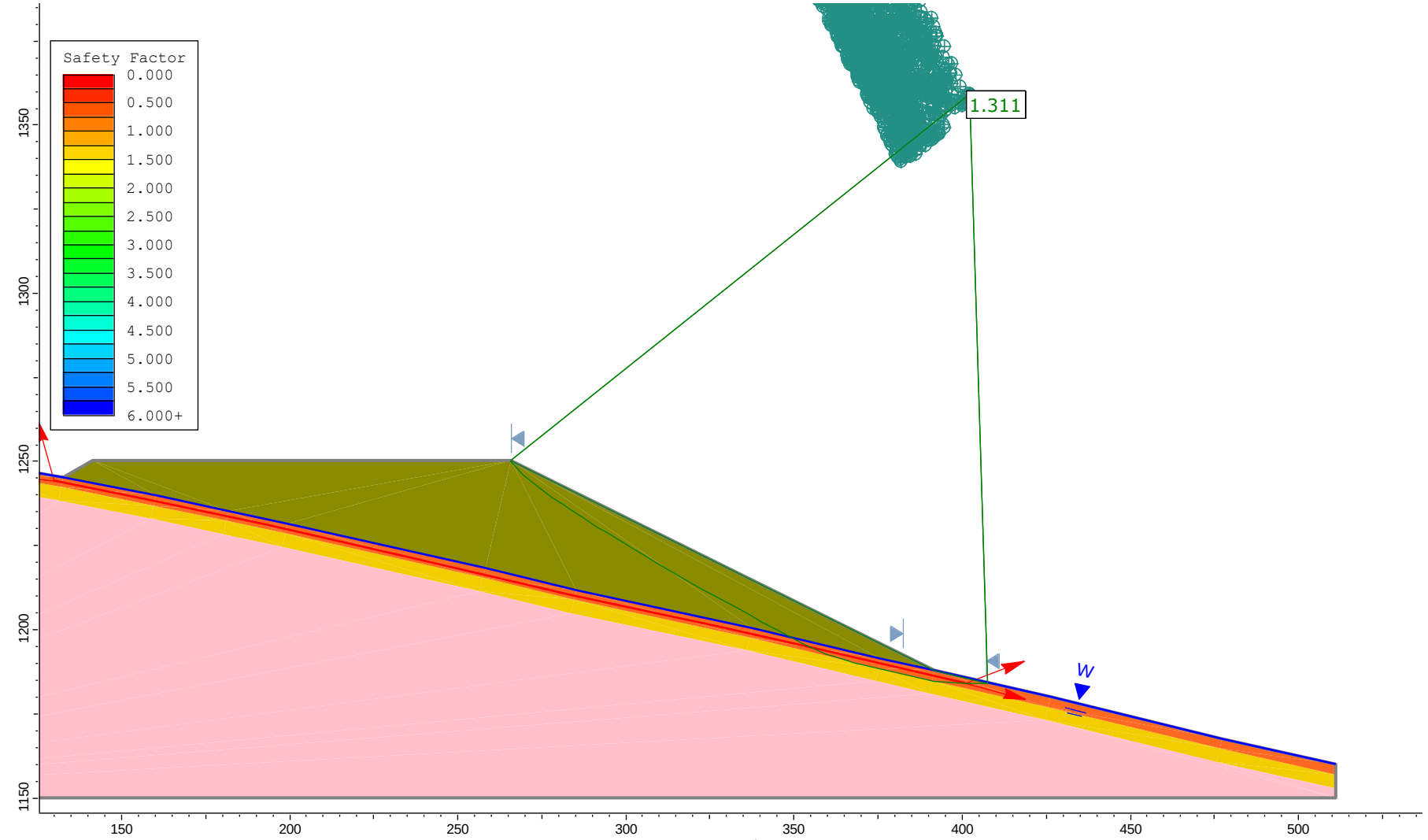
Temporary Organics Stockpile Results, Static (Toe)



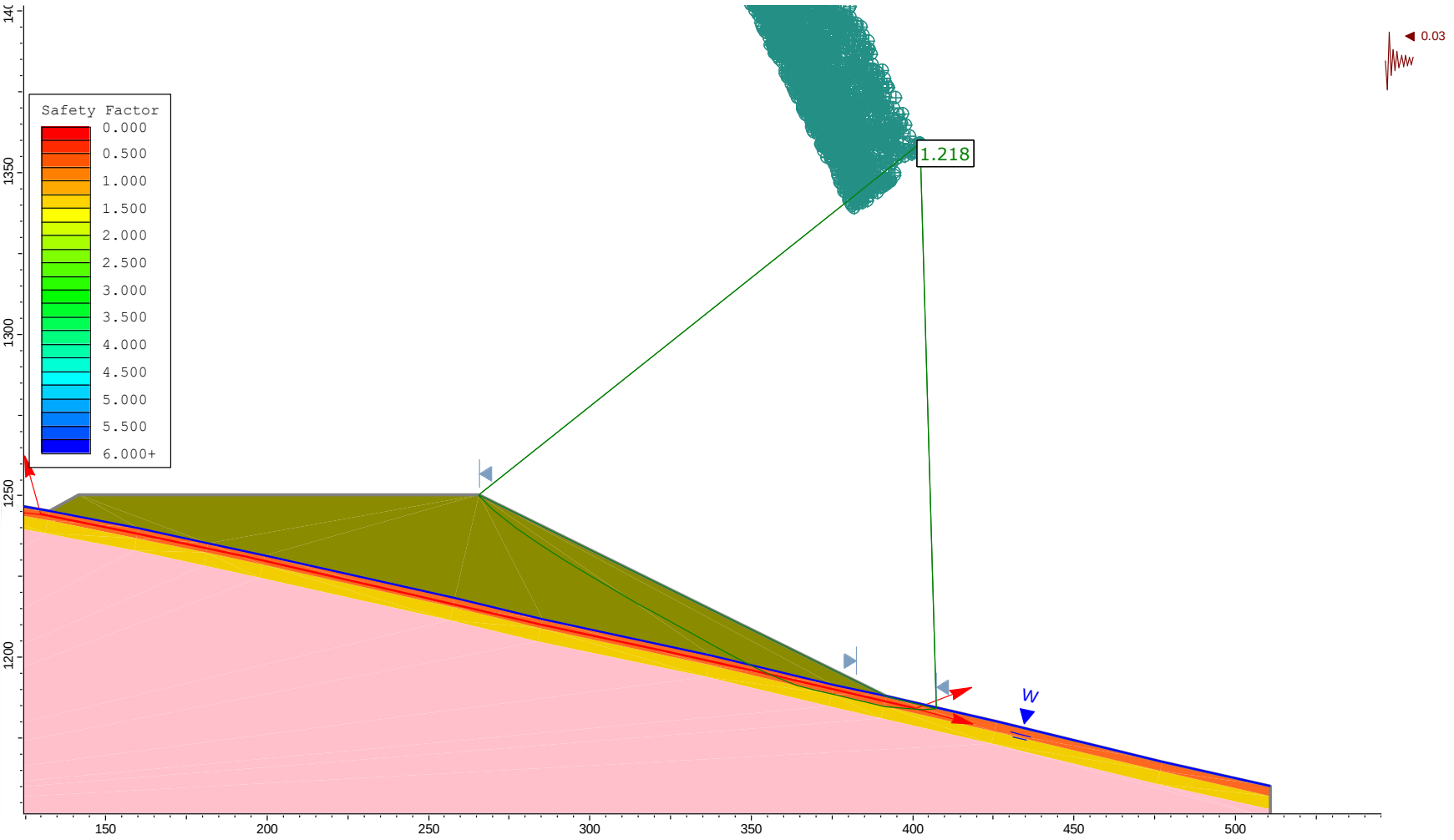
Temporary Organics Stockpile Results, Pseudostatic (Toe)



Temporary Organics Stockpile Results, Static

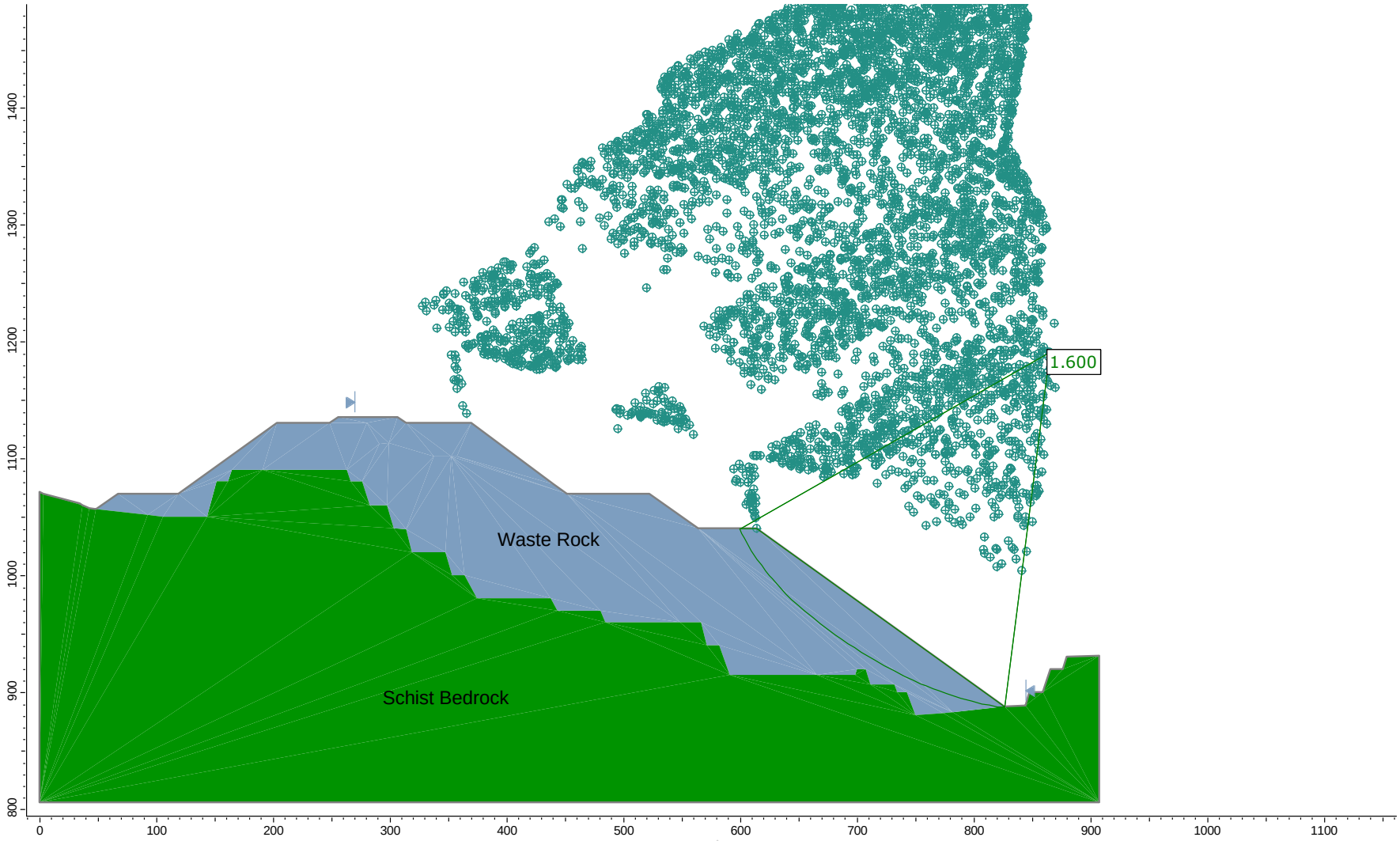


Temporary Organics Stockpile Results, Pseudostatic

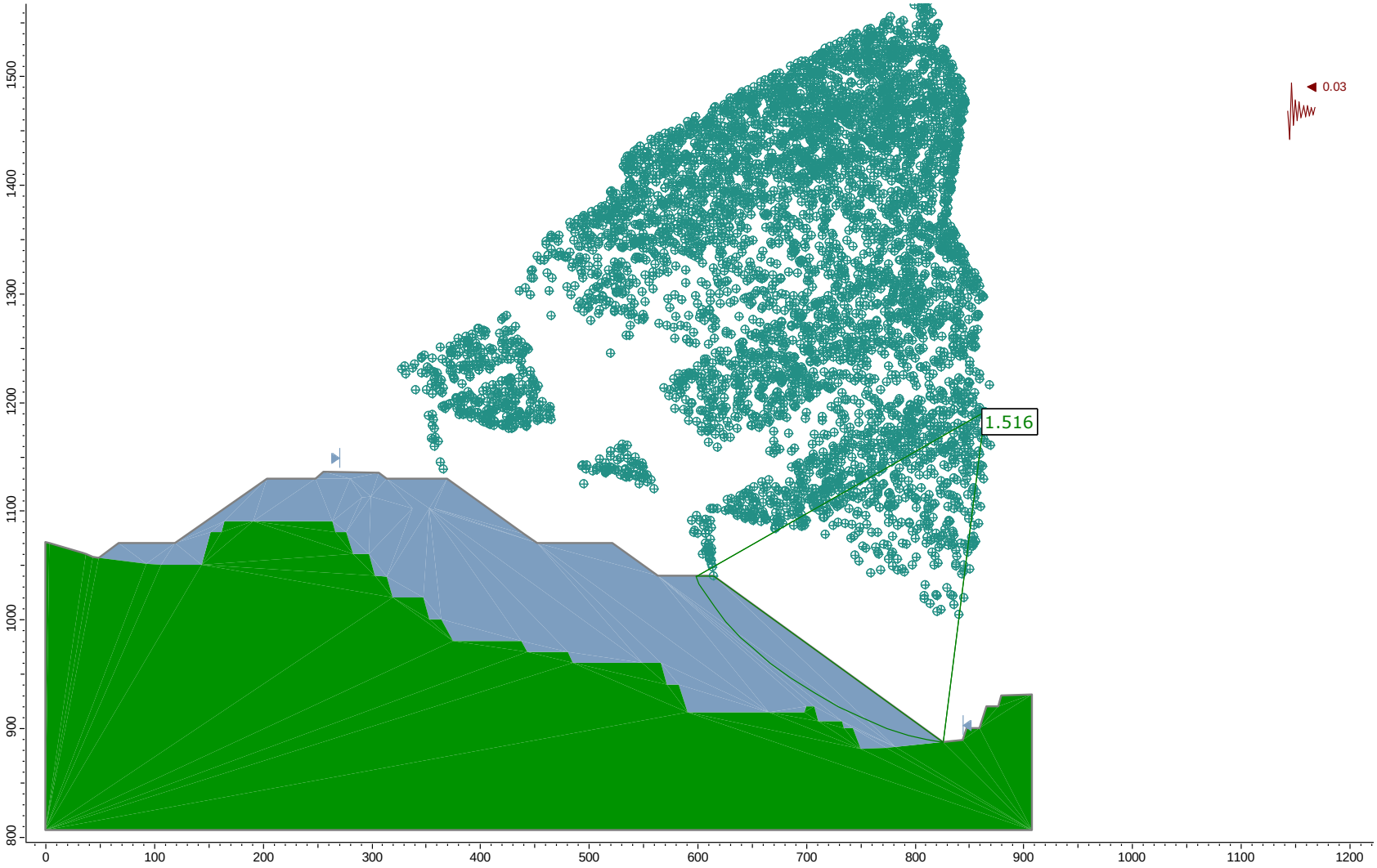


Supremo In-pit Backfill

Supremo In-pit Backfill Results, Static



Supremo In-pit Backfill Results, Pseudostatic









JDS Energy & Mining Inc.







APPENDIX B

Thermal Modeling for the Alpha WRSF Rock Drain

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Memo

To:	Trevor Herd, Bill Koehn, Carly Church	**Client:**	JDS Energy and Mining Inc.
From:	Christopher W. Stevens, PhD	**Project No:**	1CJ004.012
Reviewed By:	John Kurylo, MSc, PEng Maritz Rykaart, PhD, PEng	**Date:**	February 9, 2018
Subject:	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain		

1 Introduction

1.1 General

The Coffee Gold Project (the Project) is a high-grade, open-pit, heap-leach mining project located in west-central Yukon Territory approximately 130 km south of Dawson City. The Project is located within the Yukon-Tanana terrane and hosts several significant metal deposits.

The Project will require the construction of roads, laydown pads, water diversion structures, water retention berms and ponds, a heap-leach pad, and a waste rock storage facility (WRSF), some of which may be founded on ice-rich permafrost soils. The Alpha WRSF includes an allowance for a coarse rock drain constructed within existing valley drainages to convey water at the base of the facility.

This memo discusses the results of thermal numerical modeling completed to predict the thermal performance of the coarse rock drain.

1.2 Thermal Modeling Objectives

The objective of the thermal modeling was to:

- Develop ground thermal model inputs calibrated to the measured ground temperatures; and
- Predict thermal performance of a rock drain constructed through the base of the Alpha WRSF.

2 Site Conditions

2.1 Terrain and Vegetation

The Project site is characterized by rounded ridges between valleys with moderately steep slopes. Vegetation cover at the site consists of spruce and aspen trees on valley sides and low shrubs cover. North-facing slopes are covered in low shrubs and sparse stunted black spruce. South-facing slopes are characterized by mixed white and black spruce and aspen. Sphagnum moss cover is common to valley bottom locations.

2.2 Climate

A baseline meteorology station was installed at the Project site in July 2012. Measured parameters include air temperature, wind speed and direction, incoming solar radiation, barometric pressure, precipitation, and relative humidity (Lorax 2017).

Figure 1 shows the complete record of measured air temperature, solar radiation, wind speed, and relative humidity, and Table 1 summaries the mean monthly values for these parameters as recorded by the meteorological station.

The mean annual air temperature recorded is -2.5°C at the Project site (Table 1), with average monthly air temperatures that range from -19°C in December, and +13°C in July (Lorax 2017). Valley bottom temperature inversions occur during winter months which results in a reversal of the normal lapse rate (decreasing temperature with increasing elevation). The winter lapse rate has been estimated to be 6.5°C/1000 m based on a correlation between the Project meteorological station and the Pelly Ranch Station from 2012 to 2015 (Lorax 2017). The elevation difference between the Project station (975 masl) and the toe of Alpha WRSF rock drain (810 masl) is 165 m, which equates to a difference in winter air temperature of 1.07°C. Air temperature is predicted to increase from 3°C to 5°C due to climate change by the year 2100 (Lorax 2015).

The mean wind speed for April to September for the period of record (2012-2015) is 9.3 km hr^{-1}, with primary wind direction from the southeast. The mean wind speed for October to March is 6.1 km hr^{-1}, with the primary wind direction from the southwest.

The mean annual precipitation at the station (975 masl) is estimated to be 370 mm, with 68% falling as rain from May to September and 32% falling as snow between October and April (Lorax 2017).

Eight snow survey sites have been established at the Project site within low, mid and high elevation covering different slope aspects. Snow survey sites have been sampled at various frequencies near the peak of snow accumulation from 2012 to present (Table 1). A continuous snow depth record is not currently available for the project site. A summary of the measured and modelled snow depth is presented as Figure 2. Snow depth measurements recorded for nearby Casino Creek over a longer period (since 1977) are on average greater than Coffee Gold

measurements, and are used to verify reasonable average snow depths have been recorded at the Project site (Figure 2).

Mean monthly incoming solar radiation measured at the site ranges from 246 W m^{-2} in June to 3 W m^{-2} in December. Slope aspect / variation in exposure to solar radiation will exist across the site however these variations are not considered in detail as part of this rock drain thermal modelling.

Monthly relative humidity measured at the Project station seasonally varies with lower values in the spring months (lowest value in May; 49%) to higher values in the fall and winter of 78% to 84% (Lorax 2017).

Table 1: Mean Monthly Climate Parameters for Coffee Gold Meteorological Station

Month	Air Temperature (°C)	Wind Speed (km hr^{-1})	Snow Depth (cm)	Solar Radiation (W m^{-2})
January	-14.6	5.4	43.5	9
February	-15.2	7.0	55.9	40
March	-10.1	8.9	50.2	116
April	-2.7	9.7	52.5	189
May	8.3	10.1	34.0	239
June	12.3	9.5	-	246
July	13.3	8.9	-	204
August	11.2	8.6	-	168
September	4.8	9.2	-	104
October	-3.2	7.0	NA	40
November	-15.3	4.8	NA	10
December	-18.4	3.7	NA	3
Mean	-2.5	-	-	-

Notes:

1. Measured monthly air temperature from Lorax (2017; Table 3-1)
2. NA indicate value note measured
3. Coffee Gold meteorological station at 975 masl

2.3 Surficial Material

Geotechnical investigations have been conducted to characterize overburden conditions at the Project site using test pitting and boreholes drilled with sonic and diamond coring drill rigs (KP 2015; SRK 2016; Tetra Tech 2017a; 2017b). The recovered material during the various investigations was logged in the field and subsampled for laboratory testing of the physical material properties. Table 2 summaries the primary soil and bedrock physical parameters determined from borehole and test pits samples collected on the Project site (KP 2015; SRK 2016; Tetra Tech 2017a; 2017b).

Surficial material generally consists of unconsolidated well-graded coarse colluvium, up to 15 m thick, with layers of sand and gravel, some cobbles and boulders, and minor silt and clay. The colluvium is typically overlain by a veneer of aeolian (wind deposited) silt with organic material,

which may be occasionally interbedded with the colluvium near the surface. The gravimetric moisture content in the colluvium ranges from 5% to 68%, and up to 387%. The upper range of moisture content likely reflects ice-rich soils with excess ice. The organic layer thickness averages 0.24 m (range from 0.02 to 2.00 m), where present. Figure 3 presents a summary of the gravimetric water content and excess ice content for the various soil samples collected on site.

Porewater salinity of soil samples was measured to be up to 45 ppt with a handheld refractometer (Tetra Tech 2017a; 2017b). The relatively high porewater salinity is believed to be introduced from the drilling fluid (pers. com. Jan 2017 with JDS). SRK has moved forward with the assumption that the source of the porewater salinity is not naturally occurring. Therefore, freezing point depression due to porewater salinity is not considered in the thermal modeling. If naturally occurring the porewater salinity is estimated to depress the freezing point by approximately 0.2 to 2.5 °C for the range of values (3 to 45 ppt) measured at the site. To confirm this assumption, salinity values will be further investigated as part of the 2018 geotechnical drilling program.

Bedrock consists of weathered granite or gneiss, with rock quality designation values from very poor to good. Depth to the top of bedrock ranges from 0.4 to 32.6 mbgs, with an average of approximately 3.5 mbgs.

Table 2: Summary Physical Parameters from Borehole and Test Pit Samples

Parameter		Number of Samples [1]	Primary Soil Type [2]				
			Organics	Silt	Sand	Gravel	Bedrock
Natural Moisture Content (%)	Ave.	308	203	89	26	15	2
	Min.		99	6	5	3	0.1
	Max.		456	368	121	52	12
Excess Ice Content (%)	Ave.	88	23	29	21	20	-
	Min.		16	3	3	4	-
	Max.		31	51	50	55	-
Bulk Density (kg/m^3)	Ave.	48	1185	1466	1746	1972	-
Dry Bulk Density (kg/m^3)	Ave.	34	363	804	1112	-	2551
Specific Gravity	Ave.	3	2.33	2.64	2.63	-	-

Notes:

1. Number of samples indicates the total number of samples analyzed with an indicated primary material type
2. Overburden with a primary soil type described as cobble excluded due to the low number of samples

2.4 Permafrost and Ground Ice

The Project site is located within the zone of extensive discontinuous permafrost. Permafrost conditions have locally been assessed using direct measurements (ground temperature measurements and boreholes), and inferred through permafrost mapping based on geobotanical indicators, surface slope and aspect, and extrapolation of direct measurements and observations made during site investigations.

Figures 4 and 5 show ground temperature profiles available at the time of reporting and initially used for the site calibration models. Ground surface temperature (GST) has not been measured at the standardized depth of 0.02 mbgs to 0.05 mbgs at the Project site, and are therefore not presented in this memo.

Table 3 provides a summary of permafrost temperatures as defined by the average ground temperature measured near the depth of zero annual amplitude; i.e. the position in the ground where seasonal variability in ground temperature is less than 0.1°C. The average permafrost temperature is -0.9°C near the depth of zero annual amplitude (13 to 30 mbgs) with a range from -0.3°C to -1.8°C (n=14). The average ground temperature is -0.4°C (n=16) for shallow measurements collected 4.3 to 9.5 mbgs using single bead thermistor cables. The average geothermal gradient is estimated to be 0.021°C m^{-1} based on site ground temperatures measurements.

Ice-rich permafrost is common beneath north-facing slopes (TetraTech 2017b). Slopes underlain by permafrost are typically poorly-drained, with observed seepage of suprapermafrost groundwater. South-facing slopes are reported to be generally absent of permafrost and well-drained.

Ground ice has been evaluated from core recovered from sonic drilling and diamond coring using chilled drilling fluids. The excess ice, i.e. the volume of ice in the ground that exceeds the total natural pore volume, has been estimated by visual inspection of recovered core and based on quantitative percent by volume measurements of the supernatant water of thawed samples.

Table 3: Summary of Ground Temperature for Sites with Permafrost

Borehole ID	Thermistor Cable Type	Thermistor Depth (m)	Average Ground Temperature (°C)[1],[2]
MW14-04T	Multi-bead	26.1	-1.4
MW14-07T	Multi-bead	29.7	-0.8
MW 15-01T	Multi-bead	19.8	-1.5
MW15-04T	Multi-bead	13.8	-0.5
MW15-05T	Multi-bead	17.2	-0.6
MW15-07T	Multi-bead	26.0	-1.5
MW16-01T	Multi-bead	29.7	-0.3
MW17-01T	Multi-bead	20.0	-0.4
SRK15D-07T	Multi-bead	24.7	-1.7
SRK15D-08AT	Multi-bead	26.0	-0.6
SRK15D-10T	Multi-bead	20.5	-1.8
SRK 15D-13T	Multi-bead	13.0	-0.3
KPBH1-CFD0451	Multi-bead	19.8	-0.9
KPBH4-CFD0451	Multi-bead	19.8	-1.0
GT17-02	Single Bead	8.3	-0.2
GT17-03	Single Bead	7.1	-0.4
GT17-06	Single Bead	6.3	-0.3
GT17-06B	Single Bead	8.0	-0.3
GT17-07	Single Bead	6.7	-0.1
GT17-11	Single Bead	4.6	-0.4
GT17-14	Single Bead	6.7	-0.3
GT17-16	Single Bead	6.0	-0.4
GT17-19	Single Bead	6.6	-0.2
GT17-20	Single Bead	6.1	0.0
GT17-30	Single Bead	4.3	-0.7
GT17-31	Single Bead	6.0	-0.2
GT17-33	Single Bead	9.5	-0.6
GT17-40	Single Bead	9.0	-0.5
GT17-40B	Single Bead	9.2	-0.8
GT17-41	Single Bead	6.7	-1.0
Average Temperature – Multi-bead Cables (13 to 30 mbgs)			-0.9
Average Temperature – Single Bead Cables (4.3 to 9.5 mbgs)			-0.4

Notes:

1. Ground temperature measurement based on data made available at the time of reporting
2. Average ground temperature for multi-bead thermistor cables based near the depth of zero annual amplitude
3. Ground temperature for single bead thermistor cable based on measurements on October 4, 2017 (Tetra Tech 2017)

3 Methods

3.1.1 Model Set-up

Thermal modeling was carried out using SoilVision's SVHeat GE v5.3.03 (SoilVision 2017) software package in combination with FlexPDE (FlexPDE 2014). SVHeat was utilized for the problem setup, while FlexPDE 6.35 solver was used to complete the calculations. One-dimensional and two-dimensional models were setup to simulate conductive heat transfer with phase change and heat exchange.

The advection of heat from water flowing through the rock drain would generally promote seasonal thawing of the drain. The model results are conservatively based solely on thermal conduction and do not consider advection of heat from water flow within the rock drain.

3.1.2 Critical Section & Model Sequence

A series of sections were cut through the rock drain to look at the expected geometry. The critical model section for the Alpha WRSF was selected to be approximately parallel to the creek channel.

The 2D thermal model for the critical section accounts for annual placement of waste rock over the rock drain in a series of model sequences (Figure 6). The supplemental figures attached to this memo (provided as Attachment A) show the current development of the Alpha WRSF over the expected mine life (sequencing as provided by JDS in December 2017). These surfaces were used as a basis to cut the typical section and develop the model sequences presented in Figure 6.

3.2 Model Inputs

3.2.1 Material Properties

Five materials were considered in the thermal model: waste rock, overburden sand and gravel, well-graded screened rock drain fill (40% and 100% saturated), and bedrock. Rock drain construction is assumed to take place with select rock material (likely with a dominate rock size more in the 0.3 m or larger range) or with gravity sorted waste rock (end dumped from an offset slope about 30 m or greater in height). The exact material gradations for the rock drain have not been fully constrained for detailed design, as hydraulic calculations for the rock drain will also need to be completed prior to construction. A summary of the material thermal properties used is provided in Table 4.

Thermal properties for the waste rock material were based on experience with granular granitic blast rock / waste rock material of a similar expected gradation, as site specific thermal properties were not available. The values are comparable to average thermal conductivity and heat capacity measured for granitic waste rock at Diavik Diamond Mine (Pham 2013).

The screened rock drain material assumes a density of 2120 kg/m^3, porosity of 0.3, and a degree of saturation of 40% from which material thermal properties were estimated. Screened rock drain

fill at 100% saturation was used to represent fill material with the pore space completely filled with liquid water or ice. Ice filled pores may seasonally occur where a portion of the rock drain freezes to form ice-saturated material with relatively high latent heat requirements.

The thermal properties for the foundation soil was based on average physical parameters for sand and gravel (colluvium) at the site. The foundation soil material properties include an unfrozen water content curve for natural sand (Andersland and Ladanyi 2004). The thermal conductivity and volumetric heat capacity were calculated in accordance with Cote and Konrad (2005) and Newman (1995), respectively. For the rock drain model, surface organics and silts are not considered to simplify the underlying foundation materials and subsequent heat flow calculations. The exclusion of these materials results in great heat transfer contributing to long-term warming of the underlying permafrost foundation beneath the WRSF.

Table 4: Material Thermal Properties

Material	Degree of Saturation (%)	Porosity	Thermal Conductivity, kJ/(m·day·°C)		Volumetric Heat Capacity, kJ/(m³·°C)	
			Unfrozen	Frozen	Unfrozen	Frozen
Overburden	76	0.47	139	197	2,564	1,940
Waste Rock	25	0.25	158	155	2,400	2,300
Rock Drain Fill (40% Saturated)	40	0.30	124	149	2,516	2,265
Rock Drain Fill (100% Saturated)	100	0.30	141	209	3,272	2,642
Bedrock	100	0.05	216	216	2,380	2,350

3.3 Surface Boundary Conditions

3.3.1 Calibration Model

Calibration models were developed using a surface energy balance for the ground-air interface that considers the effects of air temperature, solar radiation, wind speed, snow thickness and density, and the change in air temperature due to changing climate using site climate parameters summarized in Table 1.

An air temperature curve was developed for the Project site based on parameterization of measured air temperature values from the Project meteorological site (Figure 1). The boundary was defined by a sinusoidal function of temperature and is time based as defined in Equation 1, with the parameters shown in Table 1. Climate change is considered using the air climate change factor that allows for a daily increase in air temperature within the model.

$$Ta = \left[MAAT + (C_A * t) + Amp * Sin\left(\frac{2\pi+(t+\alpha)}{365}\right)\right] \quad \text{Eq.1}$$

Where:

Ta *is the air temperature measured in °C*

$MAAT$ *is the mean annual air temperature measured in °C*

Amp is the air temperature amplitude measured in °C
C_A is the air climate change factor in °C d^{-1}
α is phase lag of the sine wave
t is time measured in days

Modeled snow depth was based on a parabolic function (Zhang et al 1996):

$$Za_t = Z_{max}\ \left(\frac{t-t_{int}}{tmax-t_{int}}\right) \quad \text{Eq. 2}$$

$$Zd_t = Z_{max}\ \left(\frac{t-t_{max}}{t_{end}-t_{max}}\right) \quad \text{Eq. 3}$$

Where:
Z_t is the snow accumulation depth in cm
Zd_t is the snow deflation depth in cm
Z_{max} is the maximum snow depth in cm
t_{int} is the initial snow depth in cm

The calibration model assumes a constant snow density of 300 kg m^{-3} and thermal conductivity based on Yen (1969).

3.3.2 Rock Drain Model

For computational efficiency and numerical stability of the rock drain model, the surface boundary was simplified using n-factor values that account for thermal offset between the air and ground surface over the thawing and freezing seasons.

The ground surface temperature curve for the upper surface of the rock drain model was defined by sinusoidal function of temperature and time based on Equation 4 and the parameters shown in Table 5.

$$Tg = \max(nf * \left[MAAT + (C_A * t) + Amp * Sin\left(\frac{2\pi+(t+\alpha)}{365}\right)\right], \text{nt}\left[MAAT + (C_A * t) + Amp * Sin\left(\frac{2\pi+(t+\alpha)}{365}\right)\right] \quad \text{Eq.4}$$

Where:
Tg is the ground temperature measured in °C
nf is the surface freezing n-factor
nt is the surface thawing n-factor

Seasonal n-factors were applied as multipliers of air temperature to estimate the ground surface temperature. The n-factors for natural overburden were verified against measured ground temperature and double checked using surface energy balance models. The WRSF n-factors were verified against results produced with an equivalent surface energy balance model. For conservatism in the model, snow cover for the WRSF was assumed to be 70% less than the average snow depth measured at site (Figure 2).

Table 5: Rock Drain Model Surface Boundary Parameters

Parameter	Value
Mean Annual Air Temperature *(MAAT)*	-2.5°C
Air Temperature Amplitude *(Amp)*	16°C
Air Climate Change Factor[2]	0.000137°C d^{-1}
WRSF[1], Thawing n-factor *(nt)*	1.52
WRSF[1], Freezing n-factor *(nf)*	0.82
Natural Overburden, Thawing n-factor *(nt)*	0.80
Natural Overburden, Freezing n-factor *(nf)*	0.60

Notes:

1. Waste Rock Storage Facility (WRSF)
2. Climate change factor based on Lorax (2015)

3.4 Initial Conditions

The initial conditions for the calibration models were based on measured ground temperature for day one of the model. Initial conditions for the rock drain model was established using a steady state model with a -1.5°C surface ground temperature (approx. temperature expected around start of spring and early autumn) and geothermal heat flux applied to the lower boundary of the model domain. A constant initial temperature for the waste rock and rock drain material during placement was set to +5°C. A model with an initial waste rock and rock drain temperature of -1°C was used to assess sensitivity of the model results to the initial material temperature.

The vertical sides of the model space were set to a zero-flux boundary and the lower boundary set to a constant flux 4.57 kJ/(m^2·day·°C) which was calculated from the average geothermal gradient of 0.021°C m^{-1} and the thermal conductivity of the bedrock.

4 Results

Figures 4 and 5 show the measured and modeled ground temperature for calibration sites KP-BH-01 and SRK-15D-07T, respectively. These two calibration sites were selected primarily based on data availability. Reasonable agreement exists between measured ground temperature at the site and modeled values based on the surface energy balance and n-factors applied to the generalized air temperature.

Figures 7 through 11 show modeled ground temperature based on an initial rock drain and waste rock material temperature of +5°C. The initial material temperature of +5°C simulates construction of the rock drain during the thawing season (approx. average material temperature resulting from summer placement) during Year 1, followed by construction of the WRSF to the end of Year 11. The model results predict that the rock drain would remain unfrozen throughout the period of operation (Figures 8 through 11), although the rock drain toe is observed in the model to seasonally freeze and thaw due to heat transfer with the atmosphere (Figure 7).

Figure 12 shows the modeled rock drain temperature with an initial material temperature of -1°C (approx. early spring and early autumn). The model results predict frozen conditions would remain because of construction of the drain in the freezing season. Note however that the model result does not consider advection of heat from the flow of water through the rock drain material which could thaw-back the drain in time. Conversely though, if the rock drain was constructed during the winter, the average material temperature would be expected to be even colder than -1°C.

A minor difference observed in modeled temperature is predicted when comparing a rock drain constructed of screened material vs waste rock, based on the estimate thermal properties of each material (Figure 13). The rock drain constructed of waste rock materials shows slightly greater seasonal warming and cooling as measured at the rock drain toe, but the difference is not significant to the overall thermal state of the rock drain. The comparison solely considers differences in material temperature due to thermal conduction and does not assess hydraulic performance of the rock drain based on the different material.

Seasonal freezeback of the rock drain toe could be limited to reduce the area of the drain that would need to thaw back during the spring freshet. Figure 15 shows freezeback of the rock drain toe based on the current design, with a seasonal freezeback distance of approximately 38 m. Modification of the current design to include a bench with a 2:1 (H:V) slope is estimated to reduce the distance of seasonal freezeback to 21 m, which is approximately 50% less than the current design (Figure 16). Sensitivity runs were also completed to confirm that saturation of the screened rock drain material (to simulate an ice-saturate fill) does not prevent seasonal thawing of the toe (Figure 17). Further thermal optimization of the WRSF toe geometry would need to be completed in conjunction with a stability analysis if modification of the WRSA design to reduce the distance of seasonal freezeback at the toe is important.

A long-term thermal regime of the rock drain to the Year 2100 is shown in Figure 17. The model results indicate that the rock drain will remain unfrozen based on an initial material temperature of +5°C. The model results also show that the permafrost foundation below the WRSF is predicted to thaw over time due to the limited seasonal ground cooling below the facility (Figure 17).

5 Conclusions

Thermal modeling was completed to predict the thermal performance of the Alpha WRSF rock drain. The rock drain is expected to remain unfrozen if constructed over one thawing season, except for the rock drain toe that may seasonally freeze and thaw. The large amount of material annually placed over the rock drain limits seasonal cooling that would normally contribute to freezeback of the drain.

The predicted thermal performance is supported by the following:

1. Mean annual air temperature at the site is approximately -2.5°C, representing relatively warm conditions common to much of the Yukon Territory. The cold winter air temperature

at the site does not necessary equate to a cold ground temperature due to thermal insulation from the snow cover.

2. Warm (-0.9°C) discontinuous permafrost is present at the site. Permafrost is inferred to be sustained under microclimatic conditions including the presence of organic cover that promotes heat loss during the freezing season and limit heat gain during the thawing season. The variability in snow conditions inferred also have an impact on the ground temperature at the site based on review of available ground temperature data.

3. The relatively warm air temperature and permafrost temperature at the site suggests natural ground freezing of crushed rock placed during construction of the WRSF is unlikely to result in the aggradation of new permafrost during operation, and the climate conditions would be expected to limit natural air connection that may enhance heat loss. The burial of relatively cold and warm zones of material within the WRSF will occur during placement of waste rock. Heat transfer between zones of cold and warm waste rock within the facility are not expected to contribute to significant heat loss from the rock drain.

4. Placement rock drain material in the summer is preferred to maintain unfrozen rock drain conditions. Additional considerations will need to be given to the thermal impact to the underlying permafrost foundation. Assessment on the effects of thawing of the underlying permafrost to the overall geotechnical stability of the Alpha WRSF were not completed as part of this thermal assessment.

5. The construction of the rock drain using screened rock compared to waste rock has a minor impact on the overall thermal regime, based on the assumed material properties. However, this finding only considers the thermal performance and not hydraulic performance of the rock drain.

6. The model results confirm that the rock drain toe will seasonally freeze and thaw. Current WRSF design could be optimized to reduce the area of the rock drain toe that would need to thaw back during period of spring freshet, such as modifying geometry of the rock drain toe to steeper slopes or by adding a bench at the rock drain toe. Optimization of the WRSF would require additional thermal and stability analysis to verify modification to the current design.

7. The long-term thermal regime of rock drain is predicted to remain unfrozen due to the large amount of waste rock material over the rock drain at the end of operation and the projected increase in air temperature due to climate change. The model results are conservative and do not consider the thermal properties and heat transfer through organic and silt which would be expected to reduce the rate permafrost degradation. The advection of heat from flowing water through the rock drain is expected to further limit freezeback and lead to more rapid seasonal thawing at of the toe.

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Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain

Support for the initial thermal modelling and overall rock drain design approach was gathered through a literature review. A separate memorandum (memo) *"Literature Review of Rock Drains in Discontinuous Permafrost Environments"* was produced in July 2018 to document this review.

The memo *"Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain" was* prepared by Christopher Stevens, PhD, with review from John Kurylo, MSc, PEng and Maritz Rykaart, PhD, PEng.

This initial work was completed in 2017 and 2018. The final thermal memo was dated February 9, 2018.

Based on ongoing mine plan refinements, some smaller changes to the Alpha WRSF may be expected. However, at this time (June 2023), the initial thermal modelling work that was completed is still seen as relevant. The 2018 thermal memo comments on and shows the predictions for the thermal performance of the Alpha WRSF coarse rock drain design. These comments and results are still applicable.

Unfortunately, Maritz Rykaart has passed away since this initial work was completed but Christopher and John are providing signatures below, for the Coffee project record, for this past work.

Regards,
SRK Consulting (Canada) Inc.

This signature was scanned with the author's approval for use in this document; any other use is not authorized

PROFESSIONAL ENGINEER
YUKON TERRITORY
J.B. KURYLO
2023/06/07

Christopher Stevens, PhD
Associate / Senior Consultant
(Permafrost and Arctic Infrastructure)

John Kurylo, MSc, PEng
Principal Consultant
(Geotechnical / Civil)

PERMIT TO PRACTICE
Signature
Date 2023/06/07
PERMIT NUMBER: PP019
Association of Professional Engineers of Yukon

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The opinions expressed in this document have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. While SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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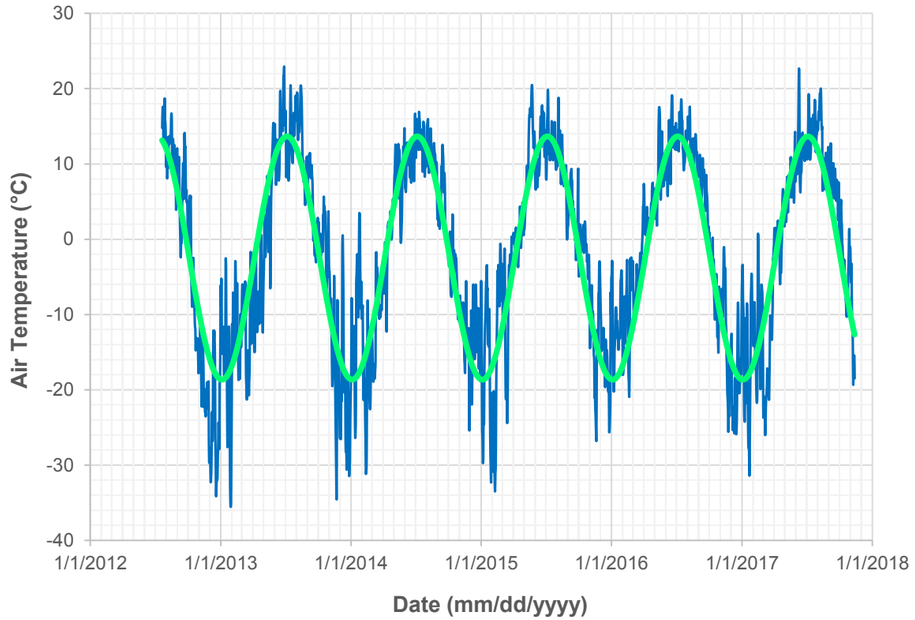
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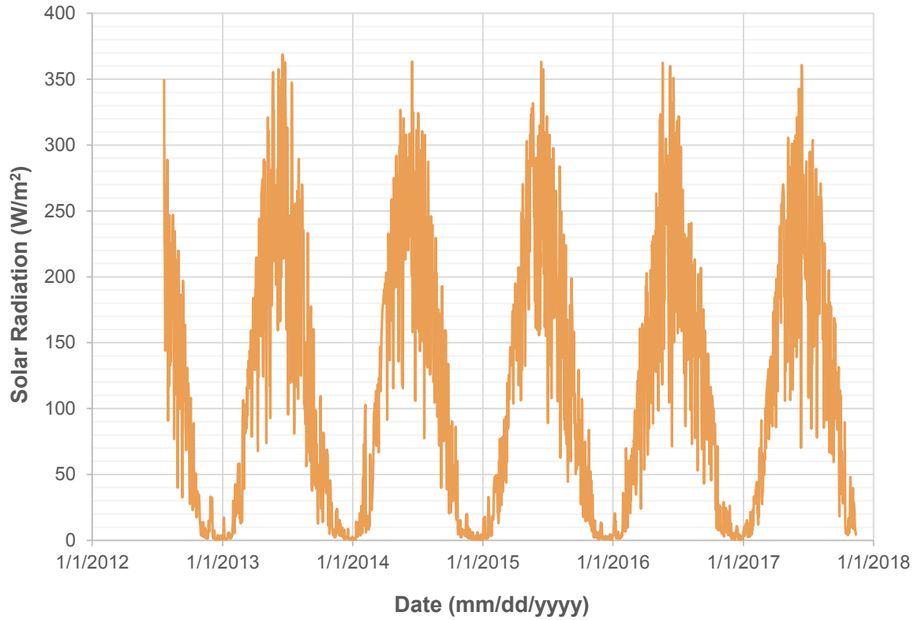
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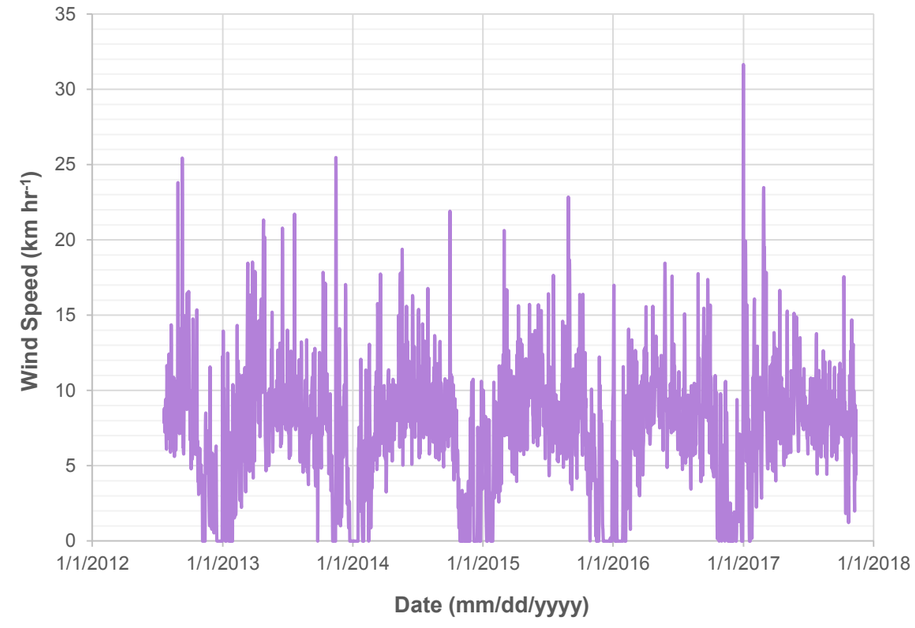
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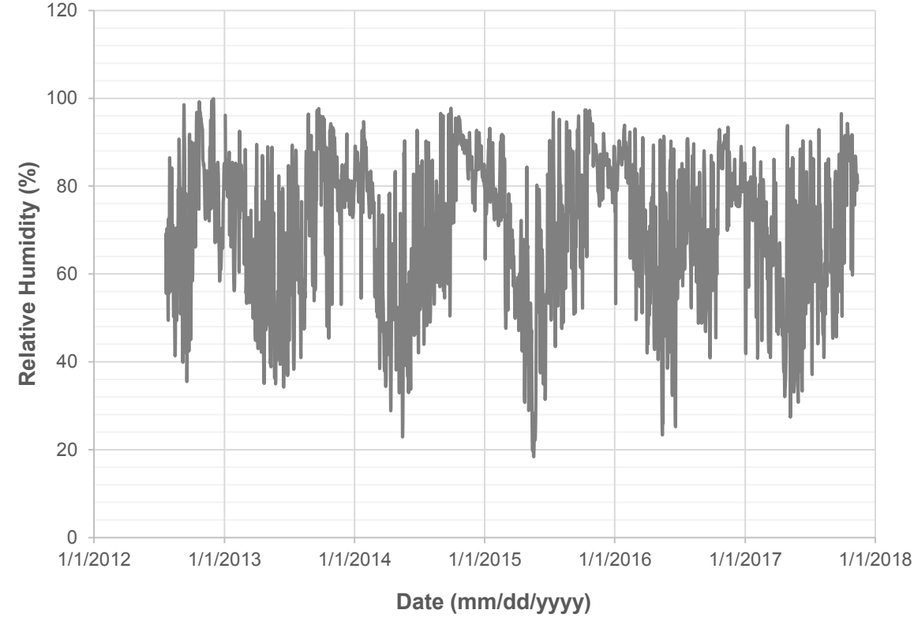
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Figures



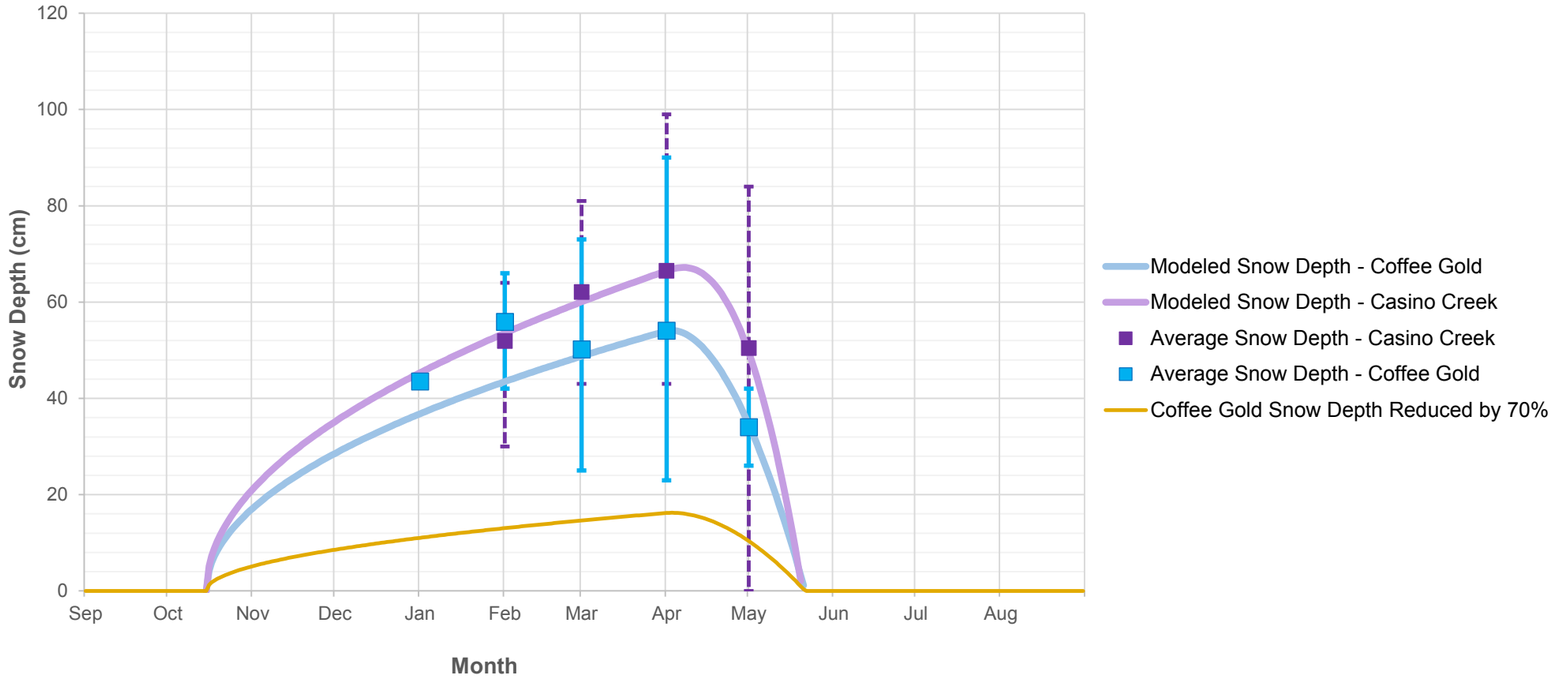






Notes:
1. Measured climate parameters from Coffee Gold meteorological station
2. Solid green line indicates modeled air temperature based on sinusoidal wave and parameterization of measured values

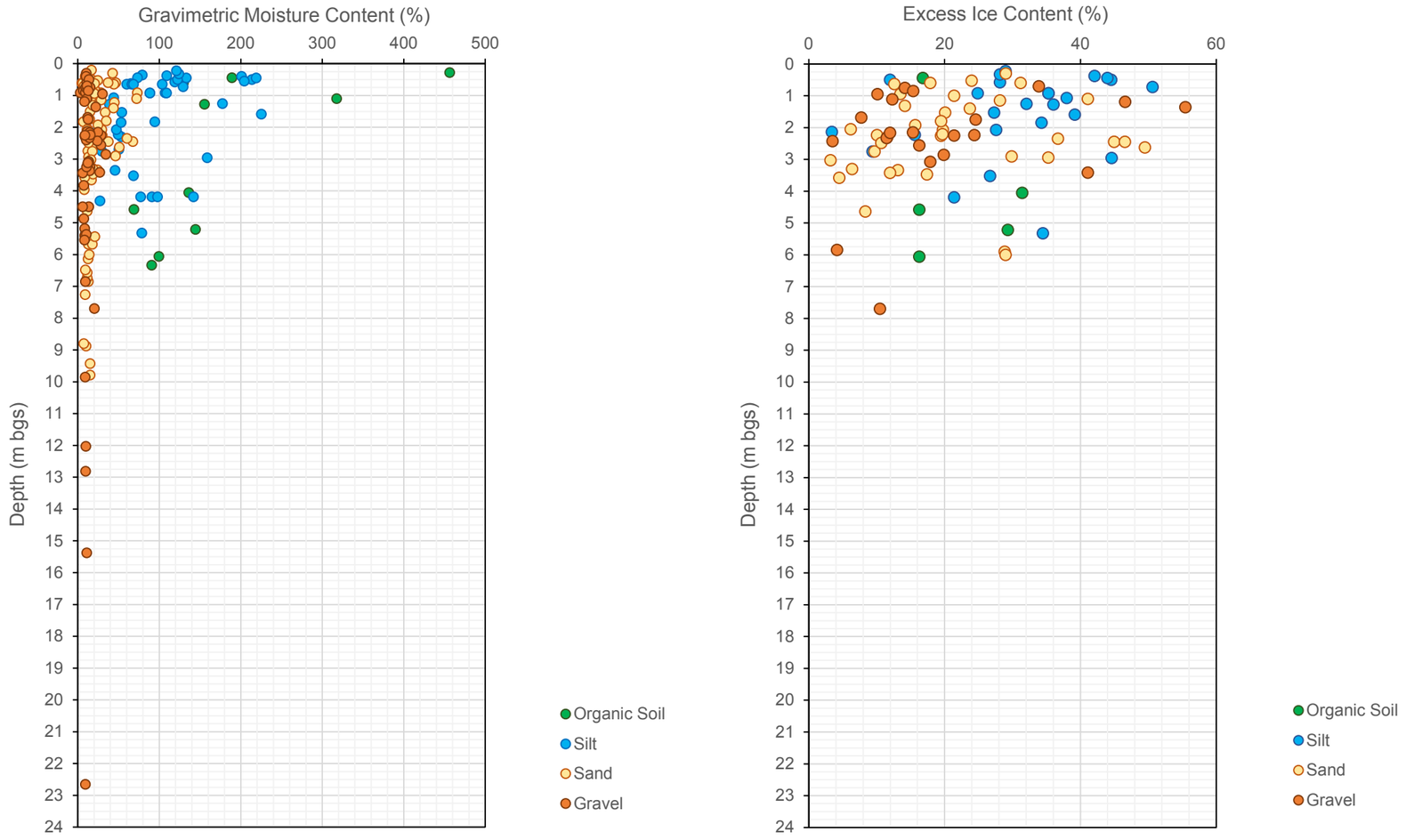
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Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Measured Meteorological Station Parameters**
		Date: 1/3/2018 | Approved: CWS | Figure: **1**



Notes:

1. Coffee Gold snow depth collected at Project site snow courses from 2012 to 2017 (Data source Lorax Environmental)
2. Casino Creek (Station ID 38N01. Elev. 1065 m asl) snow depth collected from 1977 to 2017 (Data source NRCS)
3. Bars represent the range in mean monthly values for the Project site.
4. Coffee Gold snow depth reduced by 70% used for waste rock facility surface boundary condition in thermal model

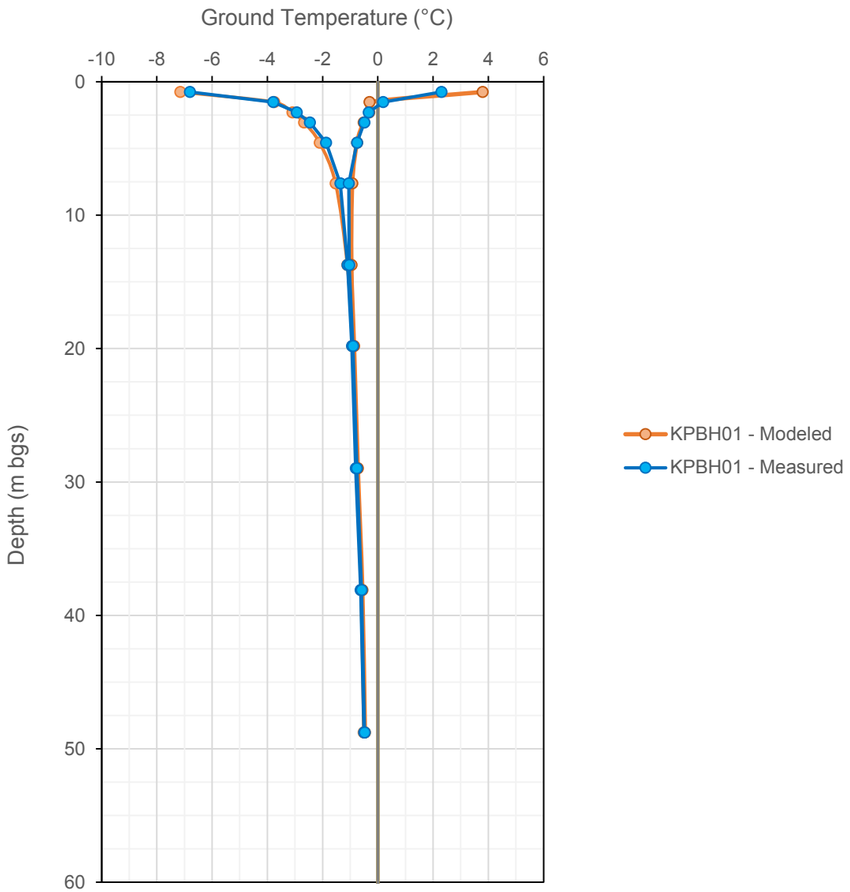
srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Measured and Modeled Snow Depth**
		Date: 1/3/2018 | Approved: CWS | Figure: **2**



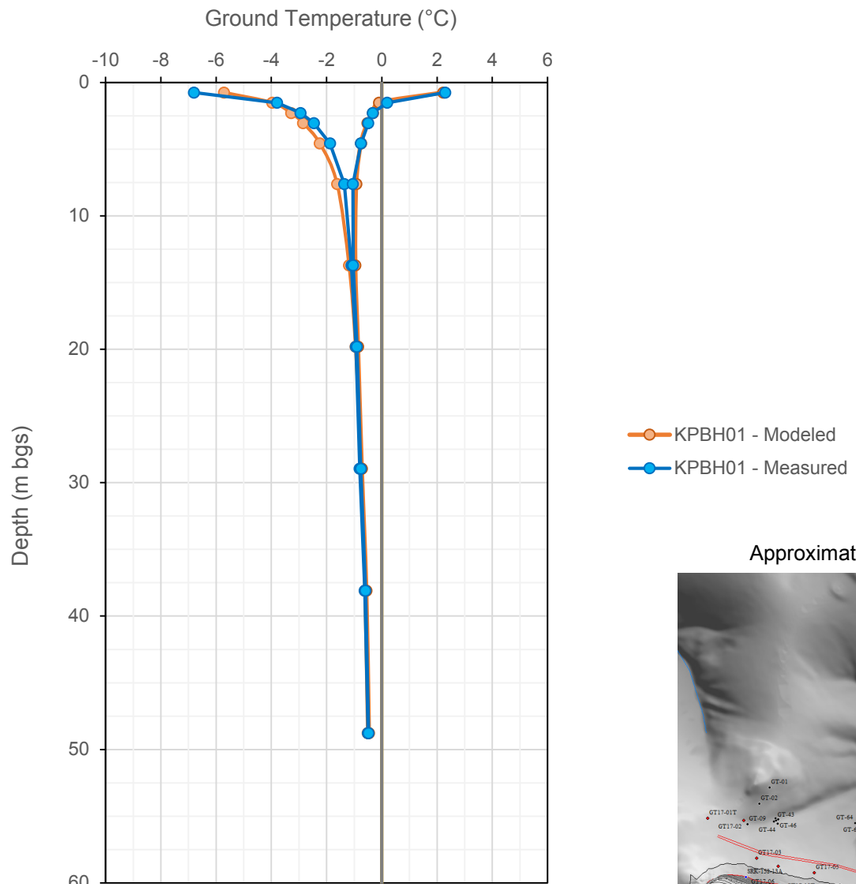
Notes:
1. Primary material type based lithological description of core and laboratory testing of soil gradation

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Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Measured Moisture Content and Excess Ice Content**
		Date: 1/3/2018 | Approved: CWS | Figure: **3**

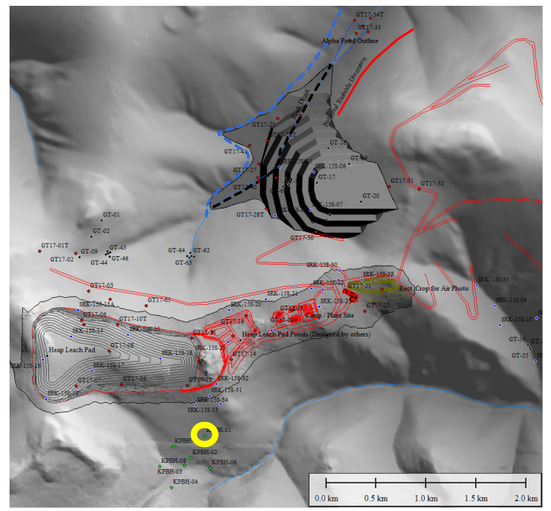
Ground Temperature Envelope
(Surface Energy Balance Model with Meteorological Inputs)



Ground Temperature Envelope
(Surface Boundary Established with N-factors)



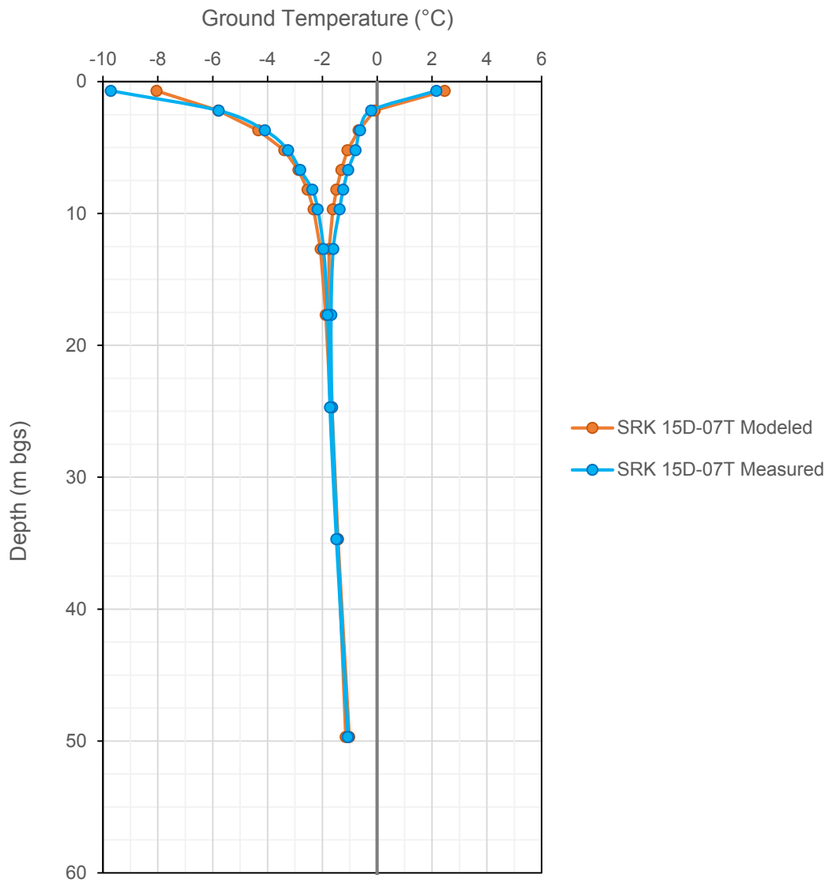
Approximate location of KPB01 (yellow circle)



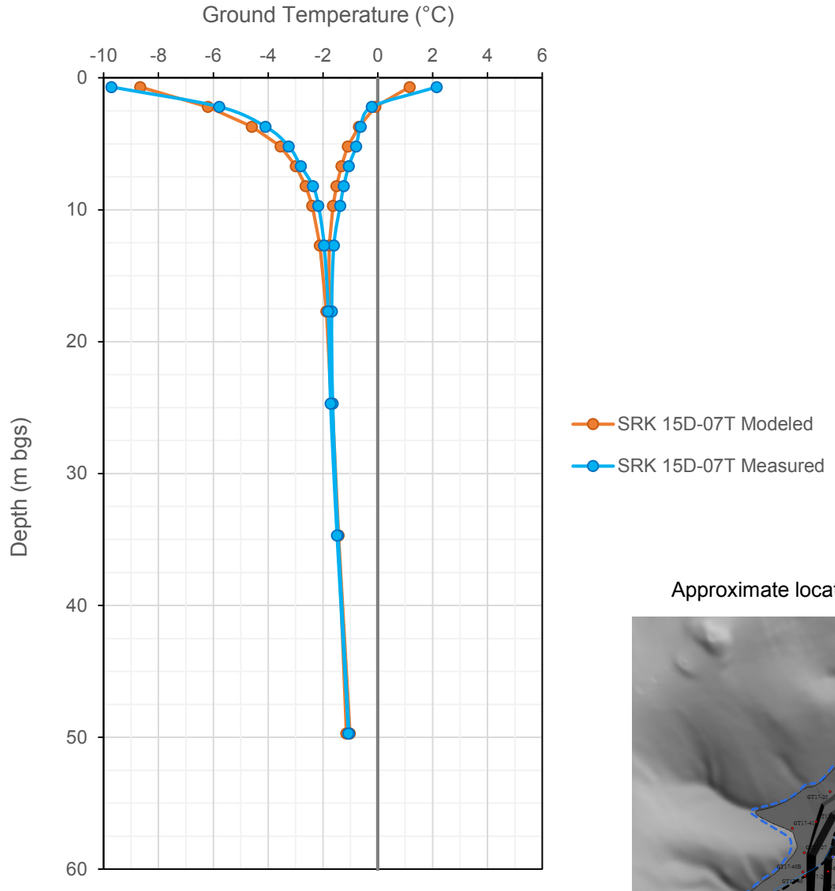
Notes:
1. Borehole drilled and ground temperature cable installed in 2014 (KP 2015).
2. Ground temperature envelope based on minimum and maximum ground temperature.

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Calibration Site (KP-BH01) – Modeled vs Measured Temperature**
		Date: 1/3/2018 | Approved: CWS | Figure: **4**

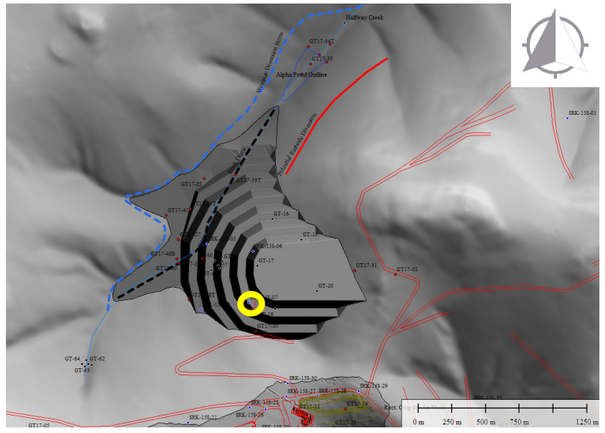
Ground Temperature Envelope
(Surface Energy Balance Model with Meteorological Inputs)



Ground Temperature Envelope
(Surface Boundary Established with N-factors)

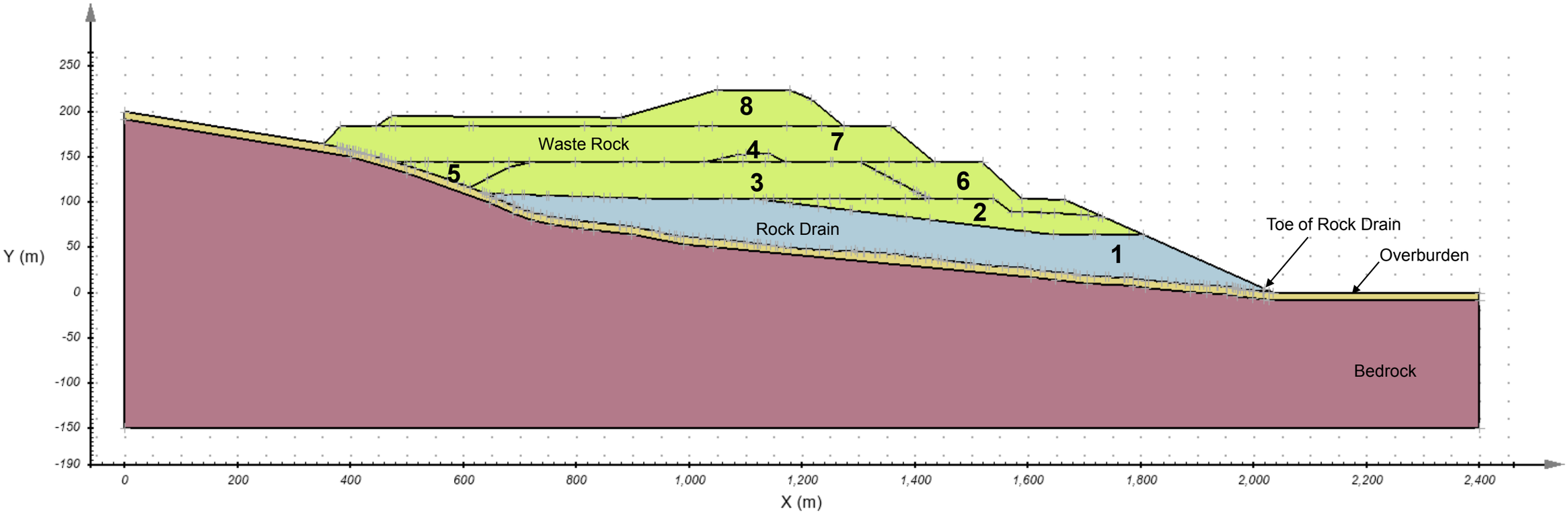


Approximate location of SRK 15D-07T (yellow circle)



Notes:
1. Ground temperature envelope based on minimum and maximum ground temperature.

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Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Calibration Site (SRK-15D-07T) – Modeled vs Measured Temperature**
		Date: 1/3/2018 | Approved: CWS | Figure: **5**



Polygon 1 = Year 0 to 3
Polygon 2 = Year 3 to 4
Polygon 3 = Year 4 to 5
Polygon 4 = Year 5 to 6

Polygon 5 = Year 6 to 7
Polygon 6 = Year 7 to 8
Polygon 7 = Year 8 to 9
Polygon 8 = Year 9 to 11

Waste Rock
Rock Drain
Overburden
Bedrock

Notes:
1. Model domain at end of operation for thermal conduction model without consideration for water flow through rock drain

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Job No: 1CJ004.012
Filename: SiteWideThermalModelingFigures.pptx

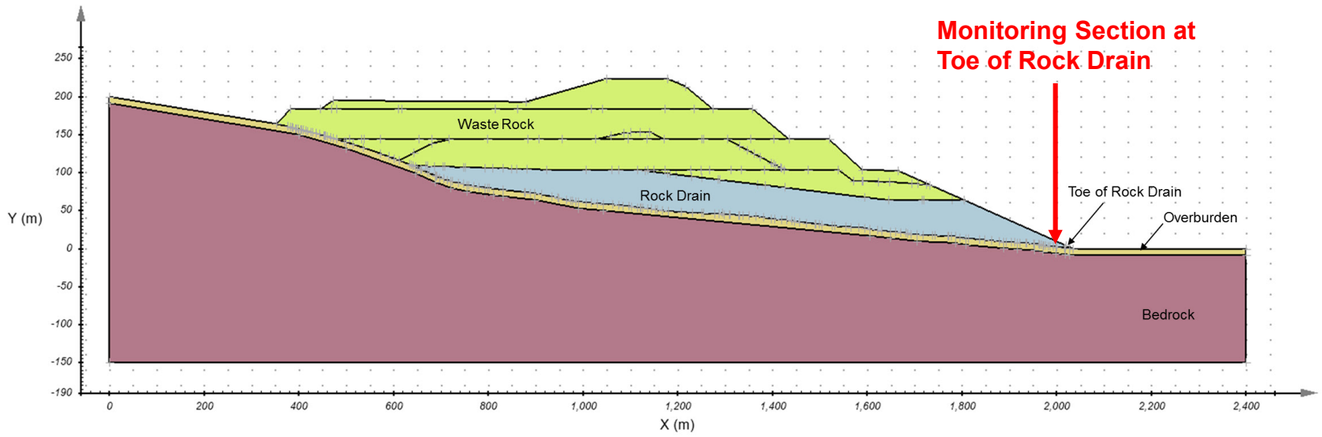
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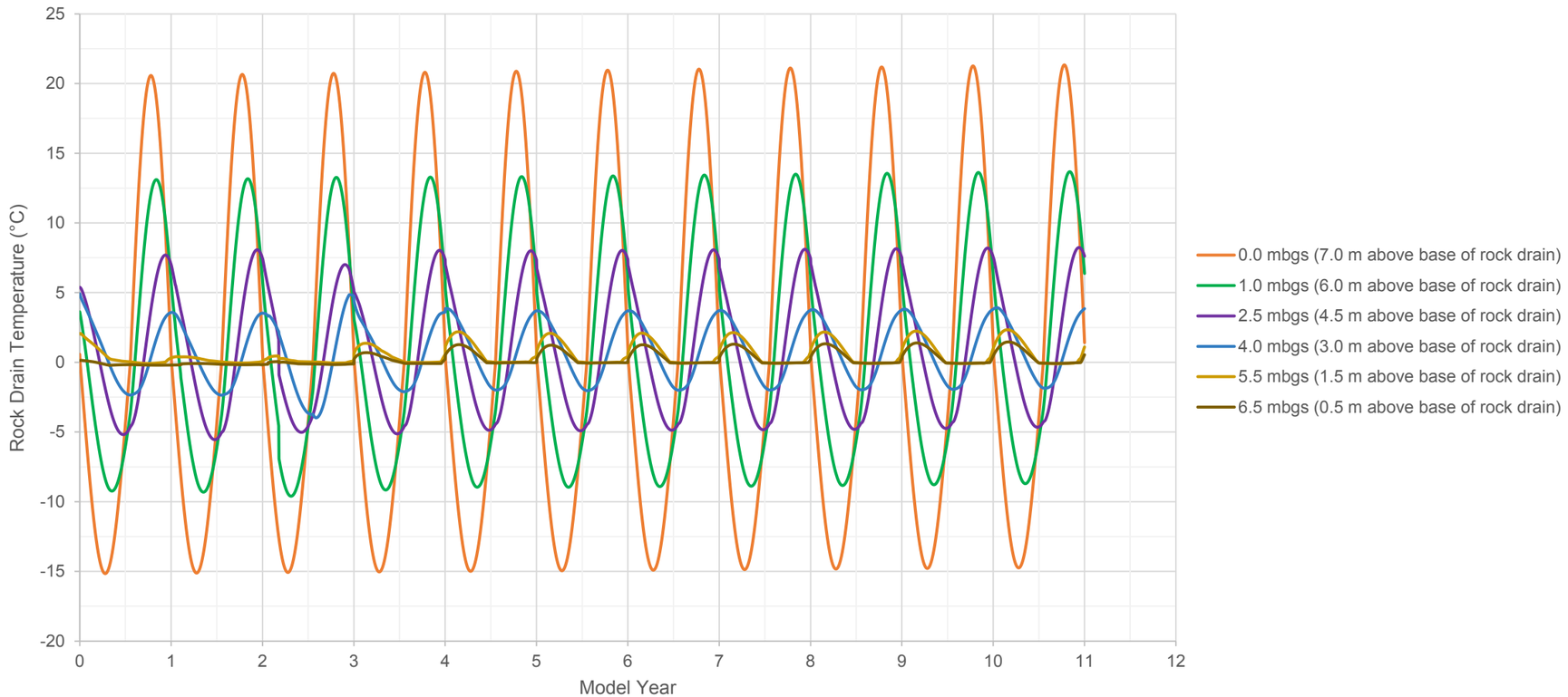
Coffee Gold Project

Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain

Model Domain – Waste Rock Drain Thermal Conduction Model

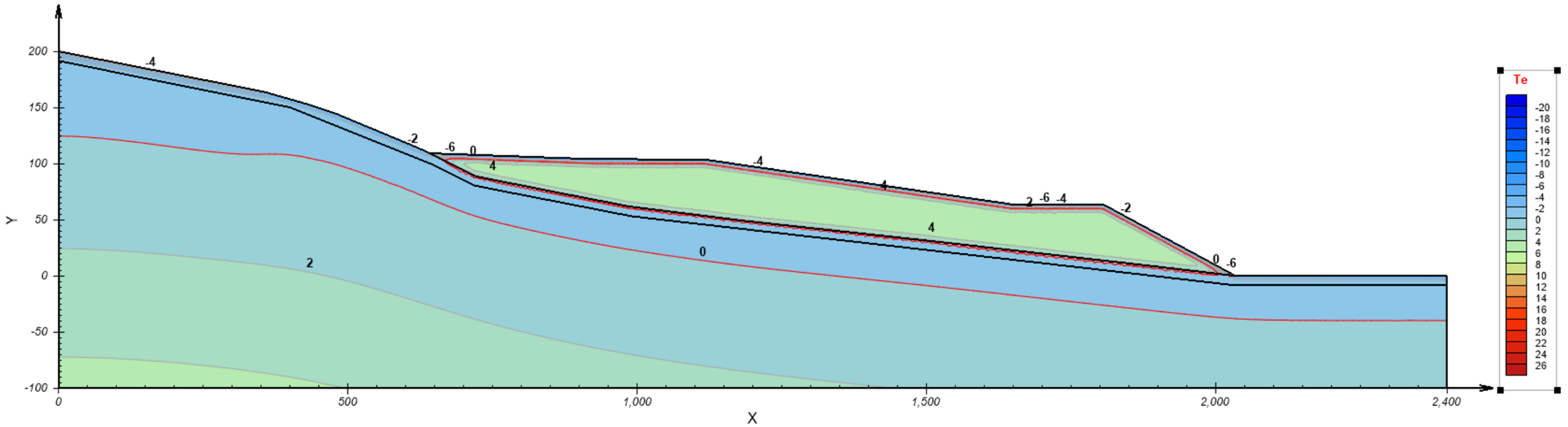
Date:	Approved:	Figure:
1/3/2018	CWS	**6**

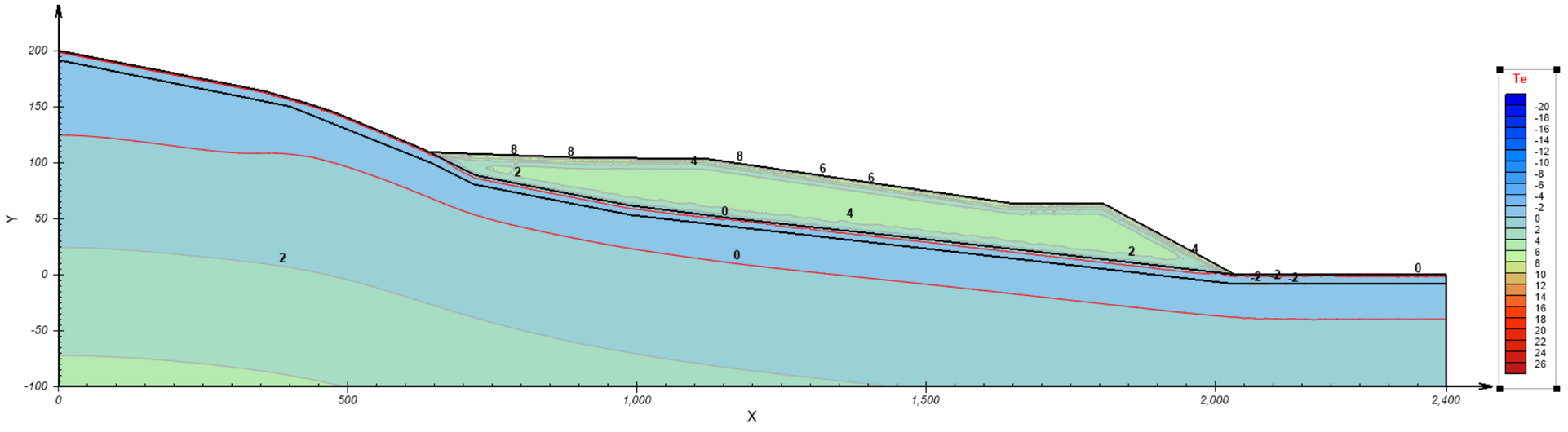




Notes:
1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Initial rock drain and waste rock temperature of +5°C
3. Temperature reported at toe of rock drain as indicated on model domain with red arrow
4. Depth below rock drain surface reports as meters below ground surface (mbgs)

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Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Thermal Conduction Model – Initial Rock Temperature of +5°C**
		Date: 1/3/2018 | Approved: CWS | Figure: **7**

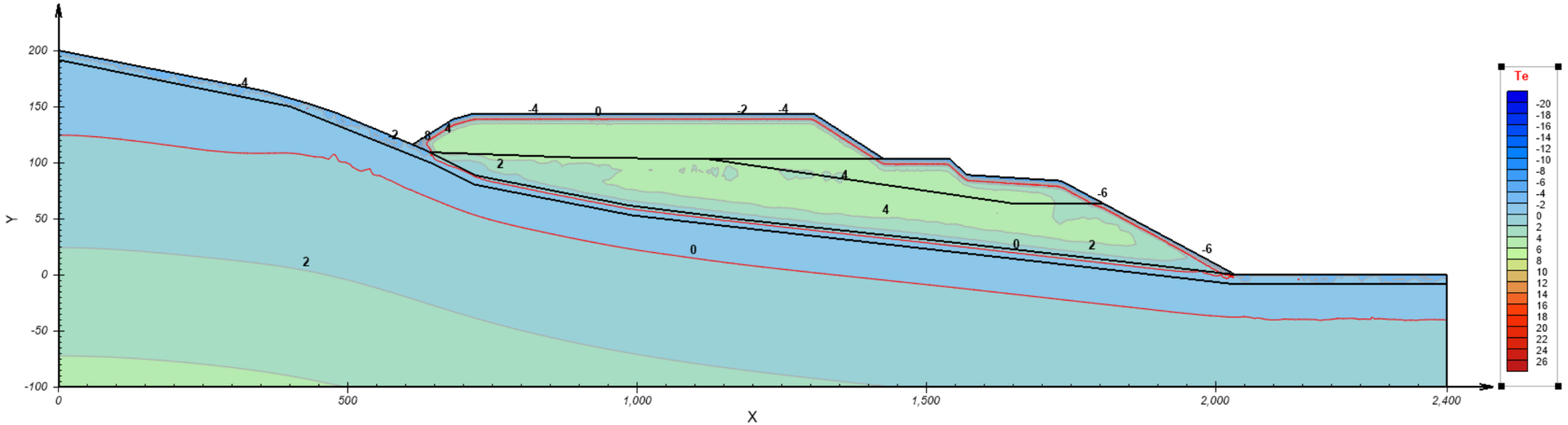


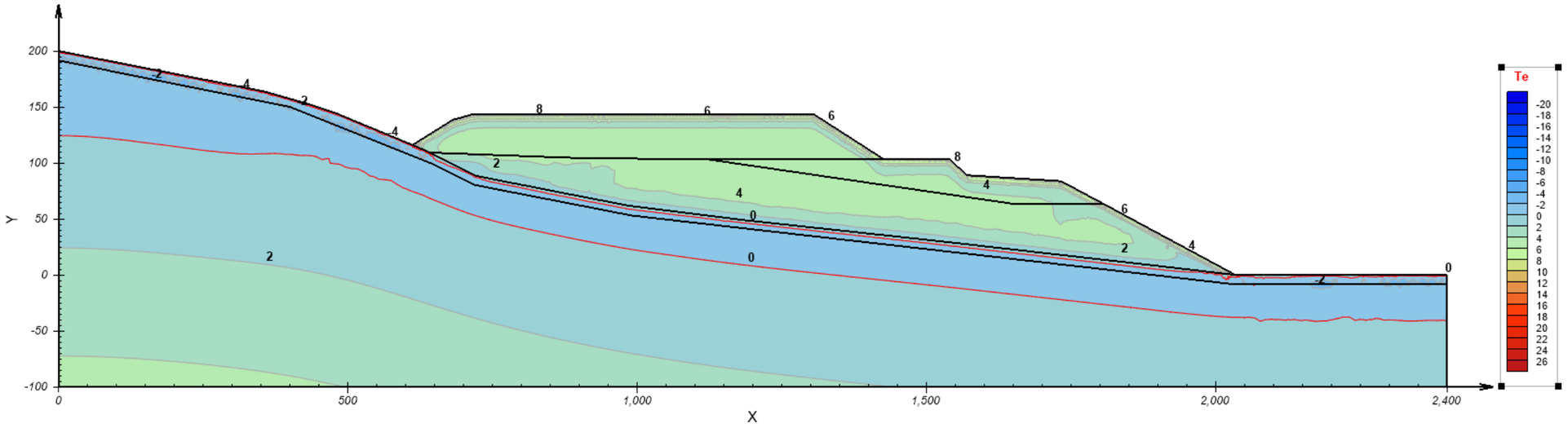


Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Initial rock drain and waste rock temperature of +5°C
3. Solid red line indicates 0°C isotherm

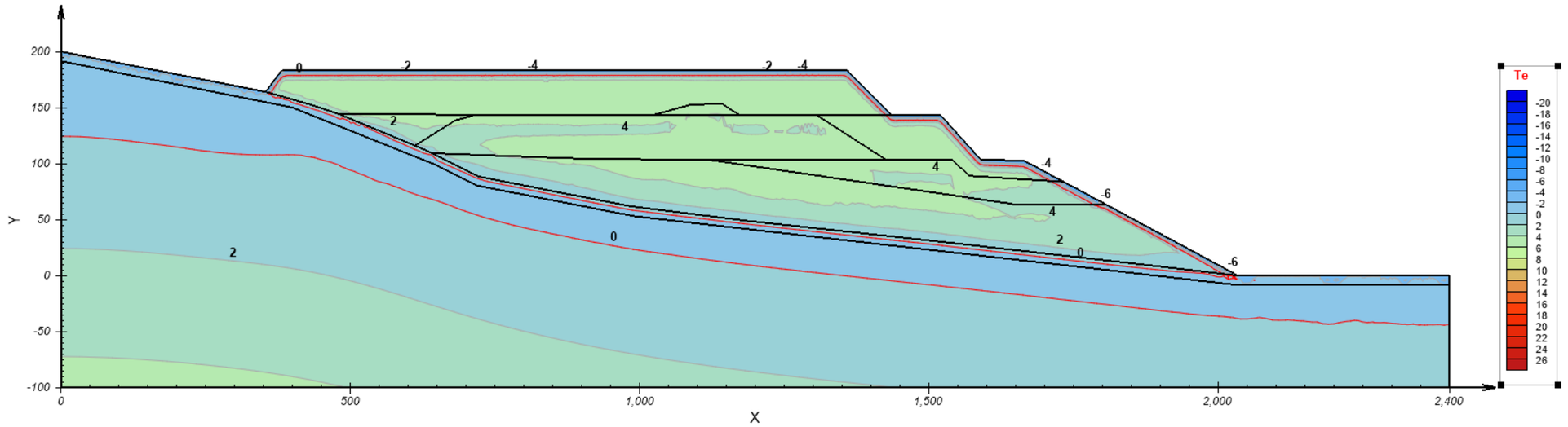
srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Model Results – Year 1 Initial Rock Temperature of +5°C**
		Date: 1/3/2018 | Approved: CWS | Figure: **8**

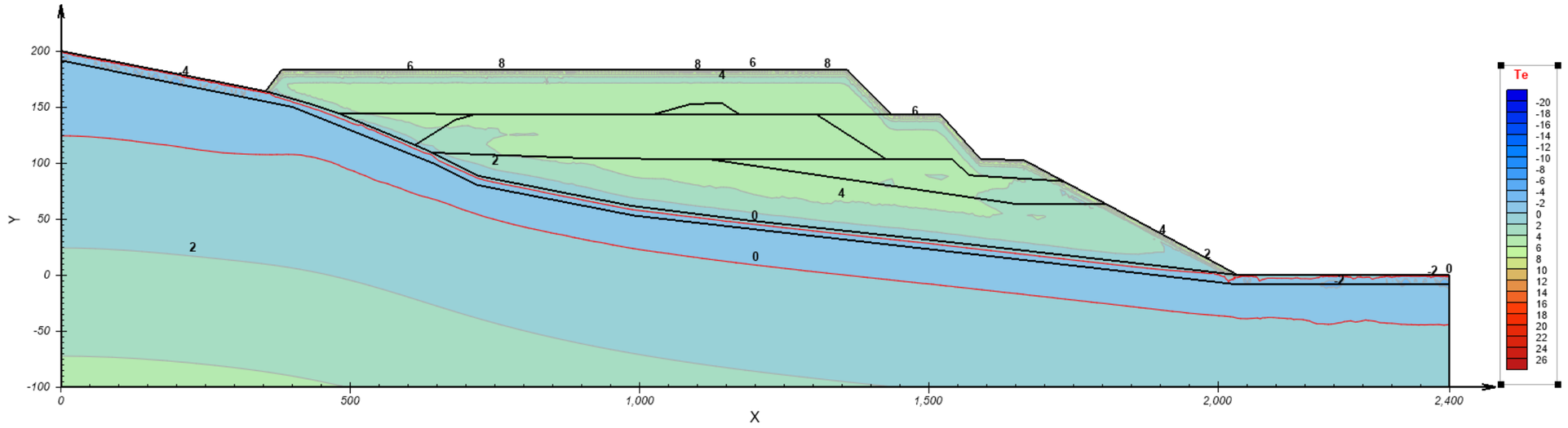




Notes:
1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Initial rock drain and waste rock temperature of +5°C
3. Solid red line indicates 0°C isotherm

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Model Results – Year 4 to 5 Initial Rock Temperature of +5°C**
		Date: 1/3/2018 | Approved: CWS | Figure: **9**

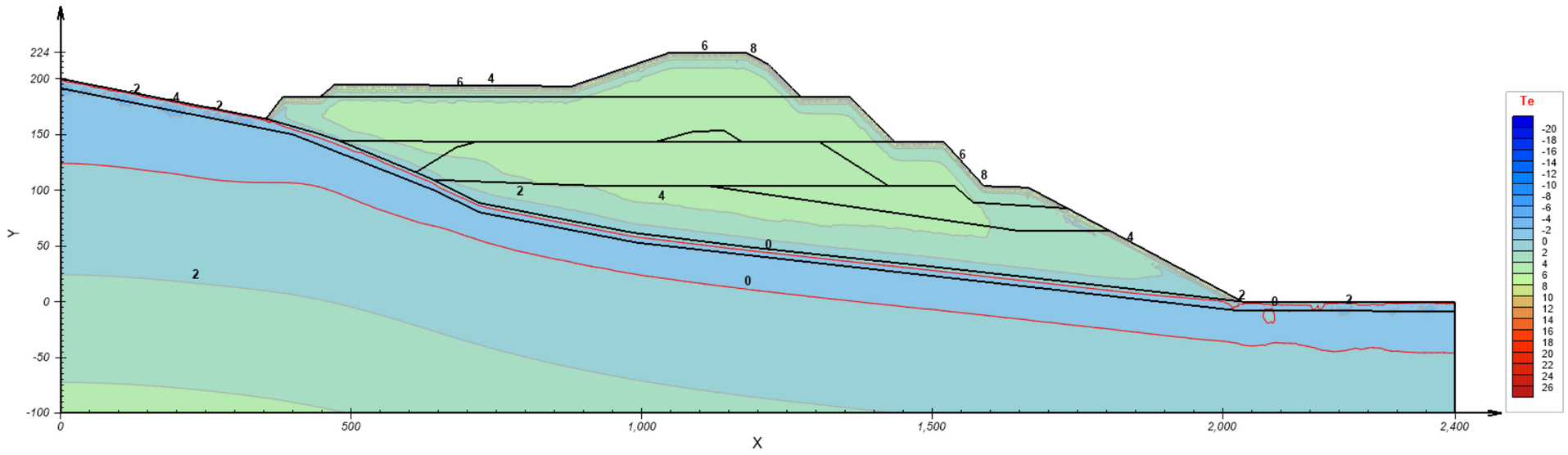




Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Initial rock drain and waste rock temperature of +5°C
3. Solid red line indicates 0°C isotherm

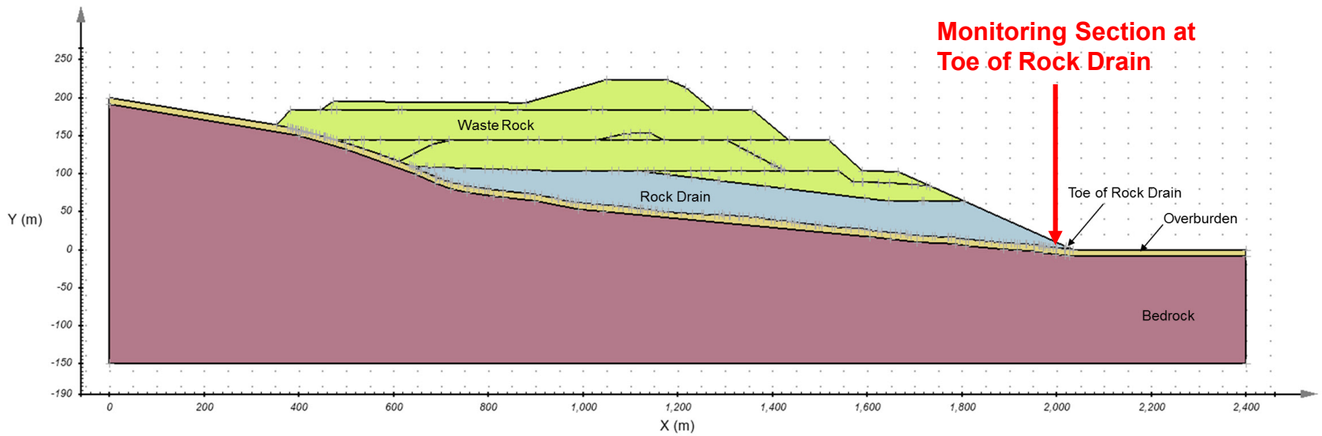
srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Model Results – Year 8 to 9 Initial Rock Temperature of +5°C**
		Date: 1/3/2018 | Approved: CWS | Figure: **10**

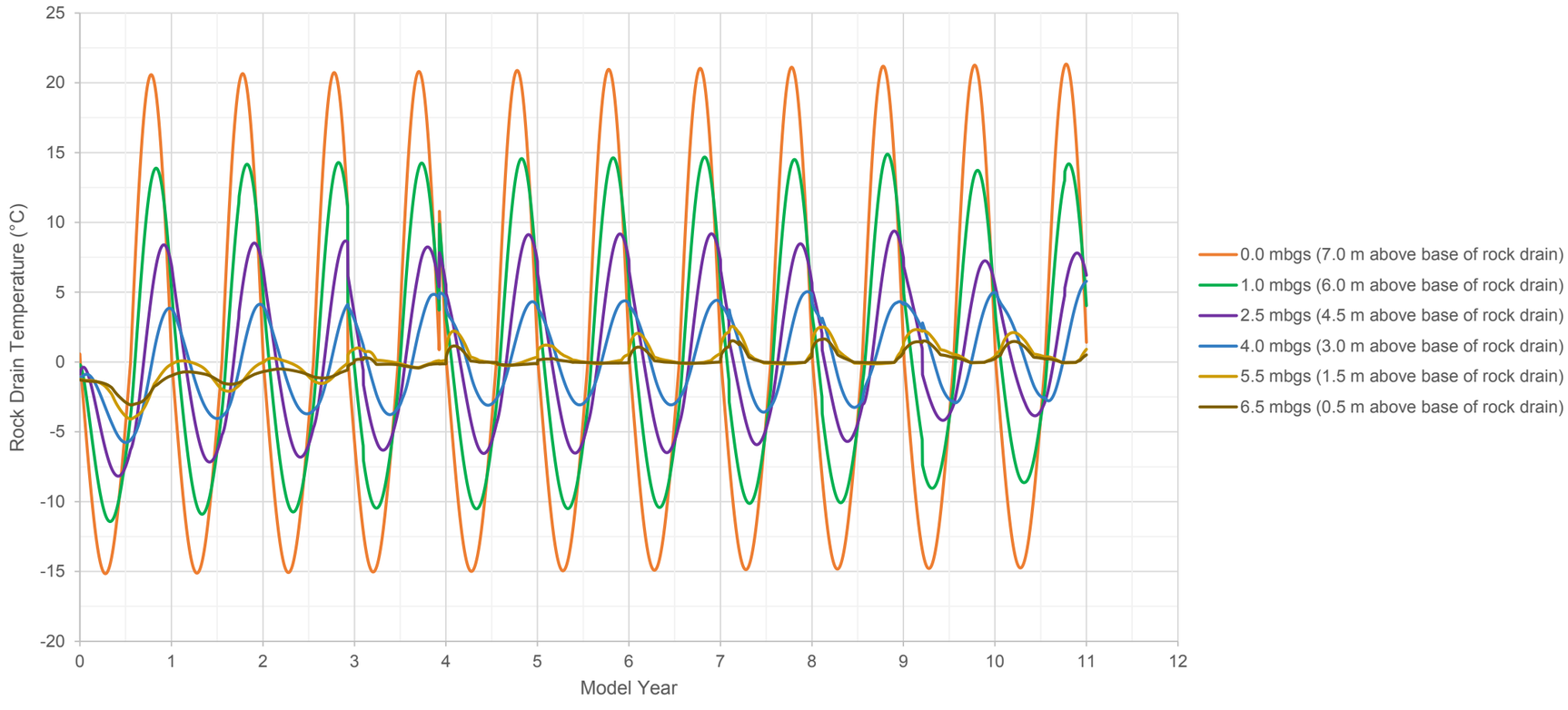


Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Initial rock drain and waste rock temperature of +5°C
3. Solid red line indicates 0°C isotherm

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Model Results – Year 11 Initial Rock Temperature of +5°C**
		Date: 1/3/2018 | Approved: CWS | Figure: **11**

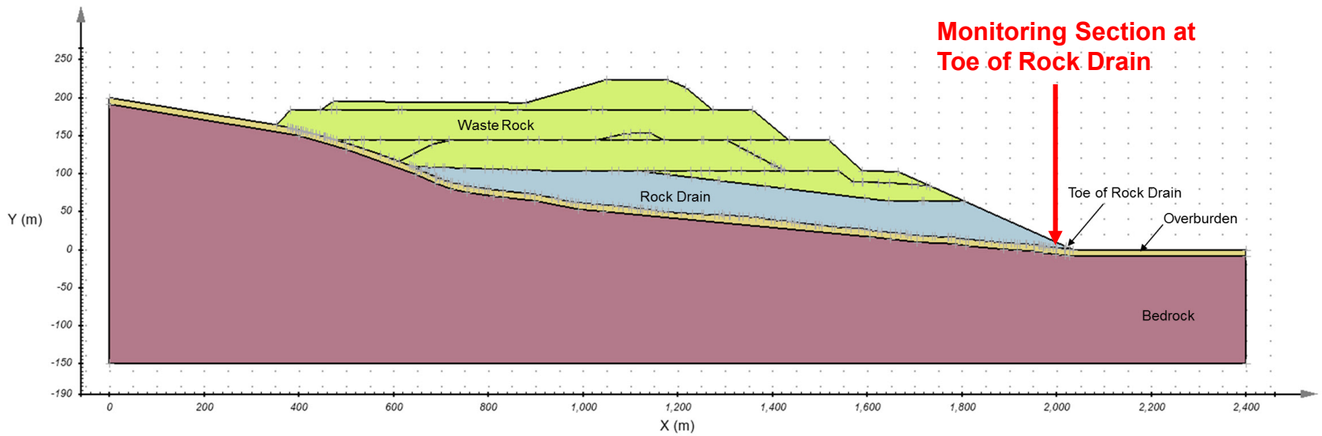


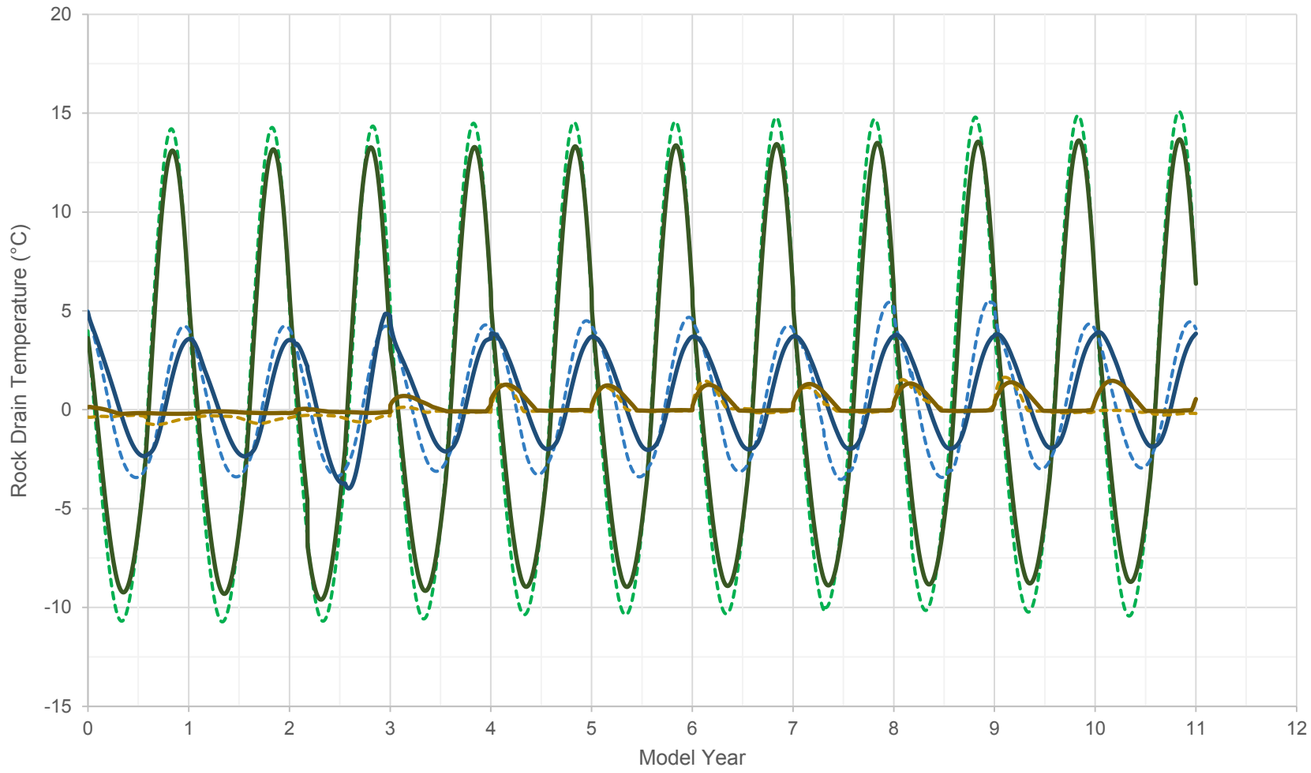


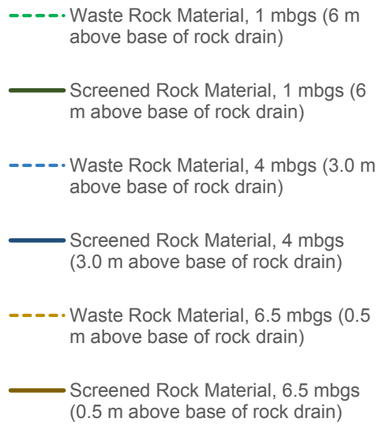
Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Initial rock drain and waste rock temperature of -1°C
3. Temperature reported at toe of rock drain as indicated on model domain with red arrow
4. Depth below rock drain surface reports as meters below ground surface (mbgs)

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Thermal Conduction Model – Initial Rock Temperature of -1°C**
		Date: 1/3/2018 | Approved: CWS | Figure: **12**







Notes:
1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Model results for rock drain constructed of waste rock vs screened rock material
3. Initial rock drain and waste rock temperature of +5°C
4. Temperature reported at toe of rock drain as indicated on model domain with red arrow

srk consulting

Job No: 1CJ004.012
Filename: SiteWideThermalModelingFigures.pptx

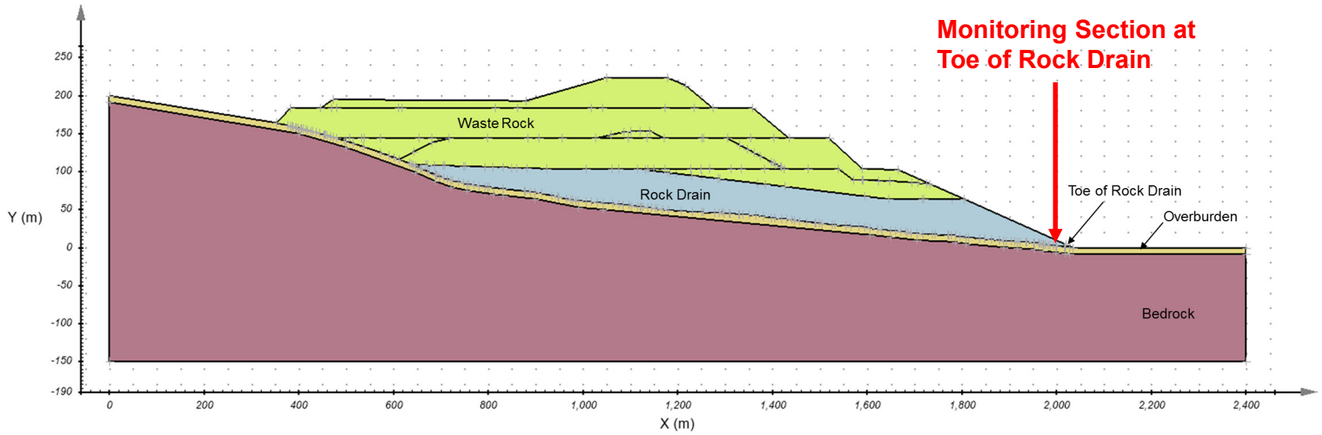
JDS Energy & Mining Inc.

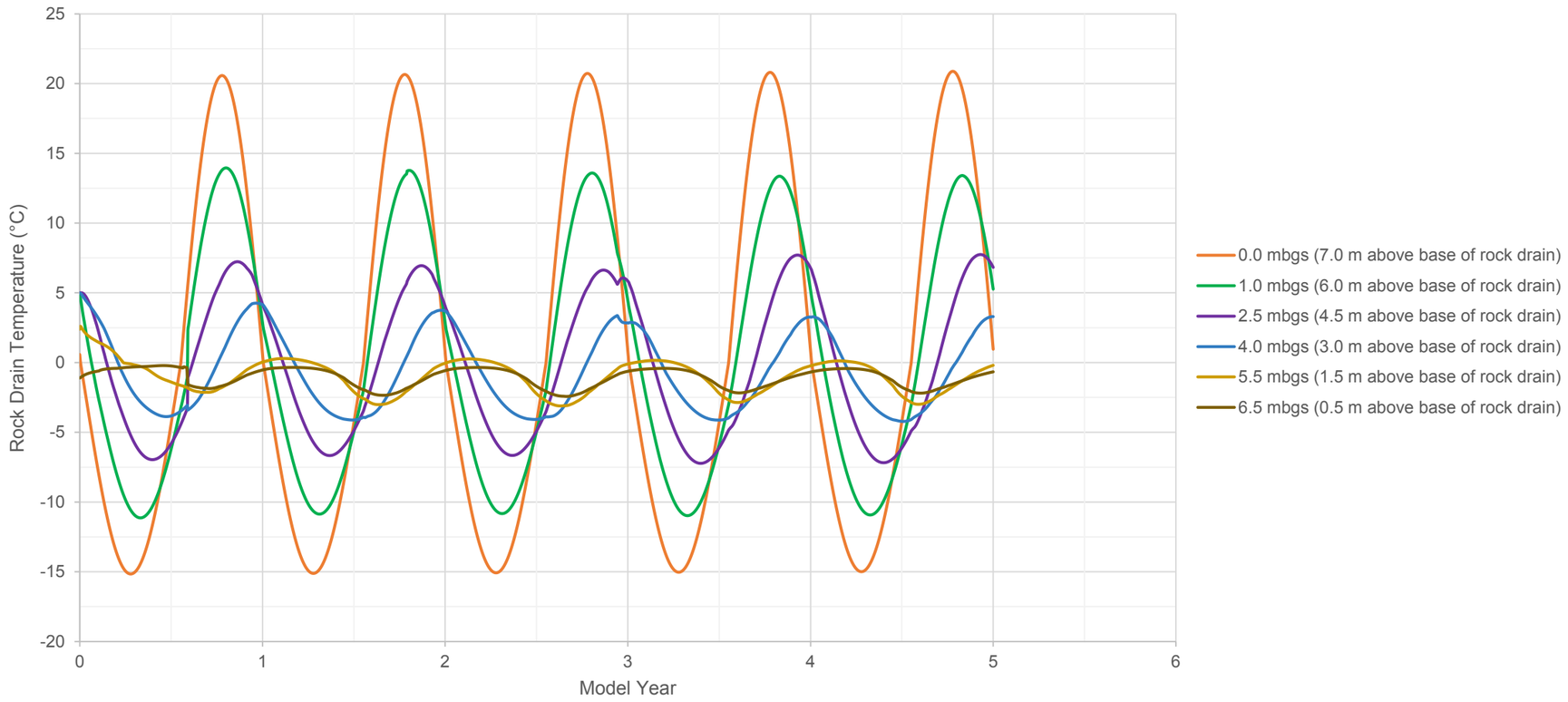
Coffee Gold Project

Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain

Comparison Rock Drain Constructed of Waste Rock vs. Screened Rock

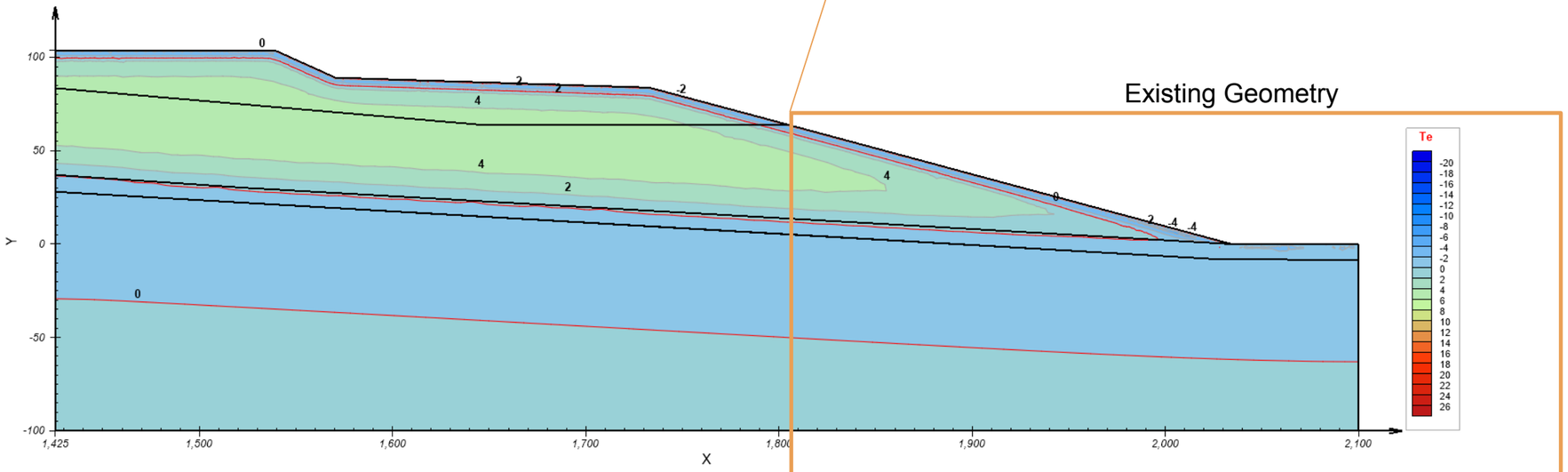
Date:	Approved:	Figure:
1/3/2018	CWS	**13**





Notes:
1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Model results for rock drain constructed of screened rock material
3. Initial rock drain and waste rock temperature of +5°C
4. Rock drain toe assumes complete saturation of material

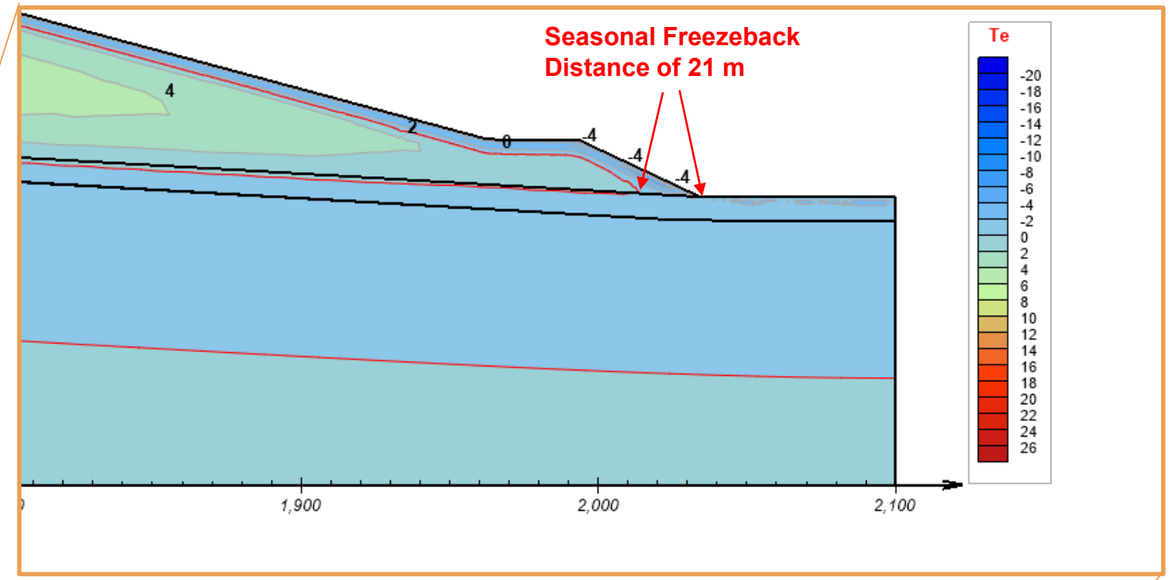
srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Thermal Conduction Model – Ice Statured Rock Drain Toe**
		Date: 1/3/2018 | Approved: CWS | Figure: **14**

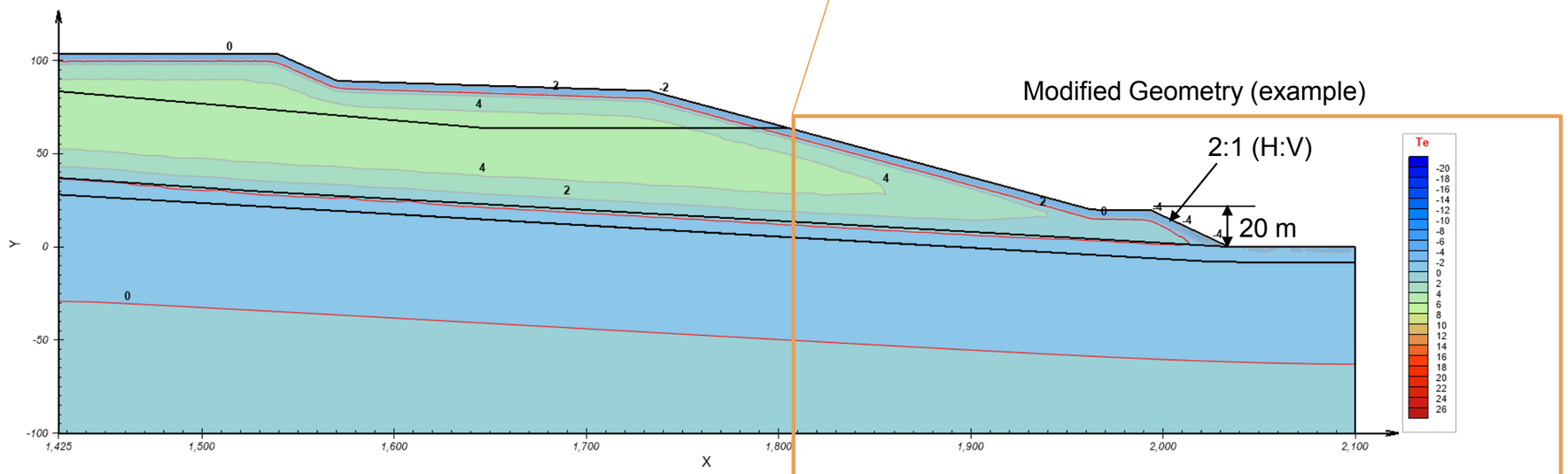


Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Model result for Year 5
3. Initial rock drain and waste rock temperature of +5°C
4. Solid red line indicates 0°C isotherm

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Seasonal Freezeback Existing Geometry of WRSF Toe**
		Date: 1/3/2018 | Approved: CWS | Figure: **15**

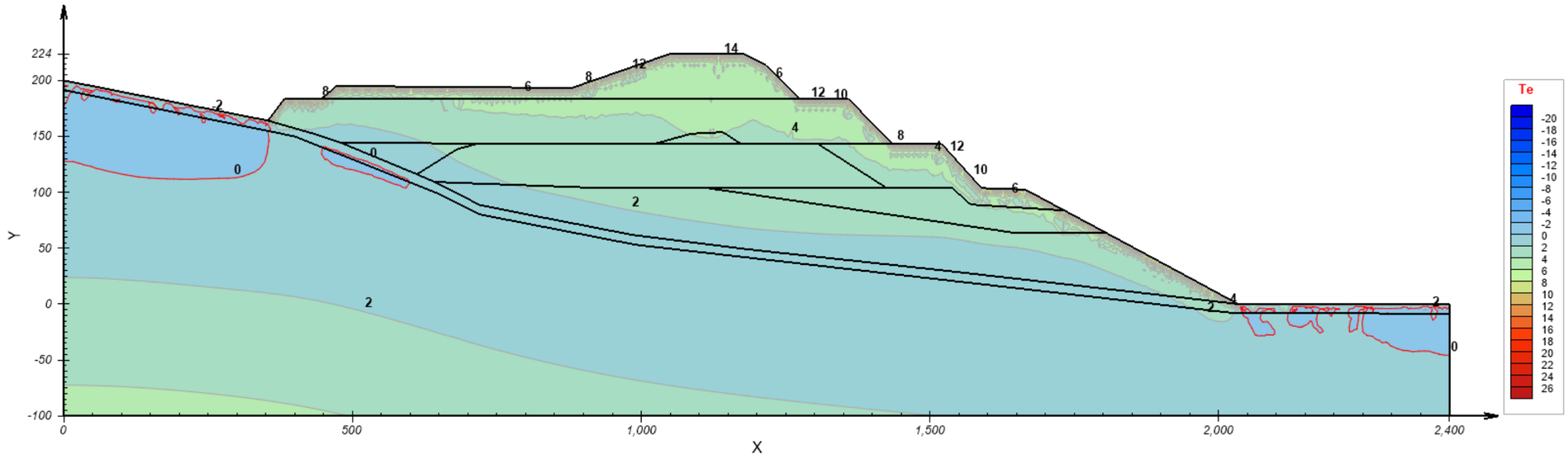




Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Model result for Year 5
3. Initial rock drain and waste rock temperature of +5°C
4. Solid red line indicates 0°C isotherm

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	**Seasonal Freezeback Modified Geometry of WRSF Toe**
		Date: 1/3/2018 | Approved: CWS | Figure: **16**



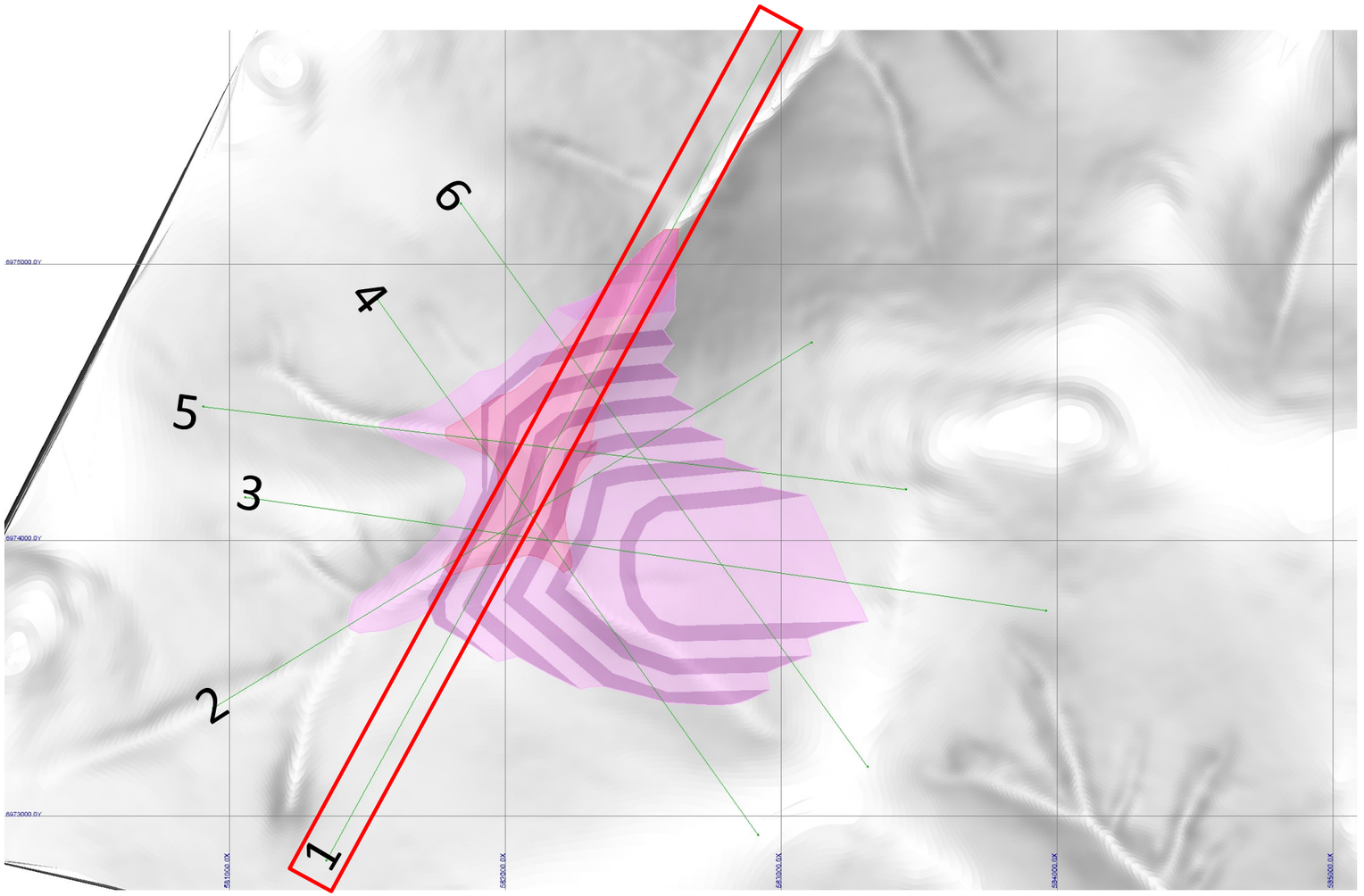
Notes:

1. Model results for thermal conduction model without consideration for water flow through rock drain
2. Model Year 82 is equivalent to the calendar year 2100
3. Initial rock drain and waste rock temperature of +5°C
4. Solid red line indicates 0°C isotherm

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
		Model Results – Year 82
Job No: 1CJ004.012 Filename: SiteWideThermalModelingFigures.pptx	Coffee Gold Project	Date: 1/3/2018 · Approved: CWS · Figure: **17**

Attachment A – Alpha WRSF Sequencing

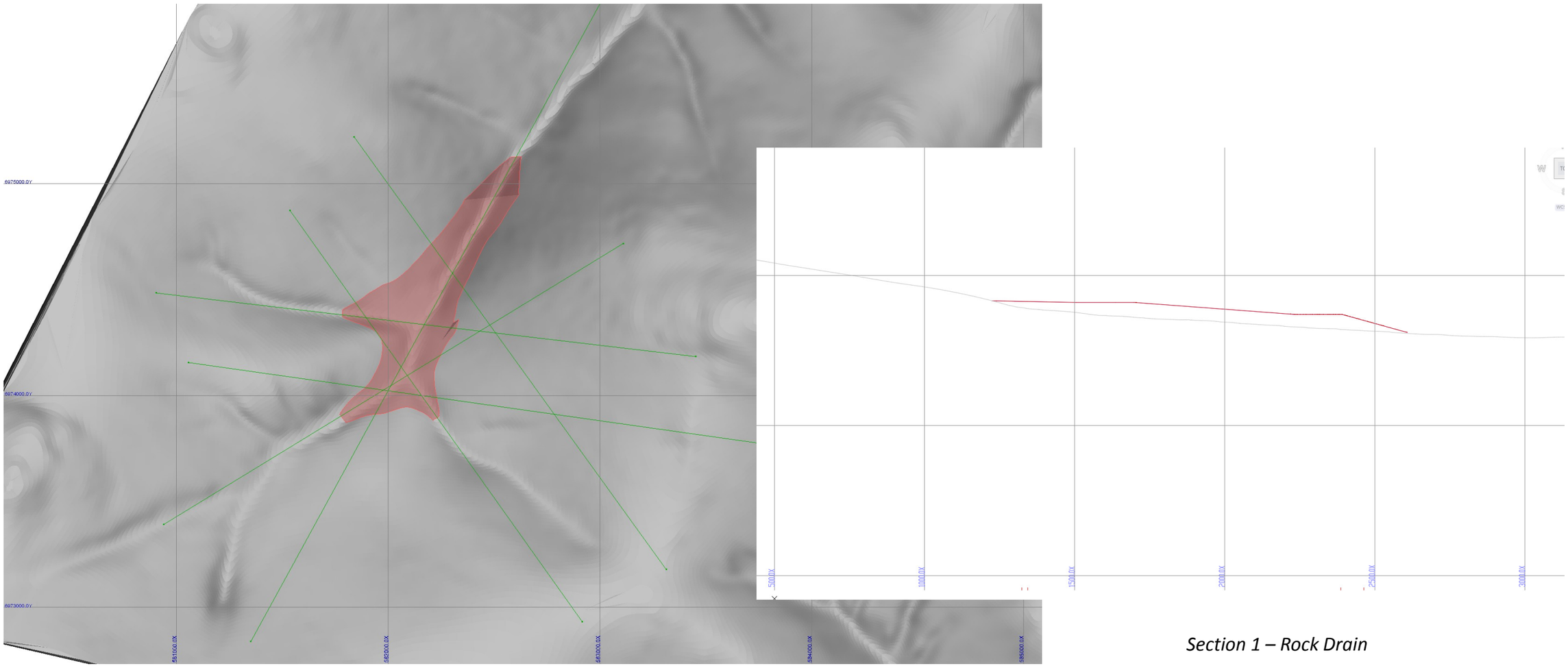
Section 1 – Selected for thermal modelling



Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Section Locations**
		Date: 1/10/2018 | Approved: JBK | Figure: **A.1**

Year 0



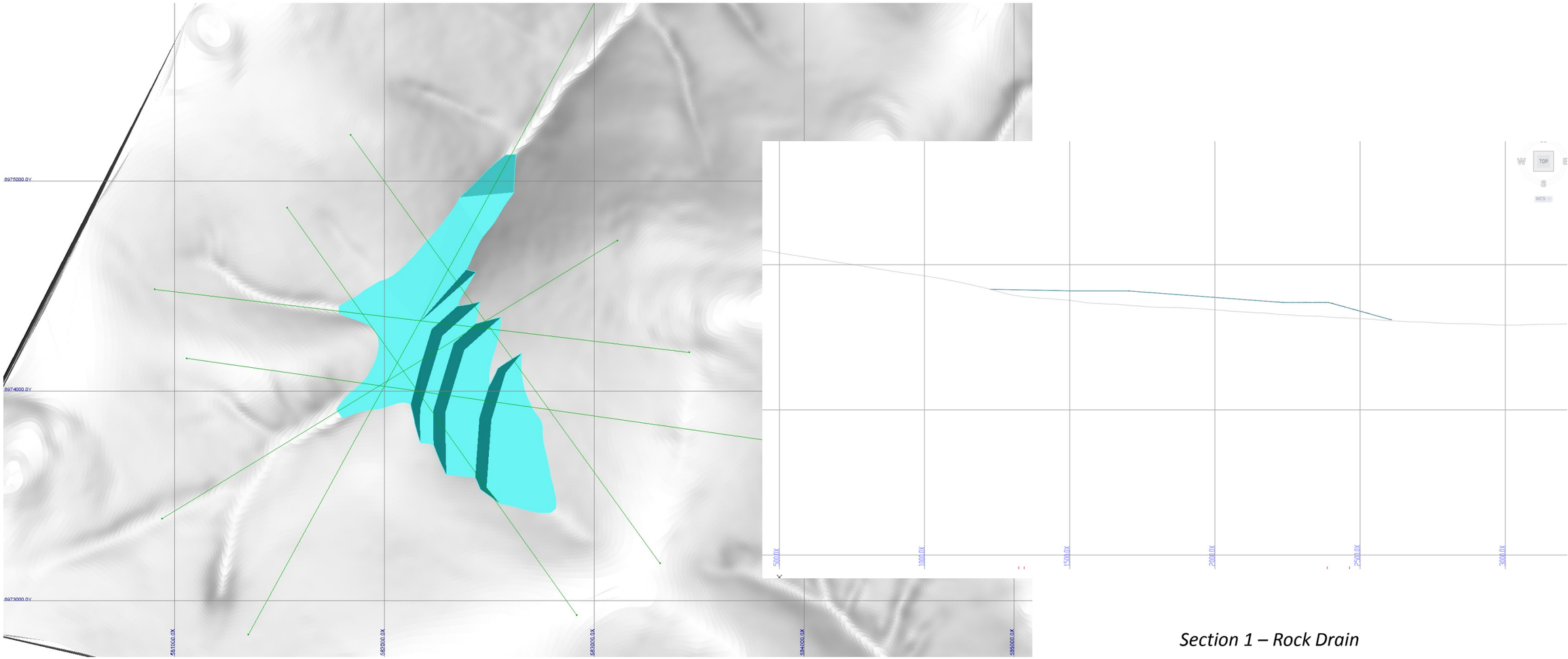
Section 1 – Rock Drain

Notes:

- *Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'*
- *Section line 1 2 (i.e. the rock drain thermal modelling section), shows no changes for Year 0, 1, and 2 as the main dump development over these years is east of the section location.*

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
		Alpha WRSF Year 0
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	Date: 1/10/2018 · Approved: JBK · Figure: **A.2**

Year 1



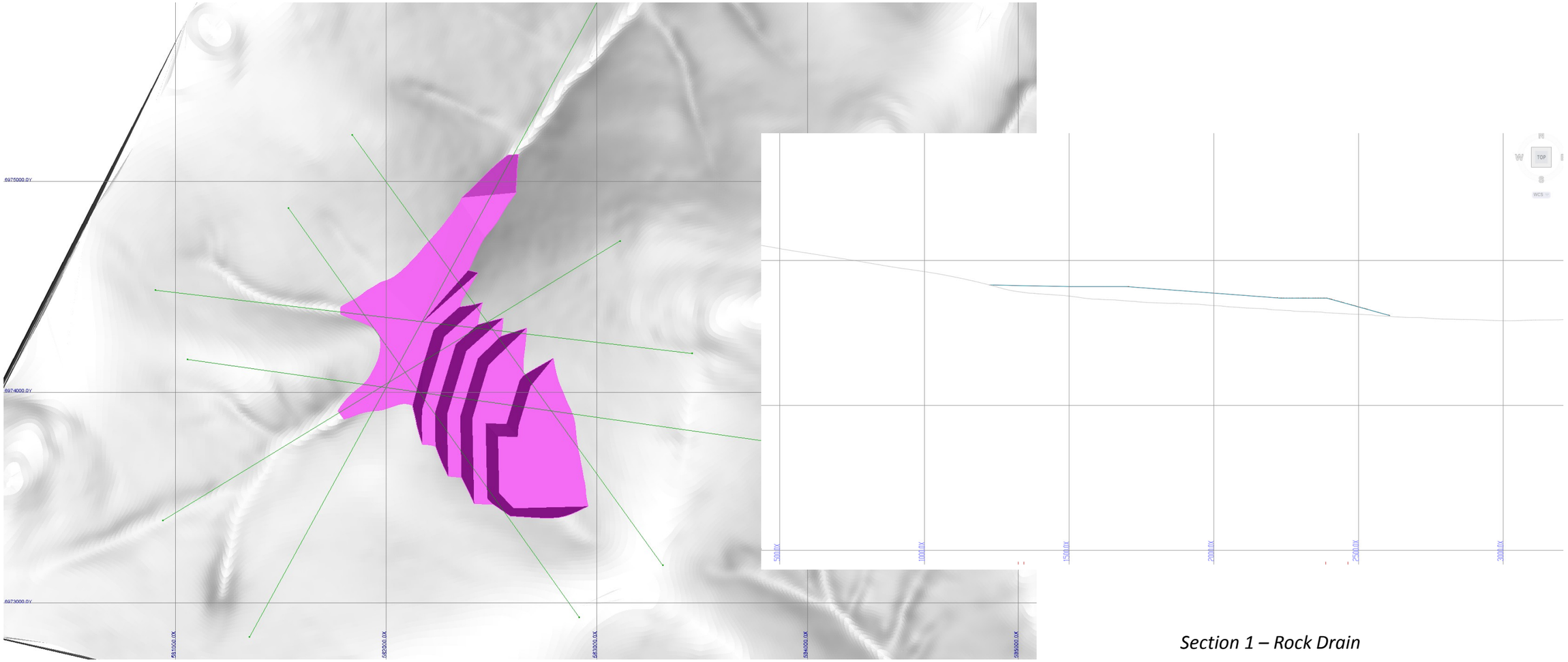
Section 1 – Rock Drain

Notes:

- *Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'*
- *Section line 1 2 (i.e. the rock drain thermal modelling section), shows no changes for Year 0, 1, and 2 as the main dump development over these years is east of the section location.*

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 1** Date: 1/10/2018 · Approved: JBK · Figure: **A.3**

Year 2



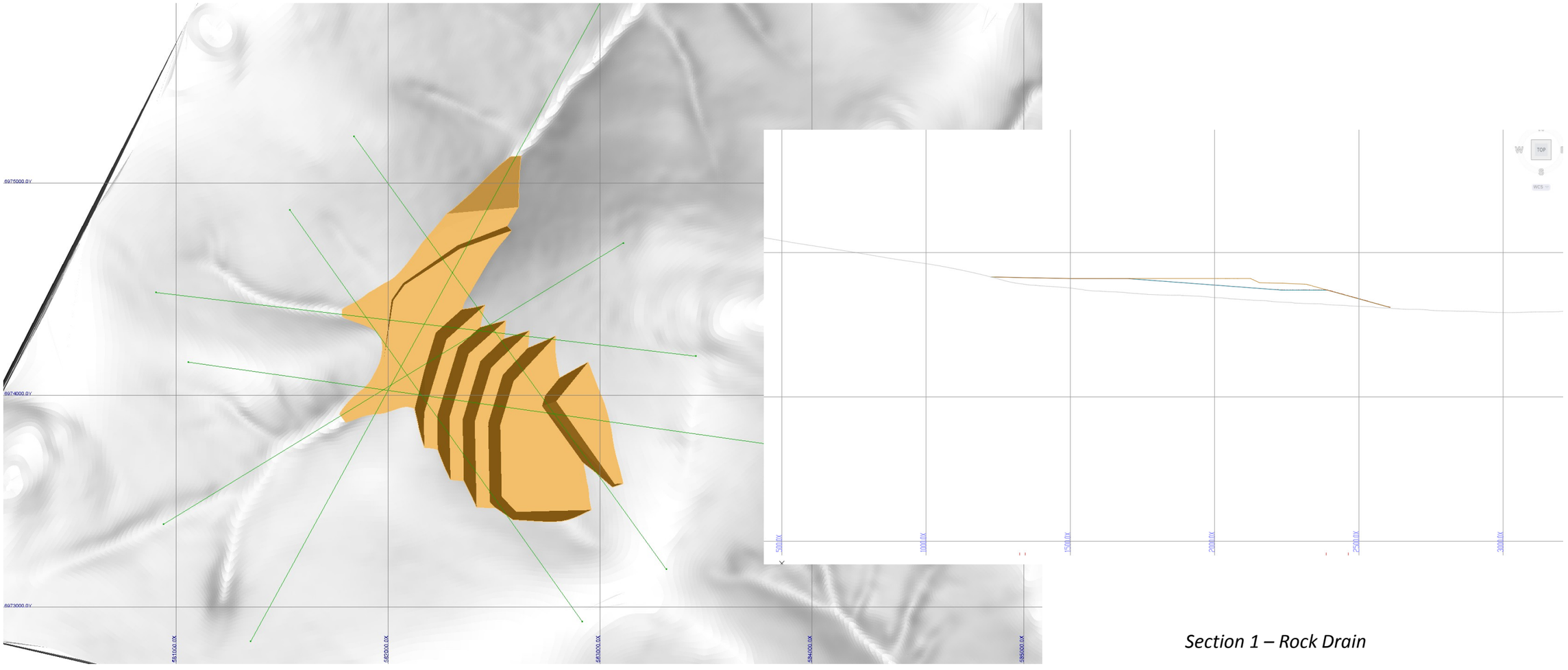
Section 1 – Rock Drain

Notes:

- *Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'*
- *Section line 1 2 (i.e. the rock drain thermal modelling section), shows no changes for Year 0, 1, and 2 as the main dump development over these years is east of the section location.*

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 2** Date: 1/10/2018 · Approved: JBK · Figure: **A.4**

Year 3

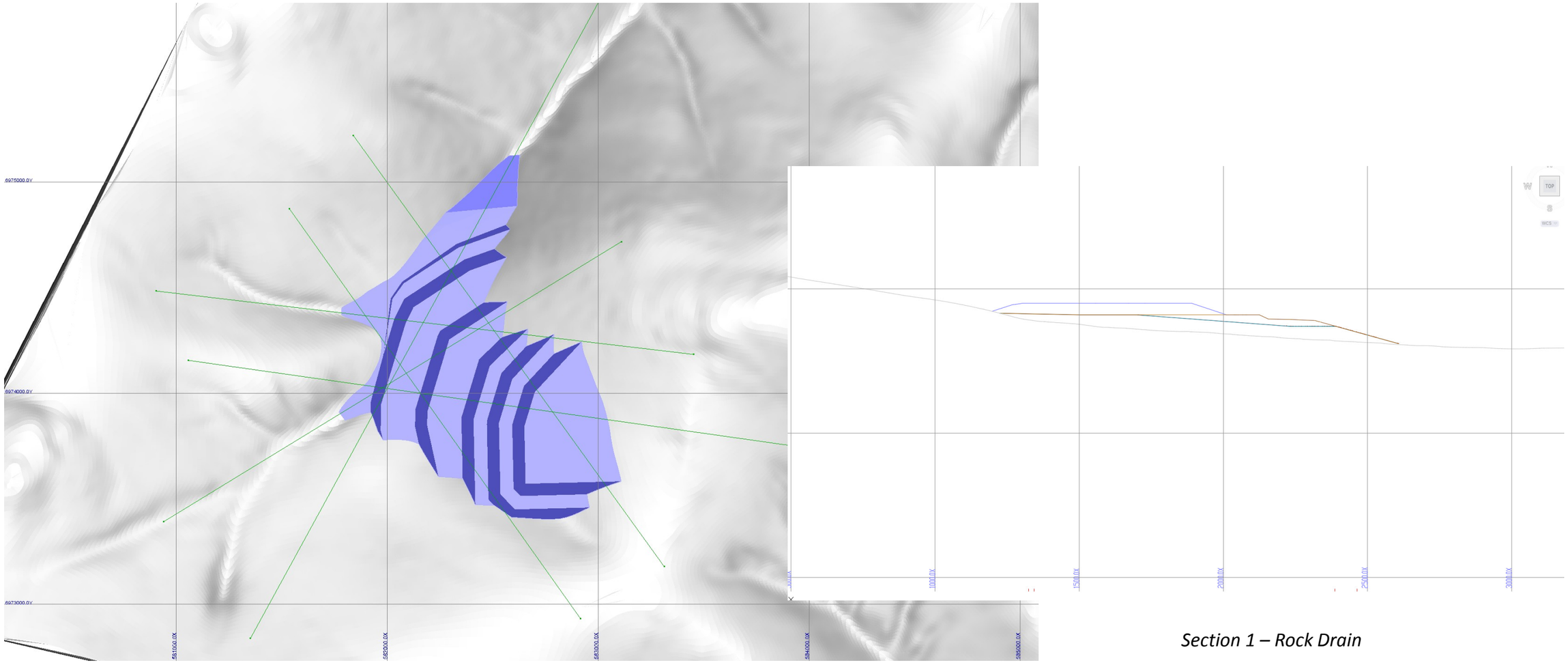


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 3** Date: 1/10/2018 · Approved: JBK · Figure: **A.5**

Year 4

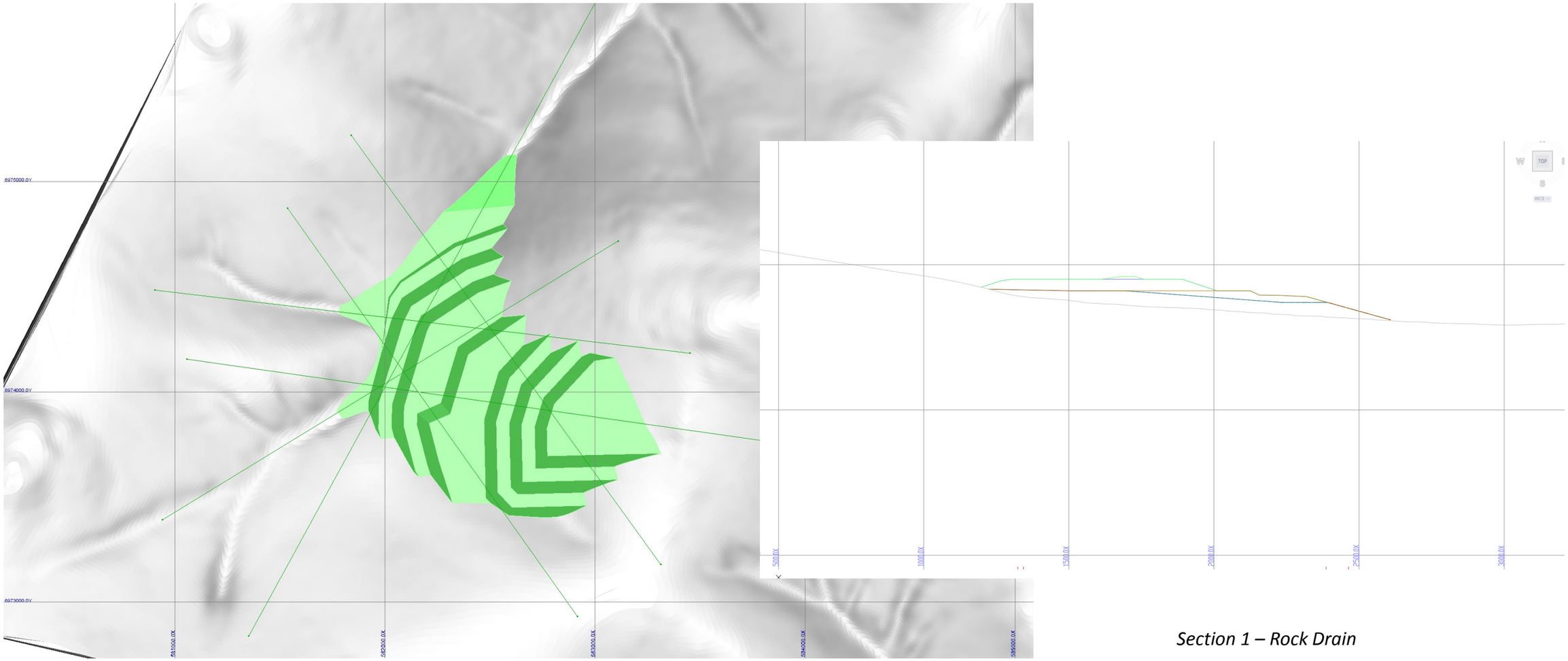


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 4**
		Date: 1/10/2018 | Approved: JBK | Figure: **A.6**

Year 5

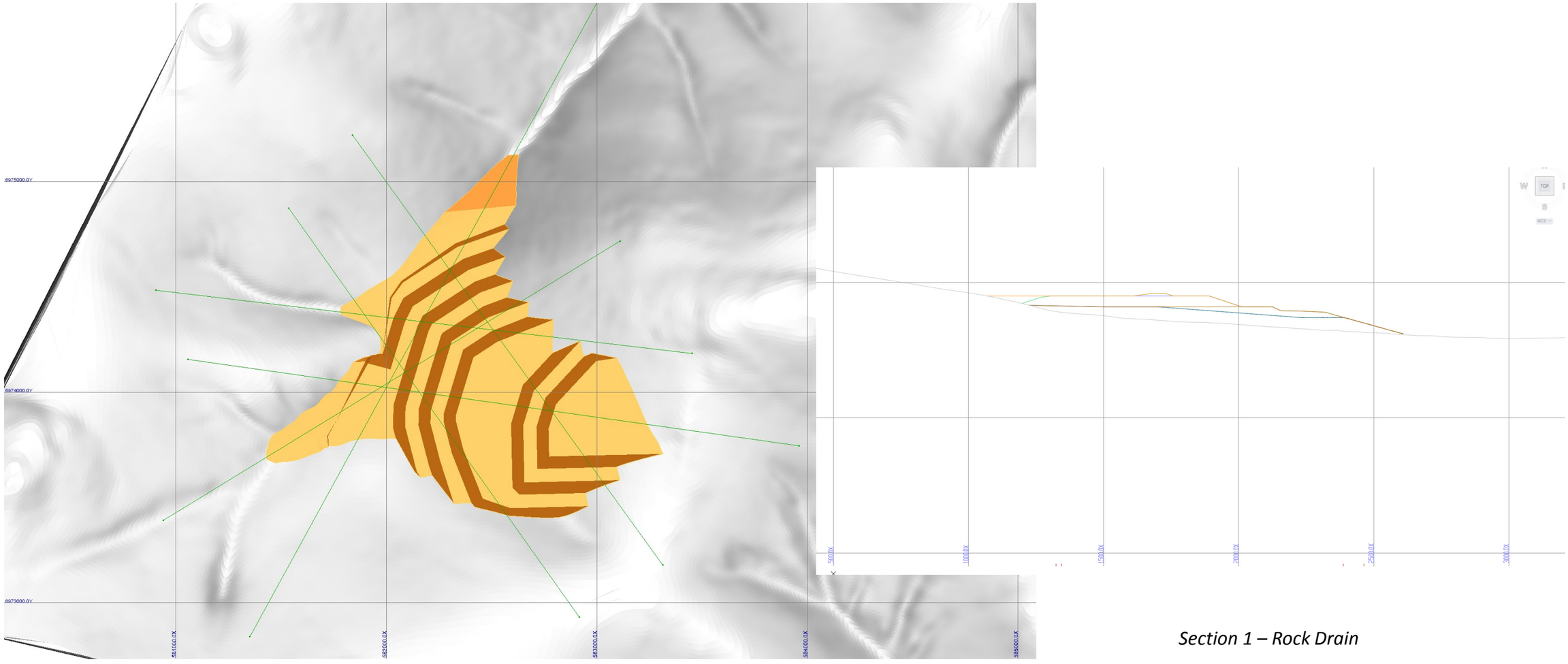


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 5**
		Date: 1/10/2018 | Approved: JBK | Figure: **A.7**

Year 6

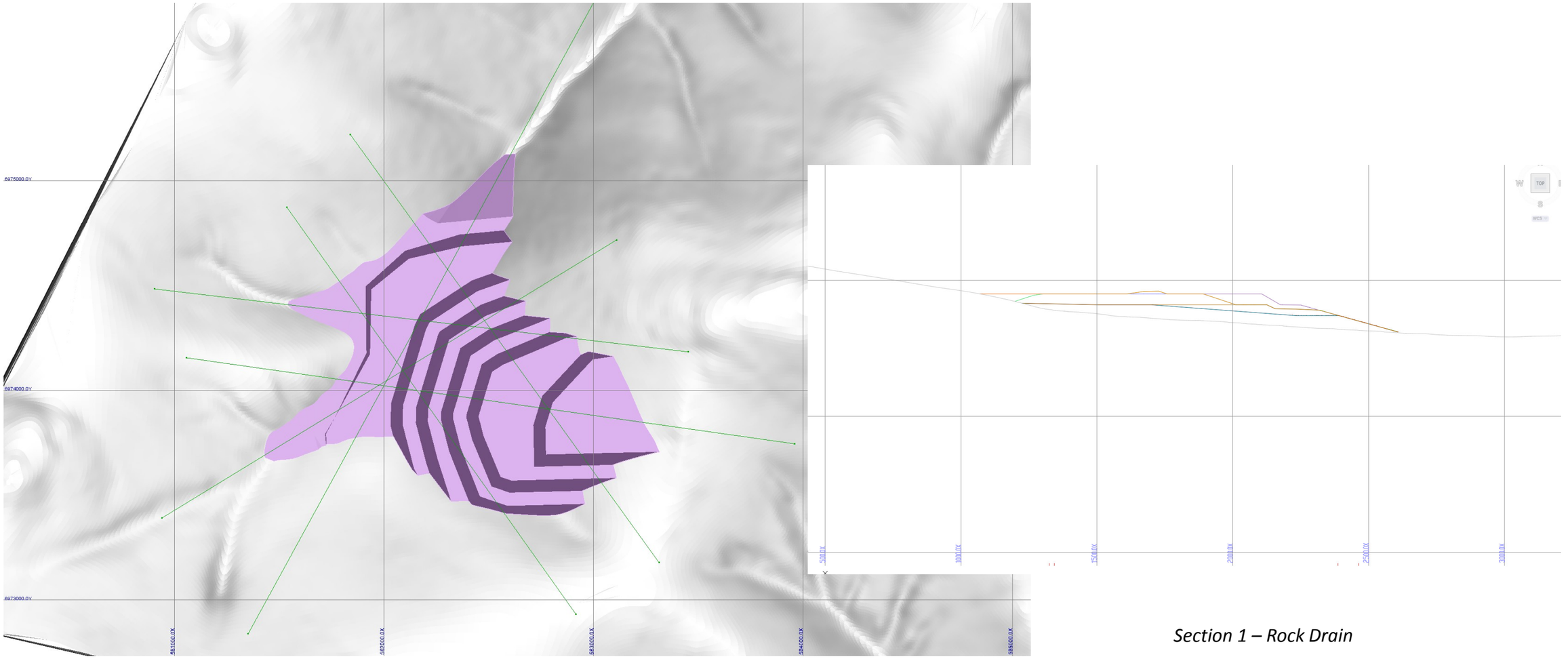


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 6** Date: 1/10/2018 | Approved: JBK | Figure: **A.8**

Year 7

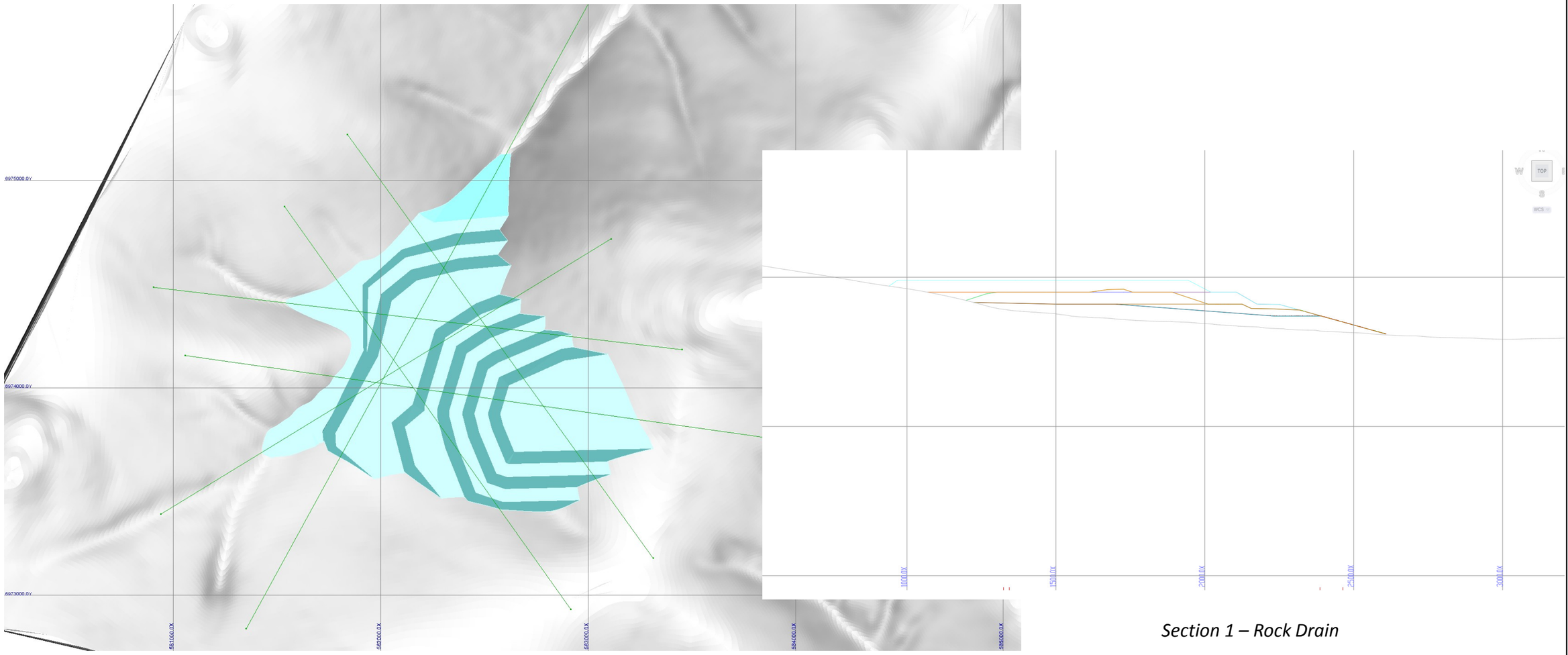


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 7** Date: 1/10/2018 | Approved: JBK | Figure: **A.9**

Year 8

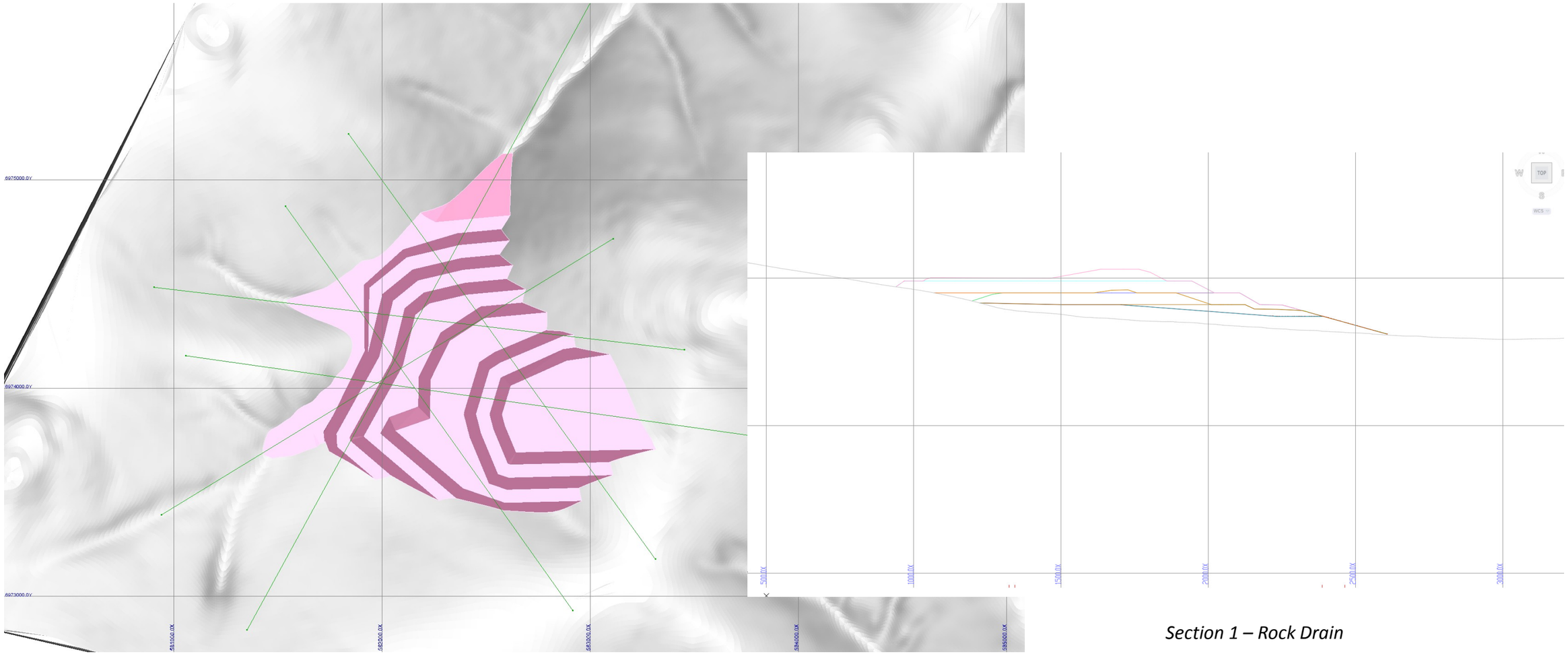


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 8**
		Date: 1/10/2018 | Approved: JBK | Figure: **A.10**

Year 9

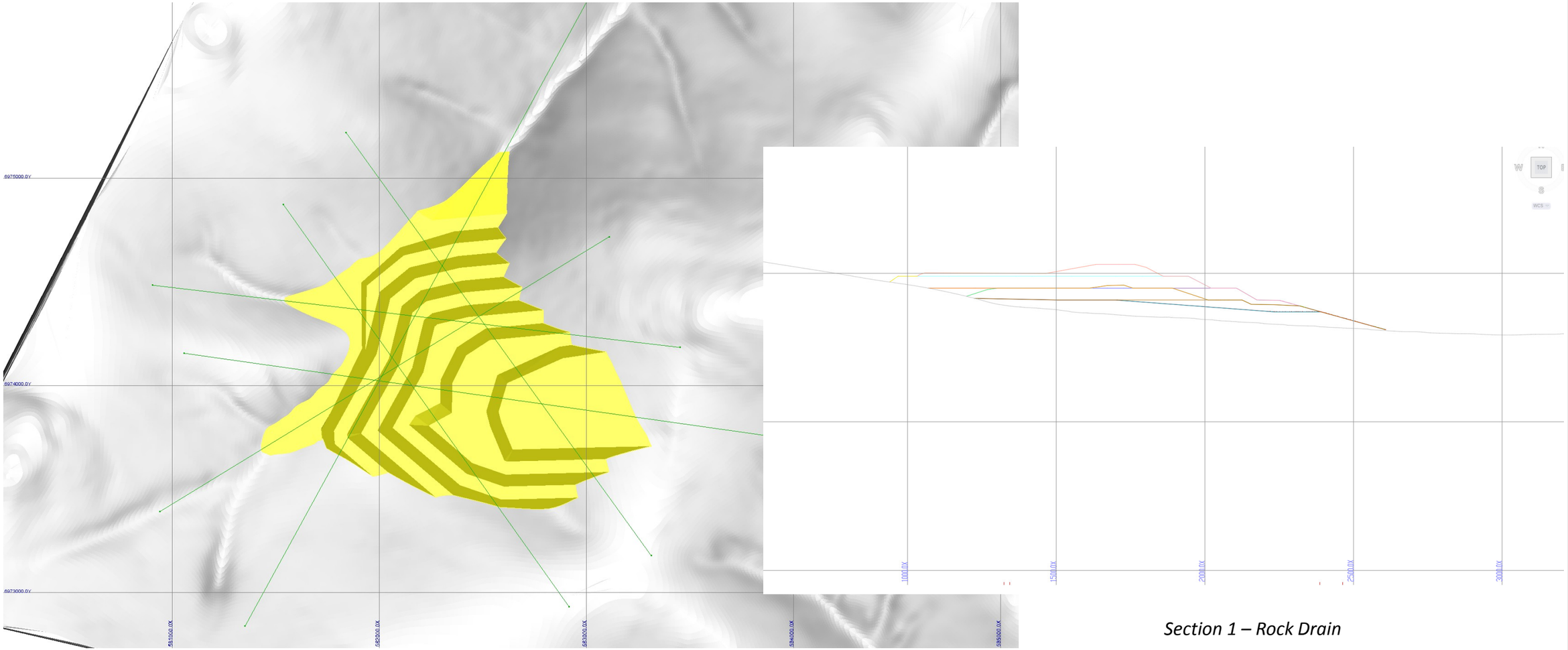


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 9**
		Date: 1/10/2018 | Approved: JBK | Figure: **A.11**

Year 10

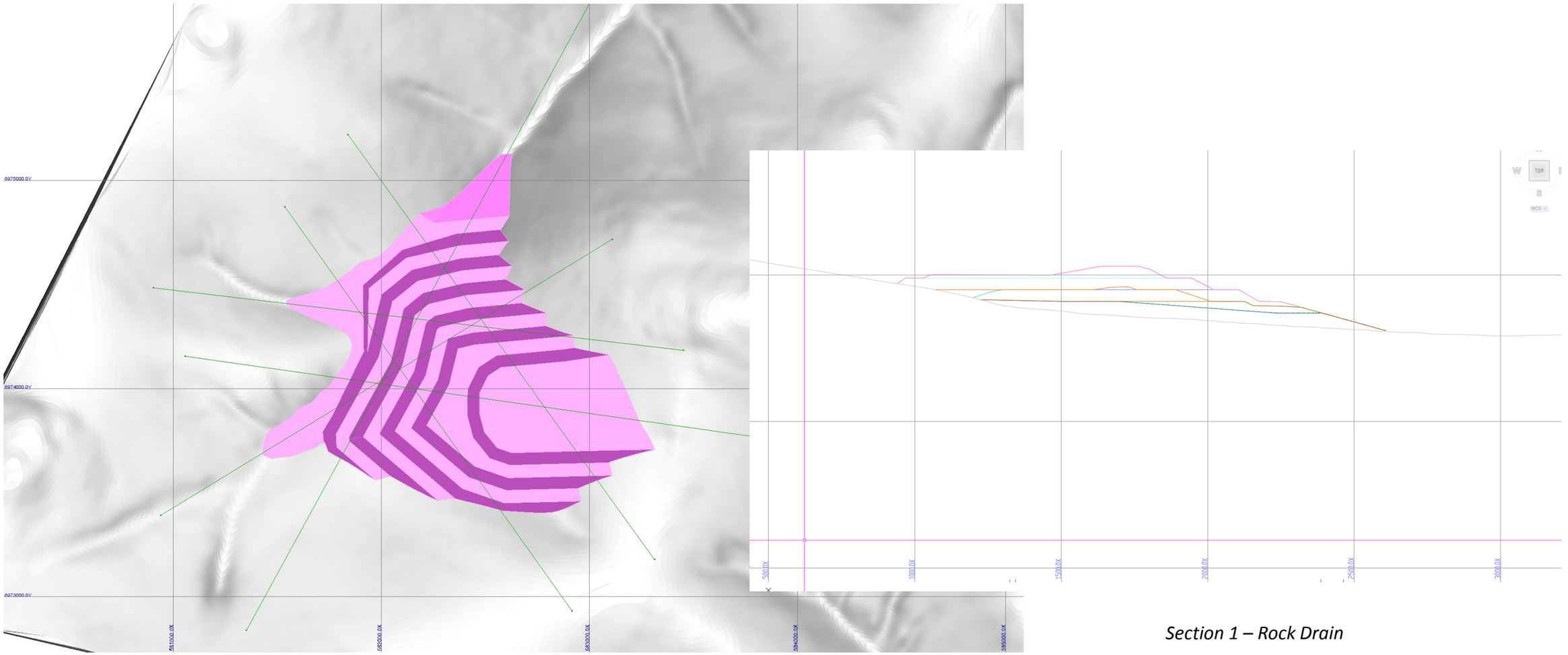


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 10** Date: 1/10/2018 · Approved: JBK · Figure: **A.12**

Year 11

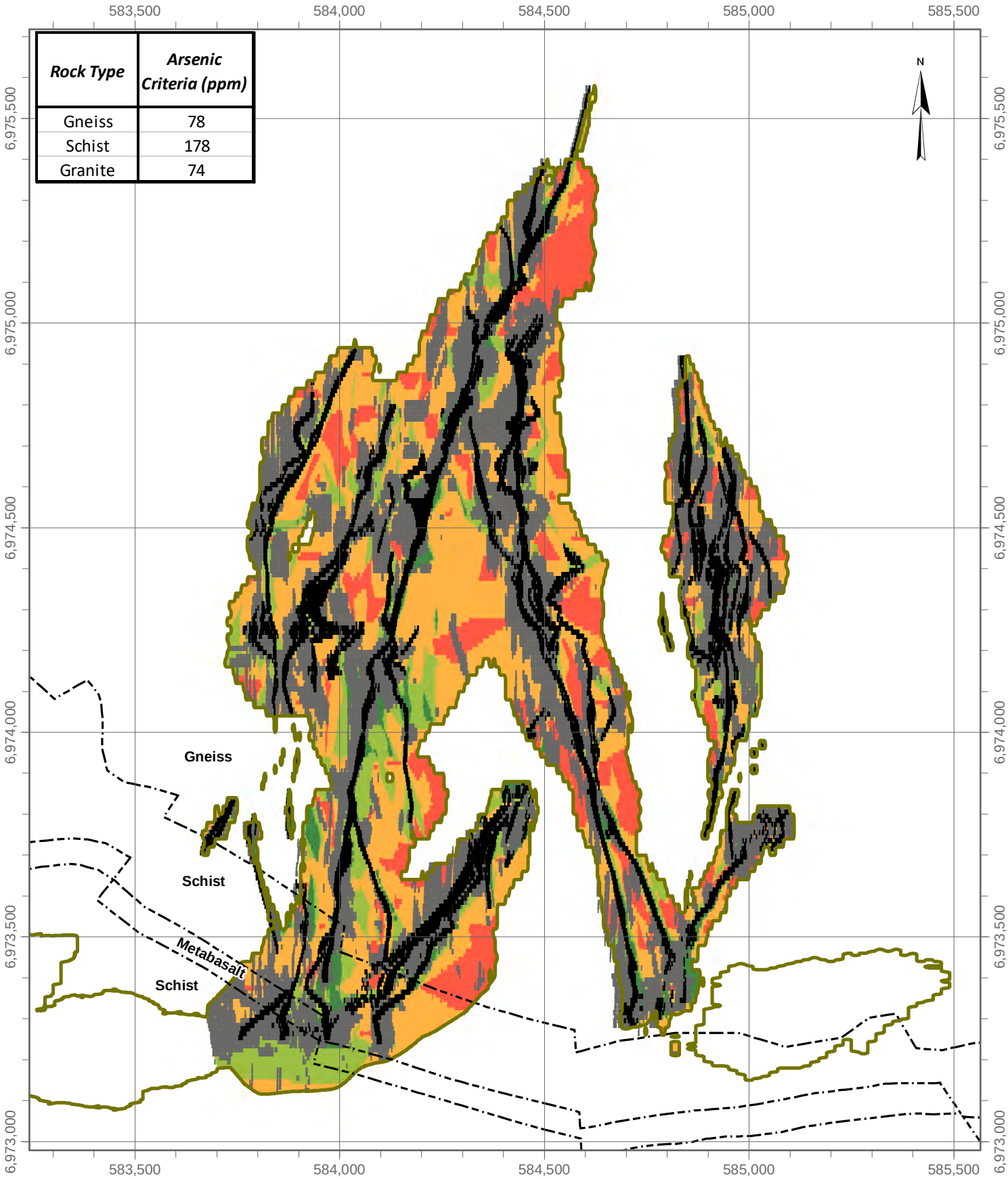


Section 1 – Rock Drain

Note: Alpha WRSF Model and year by year sequencing provided by JDS 01/03/2018 – File 'alpha_60mt_sequence'

srk consulting	JDS Energy & Mining Inc.	Coffee Gold Project – Thermal Modeling for the Alpha WRSF Rock Drain
Job No: 1CJ004.013 Filename: 1CJ004.013_CoffeeGold_RockDrainSections	Coffee Gold Project	**Alpha WRSF Year 11**
		Date: 1/10/2018 | Approved: JBK | Figure: **A.13**

APPENDIX C
Block Model Figures



LEGEND

Low As Leaching Potential	High As Leaching Potential
Oxide	Waste Zones
UT	Ore Zone
MT	
LT	Pit
Fresh	Geology Boundary

DATE SAVED:	May 25, 2023
DRAWN BY:	GM
REVIEWED:	JD
VERSION:	1

Coordinate System: NAD 1983 UTM Zone 7N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter

1:12,500

0 100 200 Meters

CLIENT: Newmont COFFEE

LORAX ENVIRONMENTAL

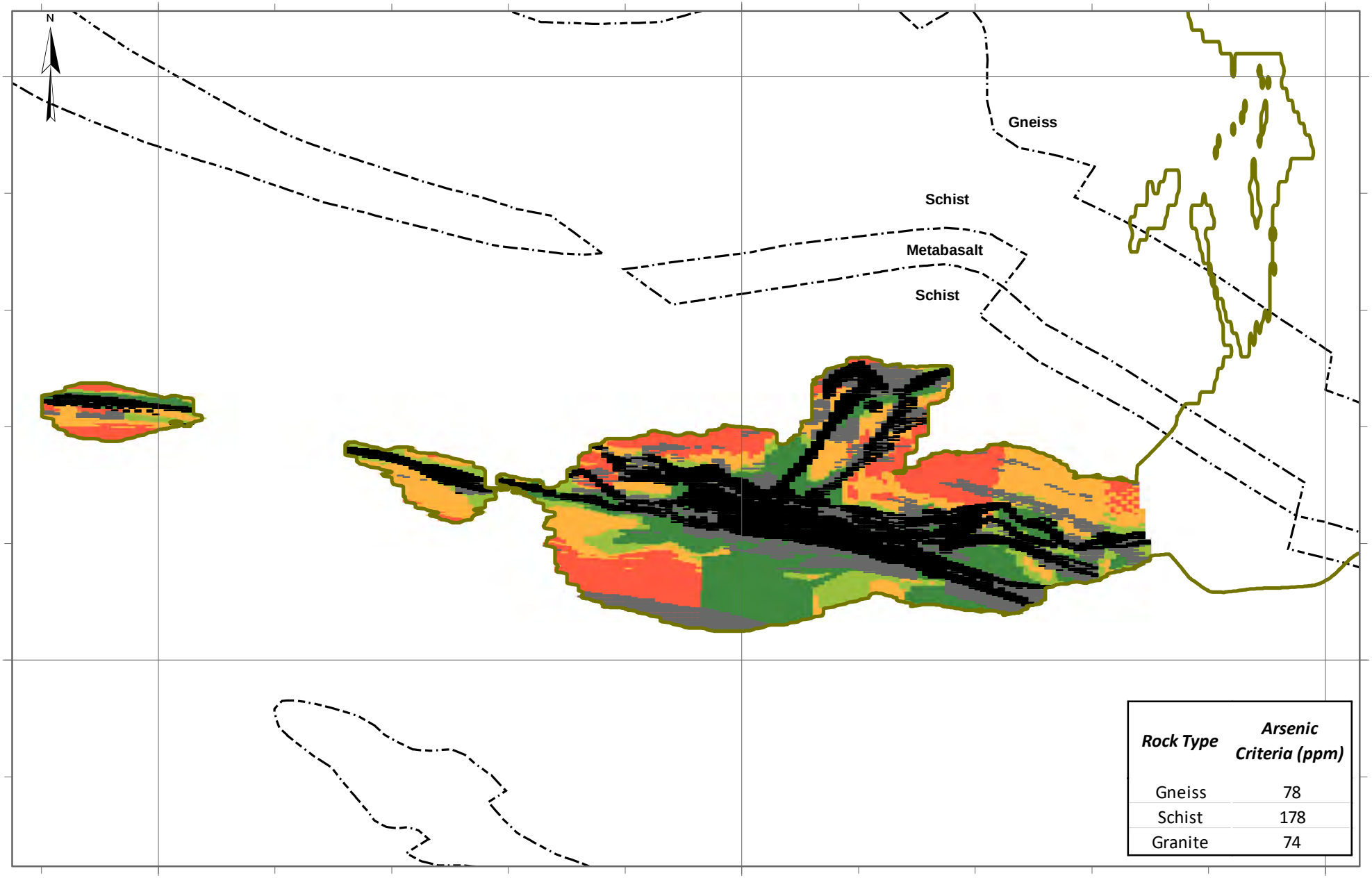
PROJECT: **Coffee Gold Project**

TITLE: Supremo Arsenic Metal Leaching Potential in Block Model

PROJECT #: A405-5

FIGURE:

P:\@Drafting\Coffee Gold\Drafting Figures\MxDs\BM Arsenic Concentrations\Low ML Block Model\Supremo BM Arsenic Criteria_20180814.mxd



Rock Type	Arsenic Criteria (ppm)
Gneiss	78
Schist	178
Granite	74

LEGEND

Low As Leaching Potential	High As Leaching Potential	
Oxide	Waste Zones	Pit
UT	Ore Zone	Geology Boundary
MT		
LT		
Fresh		

DATE SAVED:	May 25, 2023
DRAWN BY:	GM
REVIEWED:	JD
VERSION:	1

Coordinate System: *NAD 1983 UTM Zone 7N*
Projection: *Transverse Mercator*
Datum: *North American 1983*
Units: *Meter*

1:9,000

0 100 200 Meters

CLIENT: Newmont COFFEE

LORAX ENVIRONMENTAL

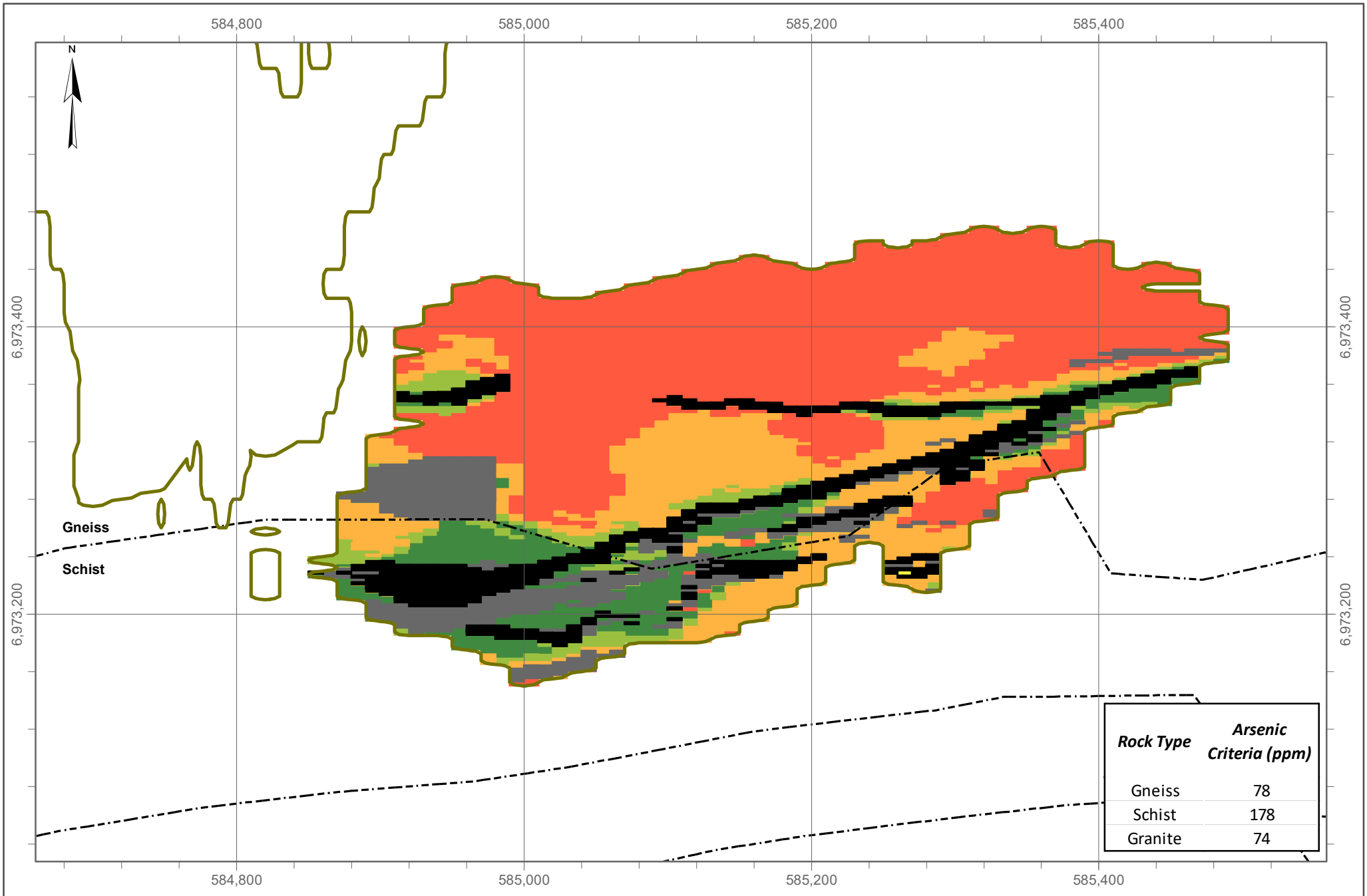
PROJECT: **Coffee Gold Project**

TITLE: Latte Arsenic Metal Leaching Potential in Block Model

PROJECT #: A405-5

FIGURE:

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Rock Type	Arsenic Criteria (ppm)
Gneiss	78
Schist	178
Granite	74

LEGEND

Low As Leaching Potential	High As Leaching Potential	
Oxide	Waste Zones	Pit
UT	Ore Zone	Geology Boundary
MT		
LT		
Fresh		

DATE SAVED:	May 25, 2023
DRAWN BY:	GM
REVIEWED:	JD
VERSION:	1

Coordinate System: NAD 1983 UTM Zone 7N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter

1:3,500

0 50 100 Meters

CLIENT: Newmont COFFEE

LORAX ENVIRONMENTAL

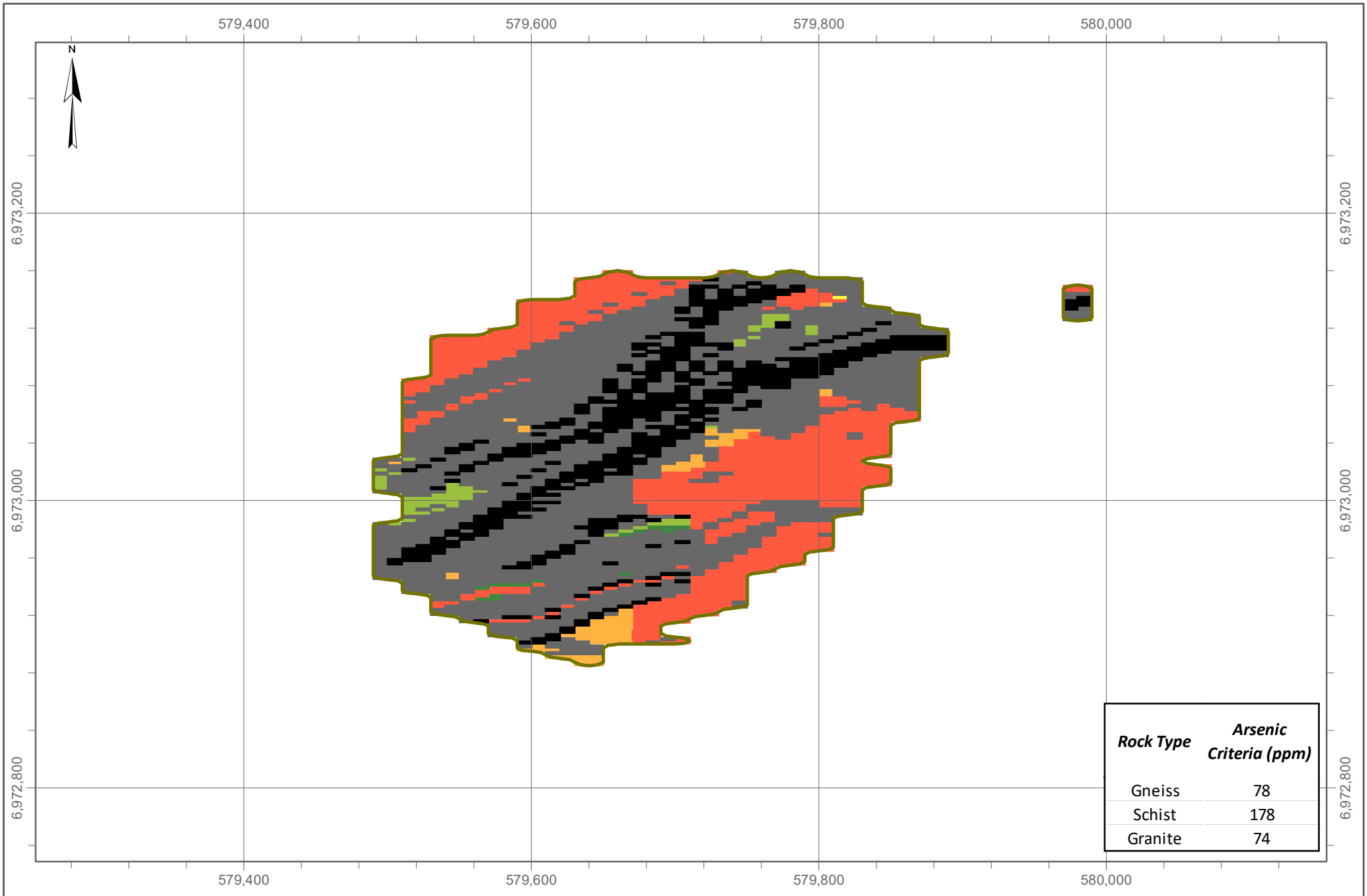
PROJECT: **Coffee Gold Project**

TITLE: Double Double Arsenic Metal Leaching Potential in Block Model

PROJECT #: A405-5

FIGURE:

P:\@Drafting\Coffee Gold\Drafting Figures\MxDs\BM Arsenic Concentrations\Low ML Block Model\DD BM Arsenic Criteria_20180814.mxd



Rock Type	Arsenic Criteria (ppm)
Gneiss	78
Schist	178
Granite	74

LEGEND

Low As Leaching Potential	High As Leaching Potential	
Oxide	Waste Zones	Pit
UT	Ore Zone	Geology Boundary
MT		
LT		
Fresh		

DATE SAVED:	May 25, 2023
DRAWN BY:	GM
REVIEWED:	JD
VERSION:	1

Coordinate System: *NAD 1983 UTM Zone 7N*
Projection: *Transverse Mercator*
Datum: *North American 1983*
Units: *Meter*

1:3,500

0 50 100 Meters

CLIENT: Newmont COFFEE

LORAX ENVIRONMENTAL

PROJECT: **Coffee Gold Project**

TITLE: Kona Pit Arsenic Metal Leaching Potential in Block Model

PROJECT #: A405-5

FIGURE:

P:\@Drafting\Coffee Gold\Drafting Figures\MxDs\BM Arsenic Concentrations\Low ML Block Model\Kona BM Arsenic Criteria_20180814.mxd

APPENDIX D
WROMP Table of Concordance

Proponent Commitments							
FSR Plan	**Mitigation Name**	**Reference**	**Proponent Committed Mitigation**	**Management Plan**	**Commitment Incorporated**	**Section Location**	**Notes**
Waste Rock and Overburden Management Plan (WROMP)	WROMP	PP Table 32-2 (YOR 2017-0211-027-1)	Goldcorp will develop and implement a Waste Rock and Overburden Management Plan that contains the following commitments: • Develop a construction QA/QC plan for the WRSFs, frozen soil storage area, soil stockpile and the ROM stockpile prior to the commencement of construction to ensure the parameter assumptions and recommendations developed during the design process are achieved.	WROMP	Yes	**WROMP** Section 4.1: Construction QA/QC	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Include a plan for overall site clearing and stripping to ensure materials are properly stored for later use in reclamation of the site.	WROMP	Yes	**WROMP** Section 4.2: Vegetation Clearing	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Remove potentially thaw-unstable material and replace with waste rock within 15 m of the toes where seasonal thawing may occur.	WROMP	No	**WROMP** Section 3.1.2: Alpha WRSF Design	The organics will be left in-place within the WRSF footprint to preserve the permafrost conditions, except where foundation soils may require removal to bedrock, near the toe. The first 3 to 5 m of waste rock will be placed during the winter months to preserve the foundation permafrost conditions.
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Ensure each WRSF and stockpile is constructed to the appropriate geotechnical design criteria.	WROMP	Yes	**WROMP** Section 2.6: Geotechnical Criteria	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Construct rock drains in in-pit backfill, where necessary, to promote drainage.	WROMP	Yes	**WROMP** Section 3.2.1: Open Pit Backfill Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Ensure that overburden soils not suitable for the soil stockpile are not concentrated along the foundation or within the final side slopes of the WRSF.	WROMP	Yes	**WROMP** Section 3.1.2: Alpha WRSF Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Segregate frozen soils in the frozen soils storage area by type, defined primarily by ice content and grain size, to permit recovery of materials that will be utilized in reclamation.	WROMP	Yes	**WROMP** Section 3.4.2: Soil and Overburden Stockpiles Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• If there is not enough waste rock in the Alpha WRSF to contain the earliest frozen soils excavated, construct a small berm on the downslope side of the frozen soil storage area to provide initial containment and filtering.	WROMP	Yes	**WROMP** Section 3.5.1: Frozen Soil Storage Area Design	Berm will be constructed around the perimter of the frozen soil storage area
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Ensure flow-through berms for the frozen soils storage area allow for excess pore water from the thaw of ice-rich materials to drain, while containing the file grained materials that may otherwise be thaw-unstable.	WROMP	Yes	**WROMP** Section 3.5.1: Frozen Soil Storage Area Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Water from the Alpha WRSF will be routed to the Alpha Pond.	WROMP	Yes	**WROMP** Section 3.1.2: Alpha WRSF Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Backfill waste from the Kona Pit into the mined out Kona Pit.	WROMP	No	**WROMP** Section 3.2.1: Open Pit Backfill Design	Update to mine plan. All granite waste rock generated from Kona Pit will be sub-aerially disposed of in the Alpha WRSF.
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Conduct clearing and stripping in a short of a time period as practical in advance of waste rock, in order to minimize the exposure period of the de-vegetated ground.	WROMP	Yes	**WROMP** Section 3.1.2: Alpha WRSF Design **WROMP** Section 3.3.1: ROM Construction	Organics will be left in-place within the WRSF footprint to preserve the permafrost conditions, except where foundation soils will require removal to bedrock, near the toe
Waste Rock and Overburden Management Plan (WROMP)	WROMP		• Monitor the performance of the WRSFs and stockpiles as outlined in the Waste Rock and Overburden Management Plan.	WROMP	Yes	**WROMP** Section 6: Monitoring Program and Reporting	Monitoring of the WRSF and stockpiles is detailed in the Geochemical and Physical Monitoring Plans
Waste Rock and Overburden Management Plan (WROMP)	WROMP	SIR4-R4 (YOR 2017-0211-4259)	The Project site has five (5) temporary stockpiles, which will be used for stockpiling material until it is needed for site reclamation and revegetation activities. The stockpiles have a cumulative footprint of 35.9 ha and a maximum capacity of 5 million cubic metres (Mm3) with side slopes at the angle of repose (approximately 1.7H:1V (horizontal to vertical)). Sediment and erosion control measures will be put in place, as appropriate, downslope of the stockpiles during development, and other mitigations outlined in the Project Proposal will be implemented.	WROMP	Yes	**WROMP** Section 3.4: Soil and Overburden Stockpiles **WROMP** Section 3.4.2: Soil and Overburden Stockpiles Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP	SIR4-R4 (YOR 2017-0211-4259)	• Construct a rock drain beneath the Alpha WRSF to downstream Alpha Pond. This drain will convey runoff from the upper portion of the Halfway Creek catchment, meteoric water infiltrating through the WRSF, and groundwater discharge to the Halfway Creek channel covered by the WRSF.	WROMP	Yes	**WROMP** Section 3.1.3: Rock Drain and Seepage	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		The Alpha WRSF will be constructed with primarily 40 metre (m) high benches or lifts at their natural angle of repose (approximately 1.5H:1V) with a 60 m wide safety berm left on each lift, resulting in final overall slopes angles of 3.0H:1V. Where appropriate, waste rock benches will be designed to slope inwards away from the inter-bench slope. Benches will be crowned along the centerline of the WRSF. Runoff will be and collected along the WRSF perimeter. Interim water management structures will be built, as required.	WROMP	Yes	**WROMP** Section 3.1.2: Alpha WRSF Design	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		A ROM stockpile area will allow the storage of ore when the crusher is not running, particularly during the winter months of January through March. The stockpile has been designed with a maximum capacity of 3.0 Mt of ROM ore contained within a design footprint of 23 ha. To minimize potential effects of sediment loading to the receiving environment. The ROM pad will be sloped to drain towards Halfway Creek.	WROMP	Yes	**WROMP** Section 3.3: ROM Stockpile	ROM designed with a footprint of 13 ha. The ROM pad will be sloped to drain towards the Facility Pond, which will convey excess water toward the Alpha Pond.

Proponent Commitments							
FSR Plan	**Mitigation Name**	**Reference**	**Proponent Committed Mitigation**	**Management Plan**	**Commitment Incorporated**	**Section Location**	**Notes**
Waste Rock and Overburden Management Plan (WROMP)	WROMP	SIR3-R3-62 (YOR 2017-0211-501-1)	Waste rock will be managed such that materials within the upper one metre of deposits willnot exhibit an arsenic concentration that is harmful to human health, especially based on the projected use of the land post-closure for camping, hunting, and gathering. Given that the estimated average concentration of arsenic in granitic waste rock will be in the range of 120 mg/kg, it will be necessary to manage the waste rock deposit so that accessible concentrations in surface materials in the waste rock deposit are appreciably lower than this. The average arsenic concentrations in schist and gneiss are much lower than 120 mg/kg. The specifics of the risk management thresholds for arsenic and appropriate risk management actions will be better defined through future completion of a more detailed evaluation of arsenic bioavailability and disposition in the waste rock and iterative improvements to the detailed quantitative HHRA, to be incorporated in routine mine closure planning.	WROMP	Yes	**WROMP** Section 3.1.2: Alpha WRSF Design.	Where practical, waste rock will be managed such that the final 1 m of waste rock placed in the WRSF does not exhibit an arsenic concentration that is greater than 60 mg/kg, on average. Where this is not practical, Newmont will review alternative means of deterring human traffic and prolonged use of this facility in closure (e.g., signage).
Waste Rock and Overburden Management Plan (WROMP)	WROMP	SIR4-R4 (YOR 2017-0211-4259)	Mined rock will be monitored for ML/ARD potential as part of the ongoing effort to characterize mine waste over the Projects life. This monitoring program will provide continuous characterization of the ML/ARD potential of ore, overburden, waste rock and leach tailings as it is produced. The objectives of further characterization and monitoring are as follows: • Confirm that mine rock is non-PAG and that metal leaching potential is similar to what is predicted in geochemical characterization work conducted as part of mine permitting; • Provide continuous characterization of geologic material sent to various storage facilities or used in construction; and • Inform periodic revisions and updates to the Reclamation and Closure Plan.	EMAMP	Yes	**EMAMP - Appendix E: Geochemical Monitoring Plan** Section 2: Mine Waste Monitoring	
Waste Rock and Overburden Management Plan (WROMP)	WROMP	SIR1-2.8-R27 (YOR 2017-0211-323-1)	Geochemical (ML/ARD) screening protocol for waste rock proposed to be used for construction purposes.	EMAMP	Yes	**EMAMP - Appendix E: Geochemical Monitoring Plan** Section 2: Mine Waste Monitoring	
Waste Rock and Overburden Management Plan (WROMP)	WROMP	SIR4-R4 (YOR 2017-0211-4259)	A Geochemical Monitoring Plan is being prepared for Project licensing applications. Regular sampling will consist of a limited number of NP and Acid potential measurements to confirm ARD potential, and total metals analysis to monitor metal enrichment. Sample frequency will vary depending on the type of geologic material and the material source. A more complete set of analysis will be conducted for every tenth sample collected as part of the QA/QC program. All data produced as part of ongoing monitoring activities will be reported at annually as part of the reporting expected to be required by the mine's Water use license and Quartz Mining License.	EMAMP	Yes	**EMAMP - Appendix E: Geochemical Monitoring Plan** Section 2: Mine Waste Monitoring	
Waste Rock and Overburden Management Plan (WROMP)	WROMP		Visual observations of the WRSFs, overburden stockpiles, sedimentation pond dams and pit slopes will be the most frequent and most important method of monitoring their geotechnical performance. The purpose of the inspections is to identify apparent physical changes to the facilities that may indicate future instability and to allow the conditions to be mitigated prior to an instability occurring. The geotechnical performance of the waste rock and overburden stockpiles will be monitored via three types of visual inspections: • Routine inspections; • Annual inspections; • Event-driven inspections; and, • The details of the physical monitoring of the mine facilities will be outlined in the Physical Monitoring Program which will be prepared for Project licensing once designs are further advanced.	WROMP	Yes	**WROMP** Section 6: Monitoring Program and Reporting	
Waste Rock and Overburden Management Plan (WROMP)	WROMP	TH Proposed Conditions (March 2020) (YOR 2017-0211-3971)	The Proponent must include a plan for soil salvage based on the mine plan as a component of the Waste Rock and Overburden Management Plan. Soil salvage must consider: a) criteria and segregation protocols for maximizing the amount of suitable soil and overburden that can be used for reclamation purposes; b) progressively updating the soil salvage plans concurrent with mine development with the objective of ensuring that soil resources are not buried if they can be safely salvaged; and c) developing a stockpiling plan that considers progressive reclamation opportunities, maintains cost-effective handling options, and minimizes soil loss, degradation, or contamination. The plan for soil salvage must be updated progressively, concurrent with updates to the Waste Rock & Overburden Management Plan or Mine Operations Plan.	WROMP	Yes	**WROMP** Section 5.8: Segregation Protocol	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection and Monitoring	SIR1-8.1-R142 (YOR 2017-0211-325-1)	Where ice rich permafrost is planned to be excavated during construction of the NAR and if any pockets of unanticipated ice rich permafrost are encountered during construction, geocryologists will be consulted during construction to help refine the construction plan to limit any adverse effects to the surrounding permafrost.	ARCMP	Yes	**ARCMP** Section 4: Site Preparation **ARCMP** Section 5.3: Construction QAQC	In areas underlain with undisturbed, shallow, ice-rich permafrost, the existing surface material will be left intact, with the road constructed by filling over a geotextile separation layer. Care will be taken to minimize the amount of vegetative clearing to occur, limiting the amount of subgrade materials exposed to potential degradation and thaw along the roadway; this will also reduce the potential for soil erosion. During road, crossing, and barge landing construction, the engineer or engineering designate will be responsible for coordinating site inspections and site visits with all necessary additional experts (e.g., biologists, environmental monitors, geochemists, geocryologists, geotechnical engineers).

Proponent Commitments							
FSR Plan	**Mitigation Name**	**Reference**	**Proponent Committed Mitigation**	**Management Plan**	**Commitment Incorporated**	**Section Location**	**Notes**
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection and Monitoring	SIR1-Appendix 8-1 (YOR 2017-0211-364-1)	A very detailed frozen soil and overburden management plan will be developed. This plan will include recommendations for excavation, transportation, storage, potential options for use of materials for construction, and long-term storage for materials not suitable for construction. The plan will identify how and when construction should be carried out. Construction equipment should never operate directly on permafrost terrain unless it is excavation frozen materials down to competent bedrock and it remains within the footprint of the excavation.	GMDP	Yes	**WROMP** Section 5.8: Segregation Protocols **WROMP** Section 3.1.1: Geotechnical Assessment for Infrastructure	Newmont will develop soil stockpile and salvage guidelines for the Project that will be carried out throughout the Construction and Operations Phases that will include strategic stockpile placement.
Waste Rock and Overburden Management Plan (WROMP)	Waste Rock Dump Drain	SIR1-2.10-R41/R43 (YOR 2017-0211-323-1)	The Alpha Waste Rock Facility will incorporate a 'swale' at the base of the dump, near the location of the currently existing Halfway Creek. If the rock drain becomes 'blinded', the swale will allow for water to have a path to go over the rock drain while still being confined on the sides by the natural topography. A factor of safety (oversizing) of at least 2 will be used for hydraulic cross-section of the rock drain. The waste rock drain will be constructed out of competent rock.	WROMP	Yes	**WROMP** Section 3.1.3: Rock Drain and Seepage	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection	PP Table 32-1 (YOR 2017-0211-027-1)	The design includes the following measures to protect permafrost: • Water management structures (e.g., diversion channels) will be designed to reduce thermal changes to permafrost. E.g., To avoid permafrost-related stability and erosion issues in surface water diversions, berms will be used rather than ditches wherever practical.	Water Management Plan	Yes	**WMP** Section 4.3.6: Permafrost Protection	Construction in permafrost and ice-rich soils in the Project area will be carefully evaluated prior to final design. Wherever practical, and where ice rich soil exists, design will be aimed to place fill over the existing ground to slow rates of permafrost degradation, and excavations will be avoided.
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection	SIR1-8.1-R12 (YOR 2017-0211-323-1)	In general, the infrastructure components are being designed in a manner that will minimize hazardous impacts on the surrounding undisturbed terrain and on the foundation of each infrastructure component (e.g., excavation of ice-rich material in foundations, building roads using fill-only approaches where possible, or overcutting and replacement offill for roads). Ditches in sensitive permafrost terrain are being minimized (e.g., instead of a diversion ditch on the west side of the Alpha WRSF, a diversion berm was designed, thereby reducing the thermal impact of flowing water on ice-rich soils). Detailed design of the infrastructure components located on permafrost terrain will involve thermal analysis at each location to determine the impact of the infrastructure component on the permafrost and of the permafrost on the infrastructure (stability, thaw settlement, etc.).	WROMP	Yes	**WROMP** Section 2.4.1: Permafrost Distribution	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection	SIR1-8.1-R125 (YOR 2017-0211-325-1)	A blanket of waste rock placed over the ground surface at the Alpha WRSF area during the winter can mitigate foundation disturbance during the placement of the bulk of the waste rock on top of this blanket at other times of the year. In the long term, the waste rock will alter the thermal conditions in the ground below by causing the permafrost to aggrade up into the waste rock. As a result, thawing of the WRSF foundation due to global warming will be much slower than that of undisturbed terrain and therefore stability of the WRSF should be less affected than the stability of undisturbed natural terrain.	WROMP	Yes	**WROMP** Section 2.4.1: Permafrost Distribution	

Proponent Commitments							
FSR Plan	**Mitigation Name**	**Reference**	**Proponent Committed Mitigation**	**Management Plan**	**Commitment Incorporated**	**Section Location**	**Notes**
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection	SIR1-Appendix 8-I (YOR 2017-0211-364-1)	A passive approach (provision of full thermal protection to maintain permafrost in its frozen condition) will be employed along those sections of the proposed road alignment that crossareas underlain by ice-rich permafrost. Geotechnical considerations for the road design within such sections are as follows: • Cuts and ditches will be avoided wherever possible.	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	Overland construction (fill only embankment) will be used to minimize disturbance to the existing vegetative cover in areas of ice-rich permafrost. In locations where cut slopes cannot not be avoided, a passive approach will be employed and will involve over-excavation of the cut slope followed by the placement of a geotextile covered by a suitably thick blanket of thaw stable material over the cut slope to minimize the rate of thaw into underlying ice-rich native material.
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• Movement of equipment used for clearing the ROW will be controlled or prohibited to keep terrain disturbance to a minimum and to preserve the organic mat.	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	Unless existing roads or machine trails are present that provide equipment a means to bypass sections of undisturbed, shallow, ice-rich permafrost, no equipment will proceed beyond where the above has occurred.
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• During winter operations, the snow cover will be carefully removed before construction of the embankment to reduce settlement of the fill during the thaw period.	ARCMP	Yes	**ARCMP** Section 4: Site Preparation	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• The embankment will be constructed using the end dumping method so that the vegetation cover will not be damaged by the hauling equipment.	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• High fills and sideslope alignments will be avoided wherever possible.	ARCMP	Yes	**ARCMP** Section 9.7: Cut and Fill Slopes	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• For conceptual design purposes, embankment thickness will be a minimum of 1.5 m(ideally 2.0 m), with material placed on woven geotextile to protect the subgrade from thawing; 1 m of fill should be enough within sections of the road embankment underlain by ice-poor permafrost (not required in thaw-stable soils as per McGregoret al. (2010)).	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• Flat horizontal and vertical curves and gradients not exceeding 8% are highly desirable.	ARCMP	Yes	**ARCMP** Section 5.0: Road Design, Construction, and Upgrades	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• Drainage will be controlled to prevent water ponding along the toe of embankments; this will allow the thermal regime of the frozen subgrade to be maintained. If runoff water must be collected and channelized, it will be done at a reasonable distance from the embankment (>10 m).	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• Snow accumulation will be prevented on the lee side of higher sections of the road embankment to maintain the thermal regime of the frozen subgrade.	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection		• Excavation of ice-rich material in foundations, building roads using fill only approaches where possible or overcutting and replacement of fill for roads.	ARCMP; GMDP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost **GMDP** Section 3.1: Design Basis and Criteria	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection	SIR1-8.1-R127 (YOR 2017-0211-325-1)	In locations where cut slopes cannot not be avoided, a passive approach will be employed and will involve over-excavation of the cut slope followed by the placement of a geotextile covered by a suitably thick blanket of thaw stable material over the cut slope to minimize the rate of thaw into underlying ice-rich native material. This thickness would be determined by only allowing the native material to thaw or drain at a rate that will not generate elevated pore pressures that could lead to instability. If massive ice bodies exist in an area of cut it will be imperative to provide a blanket thick enough to entirely retard thaw to the native material over the life of the road.	ARCMP	Yes	**ARCMP** Section 5.5: Overland Construction in Ice-rich Permafrost	
Waste Rock and Overburden Management Plan (WROMP)	Permafrost Protection	SIR1-8.1-R128 (YOR 2017-0211-325-1)	Some of the constructed infrastructure will be instrumented and in particular, some such as the Alpha Dam, haul road constructed on ice-rich permafrost, and the Alpha WRSF is to have instrumentation that will provide information on the impact that the infrastructure is having on the native permafrost soil/rock.	WROMP	Yes	**WROMP** Section 2.4.1: Permafrost Distribution	
Waste Rock and Overburden Management Plan (WROMP)	Frozen Materials Management	SIR4-R4-2 (YOR 2017-0211-4259)	As necessary, waste rock berm will be constructed around the perimeter of the frozen soil storage area to enhance stability and provide drainage of the stored materials.	WROMP	Yes	**WROMP** Section 3.5.1 Frozen Soil Storage Area Design	