



Coast Mountain Resources (2020)
19050 94 Avenue
Surrey, BC.
V4N4X8

July 25, 2022
File: 18403

Attention: Kyle Dolan

**Re: Geological Investigation Report: Proposed Commercial Development
1451 Trowsse Road, Mill Bay, BC**

1.0 INTRODUCTION

GeoPacific was retained by Coast Mountain Resources to conduct a geological assessment of the hard rock core extracted by a coring drill rig. We understand that the quarry located at the above referenced site is investigating the feasibility of expansion. Based on the information provided to us we understand that the proposed expansion is likely to proceed in 6 phases. A single exploratory drill hole was located by Coast Mountain Resources, within the proposed expansion area.

This report presents our geological findings and recommendations for the design, based on our field investigation and experience in the immediate area. This report has been prepared exclusively for our client, for their use, the use of others on the design team as well as for the municipality of Mill Bay in the development and permitting process.

2.0 SITE DESCRIPTION

The site is located in the District of Mill Bay, B.C approximately 4.5 km south of the town of Mill Bay on Bamberton Road located directly east of Highway 1. The project has been separated into 6 phases which can be viewed in the figure provided following the text of the report.

The site is bounded by the Saanich Inlet to the east, Bamberton Provincial Park to the north, Highway 1 to the west and undeveloped forest to the south. The approximate elevation of TH21-01 is estimated to be approximately 150 m geodetic, based on elevations provided in Google Earth Pro.

The location of the site in relation to existing improvements is shown on our site plan, Drawing No. 18403-01, following the text of this report.

3.0 FIELD INVESTIGATION

GeoPacific was onsite November 25 and 26, 2021 to monitor drilling, evaluate and log the rock core extracted by the coring drill. The coring drill was operated by TerraTech Drilling Ltd. of Victoria, B.C. The single core was extracted to depths of up to 24.4 m below grade. The core was logged in the field by a member of our technical staff. The detailed test hole log is presented in Appendix A, following the text of this report.

The approximate location of the test hole completed by GeoPacific is shown on our Drawing No. 18403-01, following the text of this report. All depths are referenced from the existing ground surface at the test hole locations.

4.0 SUBSURFACE CONDITIONS

4.1 Published Geology

According to “Northern Vancouver Island - Geology” – (Map 2013-NVI-1-1) published by Geoscience BC, the region is understood to be part of the Bonanza Group and is described as: “Massive amygdaloidal and pillowed basalt to andesite flows, dacite to rhyolite massive or laminated lava, green and maroon tuff, feldspar crystal tuff, breccia; tuffaceous sandstone, argillite, pebble conglomerate and minor limestone and calcareous siltstone”.

Our review of available BCMINFILE data indicates the area was previously developed as a limestone quarry. The limestone is described in the BCMINFILE database as part of a discontinuous carbonate layer which extends from Cordova Bay to the east shore of Shawnigan Lake. We expect that some discrete limestone beds and related greenstone facies may be encountered in the quarry operation.

4.2 Bedrock Conditions

In general, the profile from the surface downwards at our test hole was consistent with the published geology in the region. The bedrock was noted to consist of massive andesite flows and was noted to be aphanitic with some larger amphibole and quartz crystallization throughout the core.

The core was heavily fractured and experiences extensive mechanical fracturing during drilling, resulting in very poor to fair rock-quality designation (RQD) with results generally below 50%. Secondary porosity was observed throughout the log as noted by the quartz veins extending through the core. Fractures developed during cooling of andesite flows result in increased secondary porosity. Quartz veins suggest that the andesite flows may have been filled by late-stage precipitation of quartz from hydrothermal fluids. The core reviewed was not oriented, preventing the determination of fracture plane orientation.

It is anticipated that bedrock conditions will vary across the property however we anticipate similar mechanical and engineering properties from any rock derived from the property.

4.3 Groundwater Conditions

Artesian groundwater was encountered as drilling reached depths of greater than 12 m at TH21-01. Hydrogeological monitoring wells were installed at both test hole locations to monitor the long-term groundwater levels over time. We expect the hydrogeological conditions at the site will be addressed in a Hydrogeological report prepared by others.

5.0 RECOMMENDATIONS

5.1 Aggregate Quality

The rock noted at our test hole location consisted of igneous bedrock comprising primarily of layered andesite. Igneous rock is generally considered hard to very hard, with low susceptibility to degradation due

to mechanical and chemical weathering. The rock encountered on site is considered suitable for use in the production of engineered aggregate.

5.2 Surface Water Control

Some runoff should be anticipated from the cut slopes during the wet months of the year. We recommend that catchment ditches are installed near the toes of all rock cuts during operations. Water collected in ditches should be transported by means of gravity or pump to treatment ponds located at low points on the site. A detailed drainage and erosion and sediment control plan can be seen on the attached mine cut and drainage plan presented in Appendix B, following the text of this report.

5.3 Rock Cut Stability

We understand that the proposed quarry will be developed using drilling and blasting, with bench heights and widths of up to 12 m and 8 m, respectively. Provided that all overburden is removed from the benches and from within 8 metres of the crest of pit, the proposed excavation is stable from a geotechnical standpoint. All cuts should be reviewed on site by a geotechnical engineer prior to manned entry. Some rock anchors may be required in cuts to resist wedge or planar failures following an on site analysis by a member of our geotechnical staff.

6.0 CLOSURE

This report has been prepared exclusively for our client, for the purpose of providing geotechnical recommendations for the design and construction of the proposed development described herein. This report remains the property of GeoPacific Consultants Ltd. and unauthorized use of, or duplication of this report is prohibited.

We are pleased to be of your assistance on this project and we trust that our recommendations are sufficient for your current purposes. If you would like further details or would like clarification of any of the above, please do not hesitate to contact the undersigned.

For:

GeoPacific Consultants Ltd.

Raymond Dickof, B.Sc.
Geological Technician

Reviewed by:

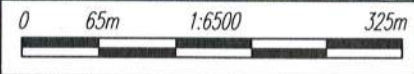
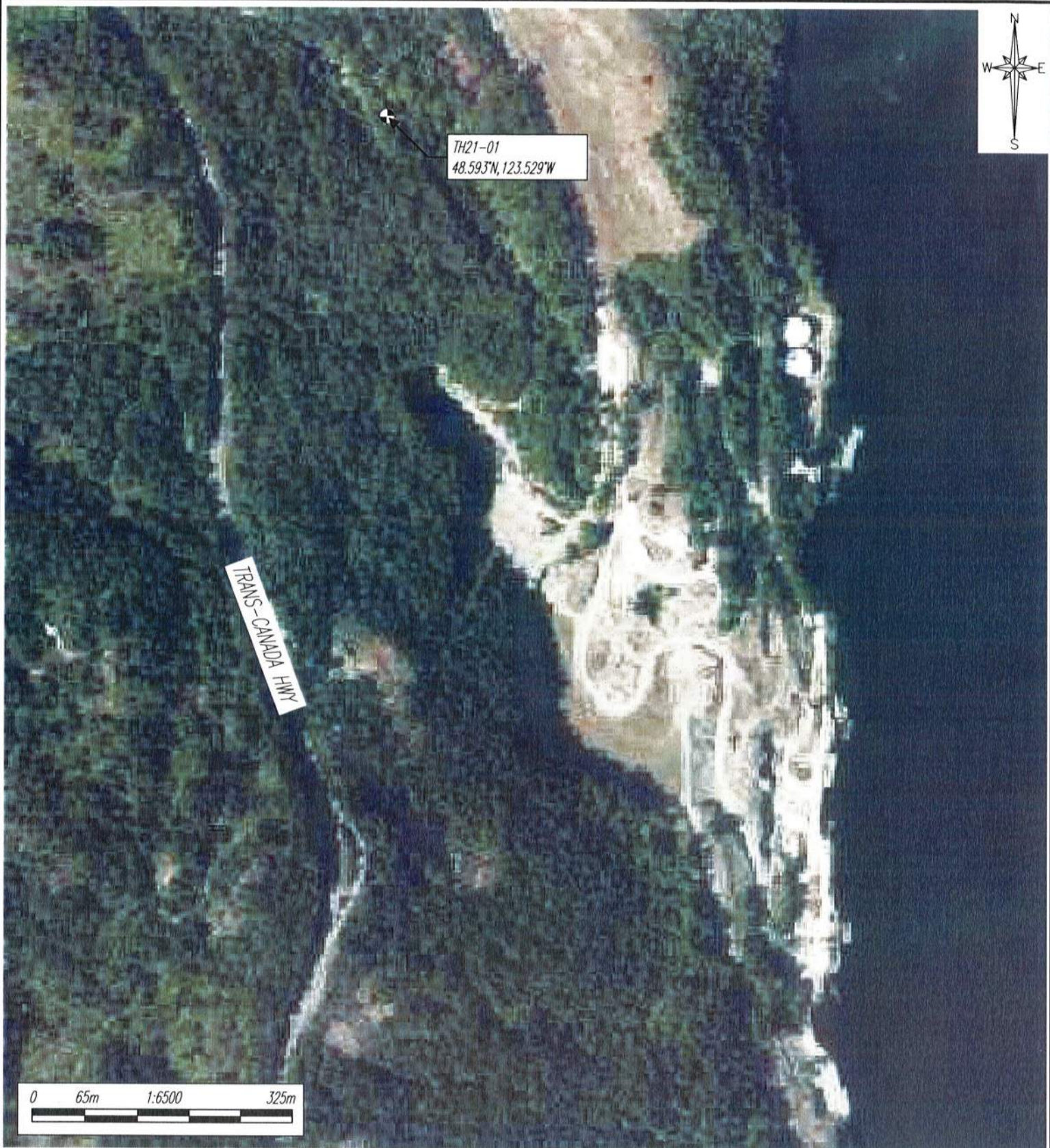
Daniel Kokan, M.Eng., P.Eng.
Project Manager

Matt Kokan, M.A.Sc., P.Eng.
Principal



JUL 27 2022

Permit to Practice EGBC
1000782



LEGEND:

↖ [TH21-XX] - TEST HOLE (TH) LOCATION

SITE PLAN

1:6500

*TEST LOCATIONS ARE APPROXIMATE

REVISIONS:

- A.
- B.
- C.

FILE NO.:

18403

DWG. NO.:

18403-01



DATE: DECEMBER 10, 2021

DRAWN BY: K.A.	APPROVED BY: M.J.K.	REVIEWED BY: R.D.
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SCALE: AS SHOWN

BAMBERTON QUARRY
 1451 TROWSSE ROAD, MILL BAY, B.C.
 TEST HOLE SITE PLAN

APPENDIX A – TEST HOLE LOGS



ROCK CORE LOG

Project: 18403

Location: Bamberton Quarry

Elevation: 0

Drilling Contractor: Terra Tech

Drilling Method and Equipment: Diamond Drilling

Orientation: Vertical

Water Level:

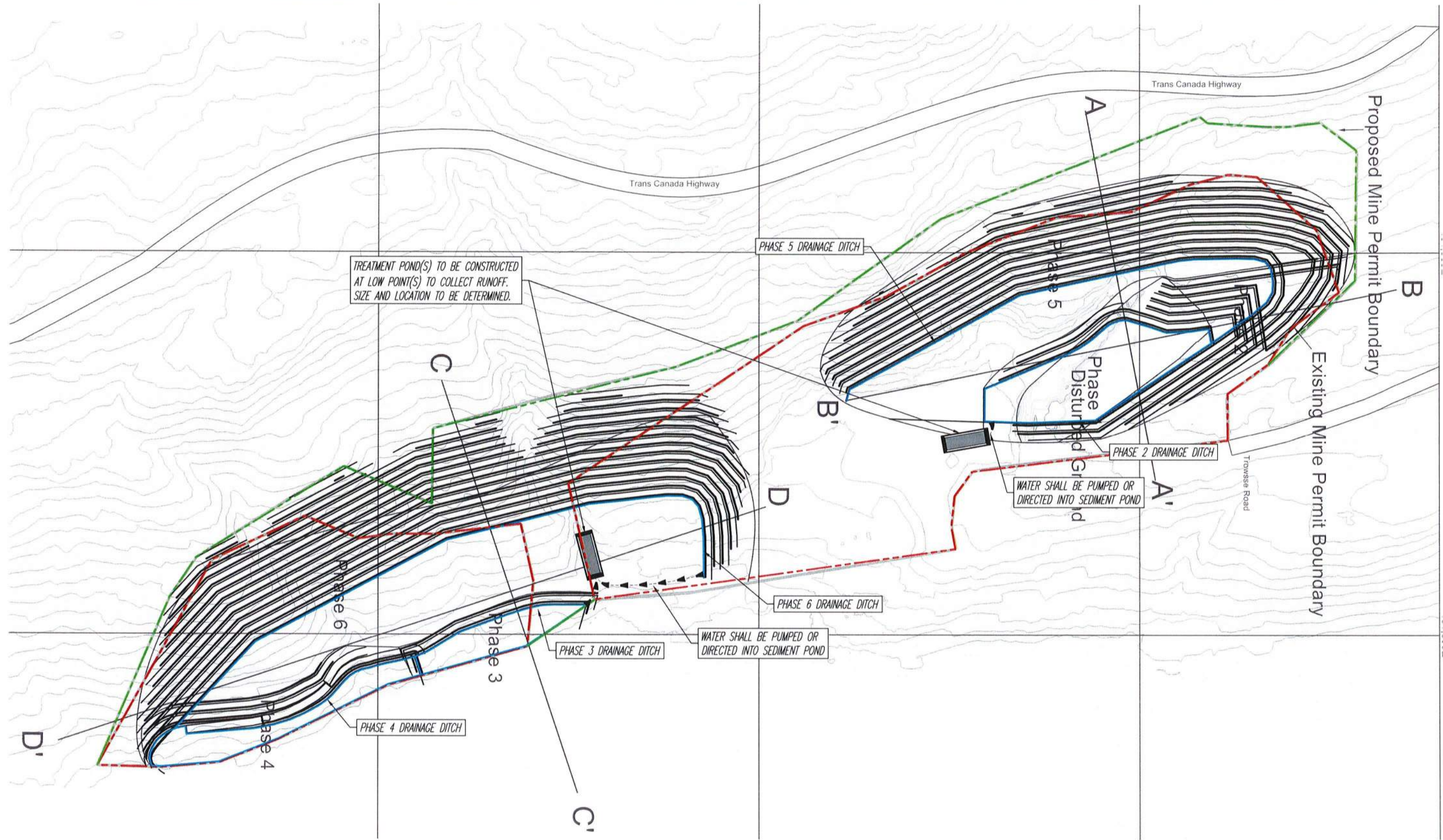
Start: 2021-11-25

Finish: 2021-11-26

Logger: RD

ELEVATION (m)	DEPTH (m)	CORE RUN (m)	CORE RECOVERY	RQD (%)	DISCONTINUITIES		GRAPHIC LOG	LITHOLOGY	COMMENTS
					DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS		SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING, ROD DROPS, TEST RESULTS, ETC.	
			107	17				<u>Bedrock</u> Aphanitic andesite with quartz veins and crystallization.	
	11	1.5						<u>No Recovery</u> No Recovery	
	12		7	0				<u>Bedrock</u> Aphanitic andesite.	
	13	1.5							
	14		86	50				<u>Bedrock</u> Aphanitic andesite. Green-grey.	
	15	1.6							
	16		95	44				<u>Bedrock</u> Fine grained andesite. Green-grey. Some amphibole crystallization.	
	17	1.6							
	18		69	38				<u>Bedrock</u> Larger amphibole crystallization. Fine grained andesite. Green-grey.	
	19	1.5							
	20		96	37				<u>Bedrock</u> Fine grained andesite with some larger amphibole and quartz crystals. 56 cm in quartz vein along concoidal fracture.	

APPENDIX B – MINE CUT AND DRAINAGE PLAN



TREATMENT POND(S) TO BE CONSTRUCTED AT LOW POINT(S) TO COLLECT RUNOFF. SIZE AND LOCATION TO BE DETERMINED.

WATER SHALL BE PUMPED OR DIRECTED INTO SEDIMENT POND

WATER SHALL BE PUMPED OR DIRECTED INTO SEDIMENT POND

LEGEND:

- -EXISTING MINE PERMIT BOUNDARY
- -PROPOSED MINE PERMIT BOUNDARY
- -DRAINAGE DITCH

SITE PLAN
1:5000



NOTE:

- DRAINAGE DITCHES TO BE LOCATED AT BASE OF CUT
- DRAINAGE DITCHES TO BE FILLED WITH 19mm CLEAR CRUSHED GRAVEL

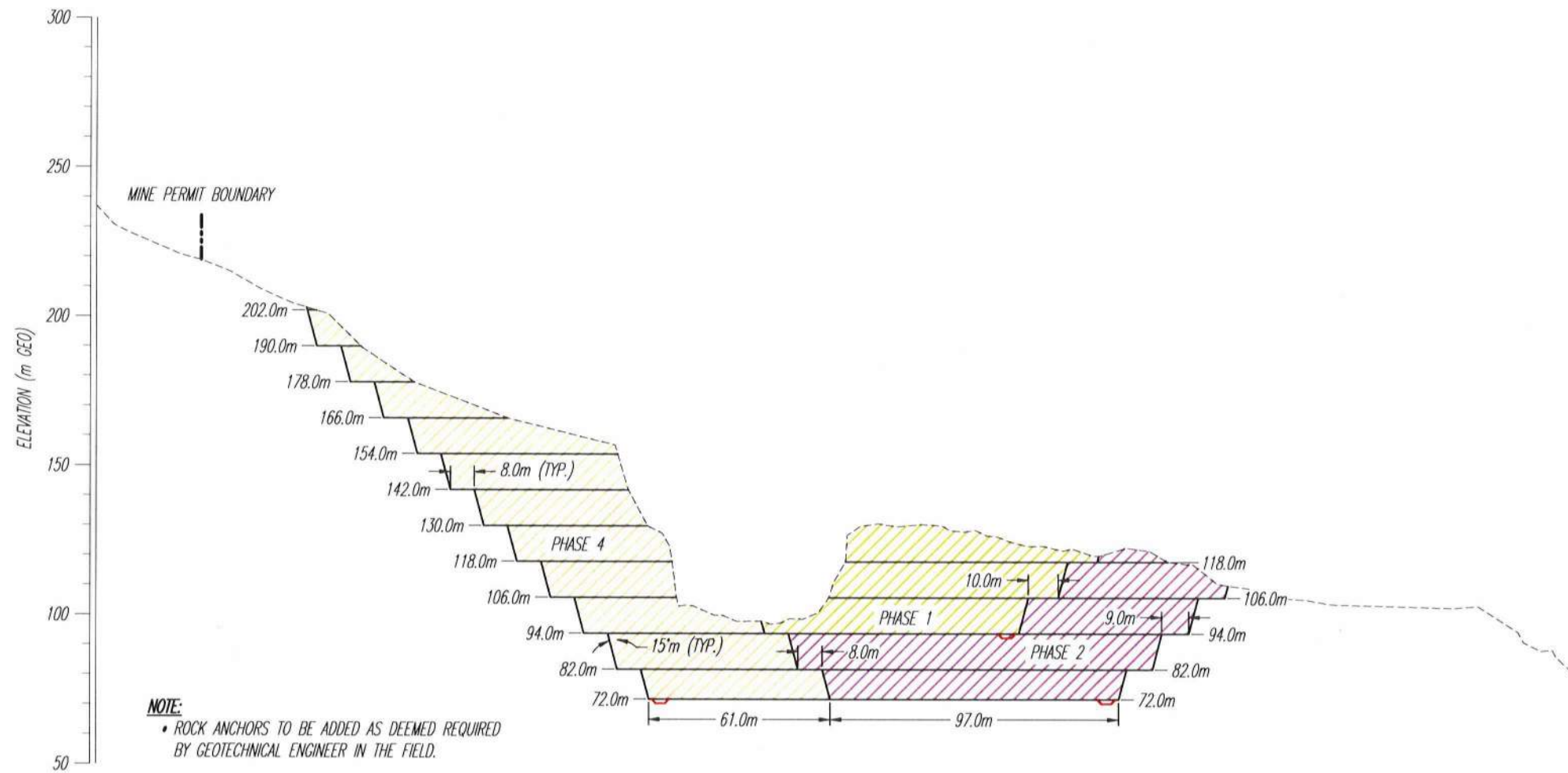


JULY 25, 2022		
NSK	MJK	DK
AS SHOWN		

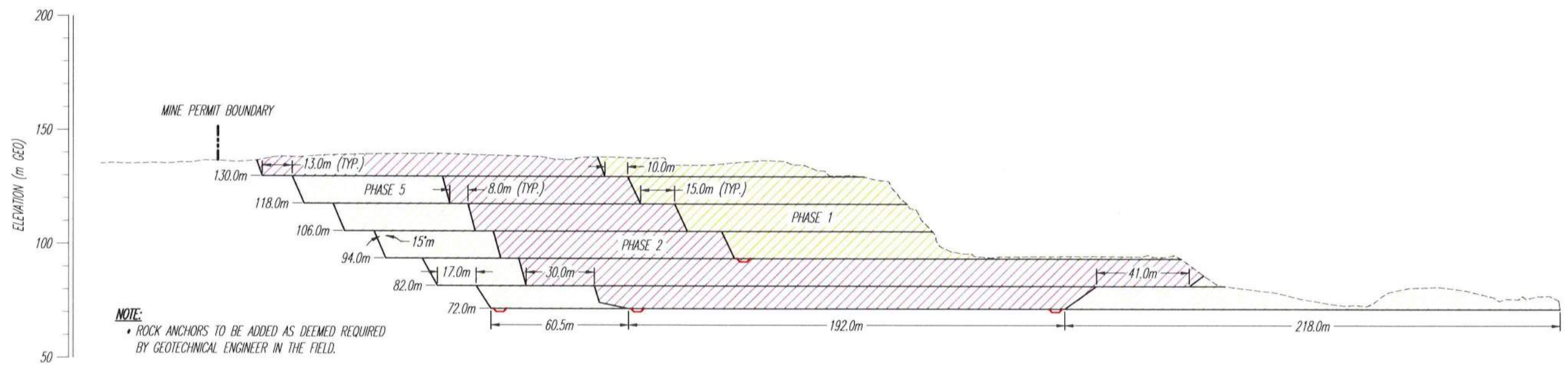
BAMBERTON QUARRY
1451 TROWSSE ROAD, MILL BAY, BC
PROPOSED MINE CUT & DRAINAGE PLAN

18403

G-S1



SECTION A
1:2000



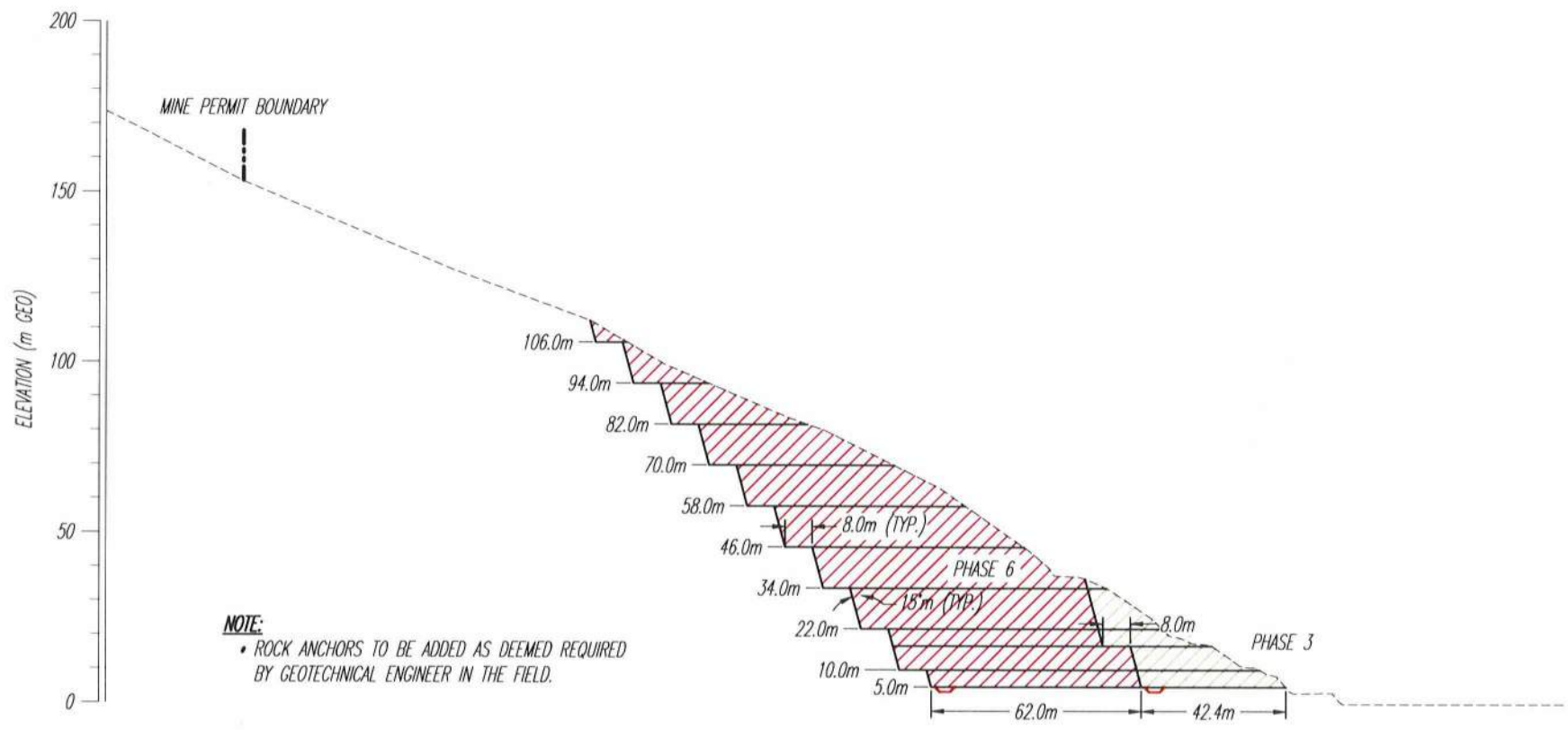
SECTION B
1:2000



JULY 25, 2022		
NSK	MJK	DK
AS SHOWN		

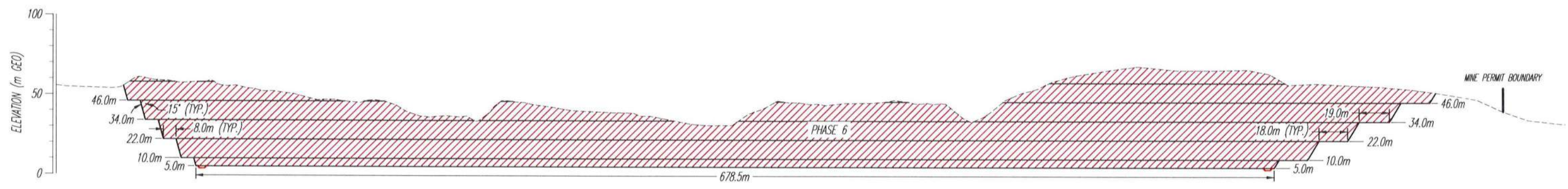
BAMBERTON QUARRY
1451 TROWSSE ROAD, MILL BAY, BC
SECTIONS A & B

18403	
G-S2	



NOTE:
 • ROCK ANCHORS TO BE ADDED AS DEEMED REQUIRED BY GEOTECHNICAL ENGINEER IN THE FIELD.

SECTION C
 1:2000



NOTE:
 • ROCK ANCHORS TO BE ADDED AS DEEMED REQUIRED BY GEOTECHNICAL ENGINEER IN THE FIELD.

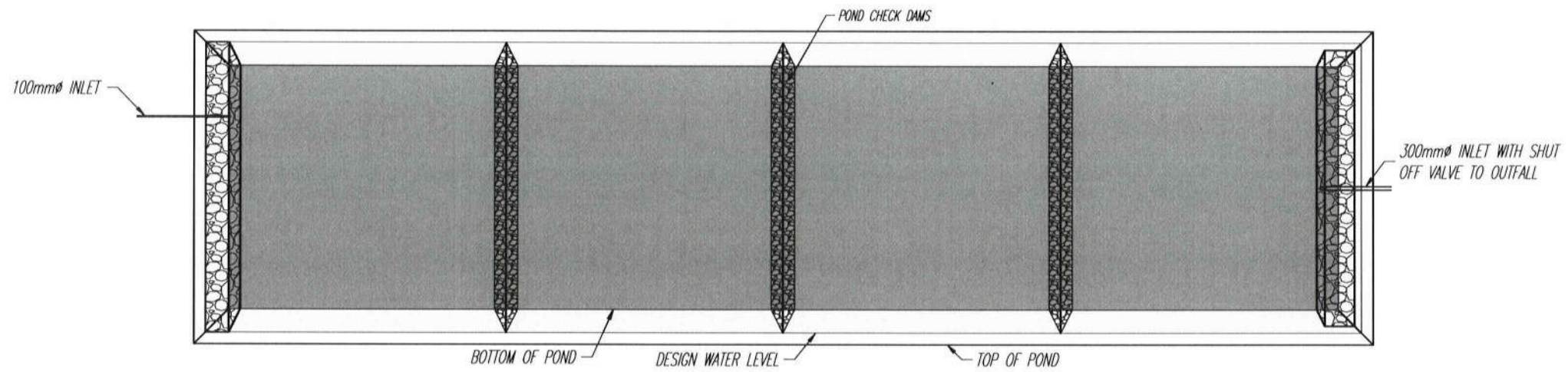
SECTION D
 1:2500



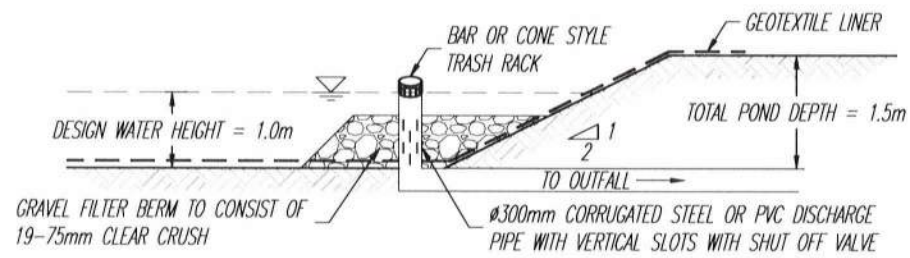
JULY 25, 2022		
NSK	MJK	DK
AS SHOWN		

BAMBERTON QUARRY
 1451 TROWSSE ROAD, MILL BAY, BC
 SECTIONS C & D

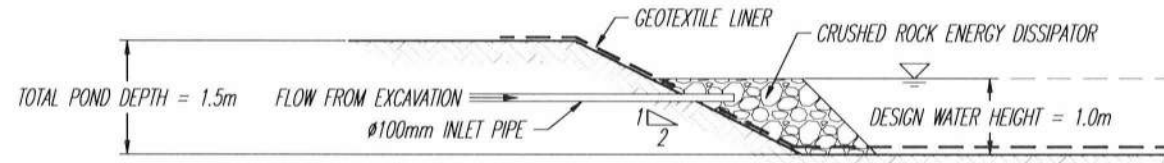
18403
G-S3



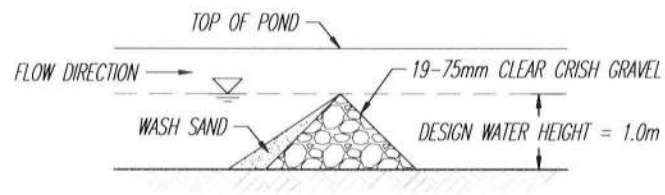
TYPICAL SEDIMENT POND
N.T.S.



SEDIMENT POND OUTLET DETAIL
1:100



SEDIMENT POND INLET DETAIL
1:100



SEDIMENT POND CHECK DAM DETAIL
1:100



DATE	JULY 25, 2022		
DRAWN BY	APPROVED BY	DESIGNED BY	
NSK	MJK	DK	
SCALE	AS SHOWN		

BAMBERTON QUARRY
1451 TROWSSE ROAD, MILL BAY, BC
SEDIMENT POND DETAILS

PROJECT NO. **18403**
DRAWING NO. **G-S4**

REVISION	
NO.	
DATE	
BY	
DESCRIPTION	

GENERAL NOTES

1. UNDER THIS PLAN, ALL PERSONS INCLUDING BUT NOT LIMITED TO THE DEVELOPER, OWNER OF THE LAND, THE ENGINEER OF RECORD, ESC MONITOR, CIVIL CONTRACTOR, CIVIL SUBCONTRACTOR, BUILDER AND BUILDING SUB-TRADES; ENGAGED ONSITE SHALL COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AUTHORITIES, FEDERAL, PROVINCIAL AND MUNICIPAL GOVERNMENT DEPARTMENTS PERTAINING TO ONSITE MANAGEMENT AND DISCHARGE ASSOCIATED WITH EROSION AND SEDIMENT CONTROL REGULATIONS.
2. IN ACCORDANCE WITH COWICHAN VALLEY REGIONAL DISTRICT, SCHEDULE C, DEVELOPMENT PERMIT AREAS, THE ESC PERMIT OF WHICH THIS PLAN FORMS A PART THEREOF; DEEMS THE PERMIT HOLDER ULTIMATELY RESPONSIBLE FOR ALL SITE ACTIVITIES THAT RESULT IN A BREACH OF COMPLIANCE WITH THE BYLAW, FOR THE DURATION OF THE PROJECT.
3. THE DEVELOPER/PERSONS RESPONSIBLE SHALL ENSURE THAT CONSTRUCTION ACTIVITIES ARE UNDERTAKEN IN A MANNER THAT ENSURES BEST MANAGEMENT PRACTICES ARE IMPLEMENTED TO CONTAIN ONSITE, SILT LADEN RUNOFF THAT EXCEEDS THE REQUIREMENTS AS SPECIFIED IN THE BYLAW, AND PREVENT ITS ENTERING DOWNSTREAM DRAINAGE INFRASTRUCTURE AND AQUATIC SYSTEMS.
4. THE DEVELOPER/OWNER/PERSONS RESPONSIBLE MUST COMPLY WITH THE ESC PLAN WITHIN THE SPECIFIED TIMEFRAME, AND COMPLY WITH ALL INSTRUCTIONS ISSUED BY THE ESC MONITOR TO RECTIFY DEFICIENCIES THAT RESULT IN NON-COMPLIANCE WITH THE PERMIT.
5. NO PERSON SHALL OBSTRUCT OR IMPEDE THE FLOW OF THE DRAINAGE SYSTEM. NO PERSON SHALL STORE, TRANSPORT OR DISPOSE OF ANY WASTE OR DELETERIOUS SUBSTANCES IN SUCH A MANNER SO AS TO PERMIT THE LIKELY ESCAPE OF THE MATERIALS INTO THE DRAINAGE SYSTEM, OR RELEASE DIRECTLY OR INDIRECTLY DELETERIOUS SUBSTANCES INTO THE DRAINAGE SYSTEM.
6. NO PERSON SHALL CAUSE OR PERMIT TO BE RELEASED INTO THE DRAINAGE SYSTEM, DIRECTLY OR INDIRECTLY, ANY SEDIMENT, EARTH, CONSTRUCTION OR EXCAVATION WASTES, CEMENT, CONCRETE OR OTHER SUBSTANCES WHICH WHEN MIXED WITH WATER WILL RESULT IN A PH AND/OR TURBIDITY VALUE OUTSIDE OF THE DISCHARGE REQUIREMENTS SPECIFIED IN THE BYLAW AND THIS PLAN.
7. THE ESC MONITOR IS RESPONSIBLE TO MONITOR, INSPECT AND REPORT TO THE DEVELOPER, CONTRACTOR AND CITY ON THE EROSION AND SEDIMENT CONTROL FACILITIES, AND SITE DISCHARGE PERFORMANCE IN ACCORDANCE WITH THE CITY'S SEDIMENT CONTROL POLICIES.
8. THE EROSION AND SEDIMENT CONTROL WORKS SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED UNTIL THE SITE NO LONGER POSES A THREAT TO THE DRAINAGE SYSTEM AND APPROVAL TO REMOVE TEMPORARY EROSION AND SEDIMENT CONTROL FACILITIES HAS BEEN OBTAINED FROM THE CITY WITH COORDINATION BY THE ESC MONITOR.

MAINTENANCE

1. UPON INSTRUCTION/NOTIFICATION BY ENGINEER OF RECORD OR ESC MONITOR, PERSONS RESPONSIBLE ARE REQUIRED TO UNDERTAKE MAINTENANCE ACTIVITIES TO MODIFY OR MAINTAIN ESC FACILITIES.
2. SHOULD ANY PART OF THE SEDIMENT CONTROL FACILITIES BECOME DAMAGED, BLOCKED OR IN ANY WAY NOT FUNCTION PROPERLY, THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO REPAIR AND/OR REMOVE SUCH DAMAGE, BLOCKAGE OR CAUSE OF MALFUNCTION.
3. ACCUMULATED SEDIMENT REMOVED DURING MAINTENANCE OF THE SEDIMENT CONTROL FACILITIES SHALL BE DISPOSED OF IN SUCH A MANNER AS TO PREVENT ITS ENTRY INTO THE SITE DRAINAGE SYSTEM, AND/OR INTO ANY STORM SEWER OR WATERCOURSE.

4. STREETS ARE TO BE INSPECTED DAILY AT MINIMUM AND SWEEPED TO ENSURE THAT NO SEDIMENT OR DEBRIS ENTERS THE STORM SYSTEM. FLUSHING IS NOT PERMITTED.
5. PAVED ROAD SURFACES ARE TO BE CLEANED OF ANY ACCUMULATED SEDIMENT AT THE END OF EACH DAY AS REQUIRED. NO MATERIAL WITH HIGH SEDIMENT CONTENT IS TO BE DEPOSITED OR PILED NEAR CATCH BASINS, LAWN BASINS OR OUTSIDE OF PROPERTY BOUNDARIES.
6. CATCH BASINS ARE TO BE INSPECTED DAILY AND FOLLOWING STORM EVENTS. SEDIMENT SACKS ARE TO BE REMOVED AND CLEANED WHEN THEY REACH APPROXIMATELY ONE THIRD CAPACITY.
7. SOIL DISTURBING CONSTRUCTION TO BE AVOIDED DURING PERIODS OF HEAVY OR PERSISTENT RAINFALL WHERE POSSIBLE.
8. STOCKPILED MATERIAL AND ALL EXPOSED SLOPES TO BE COVERED WITH 6 MIL THICK POLYETHYLENE SHEETING ANCHORED WITH WEIGHTS.
9. SILT FENCES AND BARRIERS ARE TO BE INSPECTED AND REPAIRED PRIOR TO FORECASTED RAIN EVENTS, AND FOLLOWING SIGNIFICANT RAINFALL EVENTS OR PERIODS OF EXTENDED RAIN. SEDIMENT TO BE REMOVED WHEN IT HAS REACHED APPROXIMATELY ONE THIRD THE HEIGHT OF THE FENCE.
10. SITE ACCESS PADS TO BE INSPECTED DAILY TO ENSURE FUNCTIONALITY AND ADDITIONAL ROCK IS TO BE ADDED AS REQUIRED.
11. NO CONCRETE WASH WATER IS TO BE DIRECTED INTO THE SEDIMENT CONTROL SYSTEM OR THE STORM SEWERS. ALL CONCRETE TRUCKS ARE TO BE EQUIPPED WITH A RECIRCULATORY WASH SYSTEM. NO DISCHARGE FROM CONCRETE TRUCKS IS PERMITTED ON THE STREET OR TO ENTER THE ONSITE DRAINAGE SYSTEM.
12. AN ADDITIONAL SUPPLY OF MATERIALS SHALL BE STORED ONSITE TO ENABLE A SUITABLE RESPONSE TO ANY MAINTENANCE ACTIONS REQUIRED.
13. WET WEATHER SHUT DOWN PROCEDURES TO INCLUDE SUSPENDING ANY HAULING OR MAJOR EARTHWORK ACTIVITIES USING UNPAVED ROAD SURFACES PRIOR TO FORECASTED RAIN EVENTS EXCEEDING 25mm IN 24 HOURS. ALL ERODIBLE SURFACES MUST BE STABILIZED, OR COVERED WITH POLY SHEETING, PRIOR TO SIGNIFICANT RAINFALL EVENT. ANY WATER POOLING ONSITE MUST BE DIRECTED TO SUMP AND TREATED BY WATER TREATMENT SYSTEM PRIOR TO DISCHARGE. NO UNTREATED WATER IS TO ENTER THE STORM SYSTEM.

MONITORING, SAMPLING AND TESTING PROGRAM

1. THE ESC MONITOR WILL INSPECT ALL ESC FACILITIES, RECOMMEND NEW ESC MEASURES AND/OR MAINTENANCE REQUIREMENTS, AND TEST WATER QUALITY AT THE DESIGNATED SAMPLING POINTS.
2. ALL DISCHARGE TO MUST MEET THE PH RANGE REQUIREMENT OF 6-9. WATER QUALITY REQUIREMENTS TO BE CONFIRMED BY THE COWICHAN VALLEY REGIONAL DISTRICT.
3. THE TOTAL SUSPENDED SOLIDS OF ALL DISCHARGE MUST NOT EXCEED 25mg/L. WATER QUALITY REQUIREMENTS TO BE CONFIRMED BY THE COWICHAN VALLEY REGIONAL DISTRICT.
4. WHERE ANY WASTE, DELETERIOUS SUBSTANCE, OR WATER RELEASED DIRECTLY OR INDIRECTLY INTO THE DRAINAGE SYSTEM EXCEEDS THE ALLOWABLE PH, TURBIDITY AND/OR TOTAL SUSPENDED SOLIDS LEVELS, ALL DISCHARGE IS TO BE CEASED AND CORRECTIVE MEASURES ARE TO BE IMPLEMENTED IMMEDIATELY. THE CITY IS TO BE NOTIFIED OF ANY DISCHARGE QUALITY EXCEEDANCES WITHIN 24 HOURS.

5. A LOGBOOK OF ALL INSPECTIONS SHALL BE MAINTAINED ONSITE AND BE MADE AVAILABLE TO THE CITY UPON REQUEST.
6. WATER QUALITY MONITORING AND ESC FACILITIES INSPECTIONS BY THE ESC MONITOR MUST BE CONDUCTED AT THE MIN. FREQUENCY NOTED BELOW.

	<u>MIN. MONITORING FREQUENCY</u>	<u>MIN. REPORTING FREQUENCY</u>
YEAR ROUND	MONTHLY	7 DAYS
SIGNIFICANT RAINFALL EVENT (SRE)	WITHIN 48 HOURS	7 DAYS

7. ADDITIONAL MONITORING INSPECTIONS ARE NOT REQUIRED IF SIGNIFICANT RAINFALL EVENTS OCCUR WITHIN 48 HOURS OF EACH OTHER.
8. INSPECTION REPORTS SHALL BE SUBMITTED TO THE DEVELOPER AND CONTRACTORS.
9. THE ESC MONITOR WILL NOTIFY THE CITY IF THEY ARE NO LONGER RETAINED FOR THE PROJECT.

DECOMMISSIONING

1. BUILDING CONSTRUCTION MUST BE AT STREET LEVEL OR HIGHER WITH ALL EXPOSED SURFACES STABILIZED PRIOR TO BEGINNING THE PROCESS OF DECOMMISSIONING ANY ESC FACILITIES.
2. APPROVAL TO ALTER AND/OR REMOVE ANY COMPONENT OF THE WATER TREATMENT SYSTEM MUST BE OBTAINED FROM THE CITY WITH THE COORDINATION OF THE ESC MONITOR.
3. PRIOR TO SUBMITTING THE REQUEST FOR APPROVAL TO REMOVE COMPONENTS OF THE WATER TREATMENT SYSTEM, WATER QUALITY TESTING OF THE UNTREATED WATER IN THE BUILDING SUMP WILL BE CONDUCTED TO ENSURE ALLOWABLE TURBIDITY AND/OR PH LEVELS CAN BE MAINTAINED WITHOUT ADDITIONAL TREATMENT. THE PH TREATMENT COMPONENT OF THE SYSTEM MUST REMAIN ONSITE UNTIL ALL MAJOR CONCRETE POURS HAVE BEEN COMPLETED AT MINIMUM.
4. THE DECOMMISSIONING OF ANY ESC FACILITIES WITHOUT PRIOR APPROVAL MAY RESULT IN FINES AND/OR A STOP WORK ORDER.

ENFORCEMENT

1. FAILURE TO IMPLEMENT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN OR TO COMPLY WITH MUNICIPAL REGULATIONS MAY RESULT IN FINES AND/OR A STOP WORK ORDER.
2. FEDERAL ENVIRONMENTAL OFFENCES ARE STRICT LIABILITY OFFENCES AND CAN RESULT IN FINES AND/OR INCARCERATION.



DATE: JULY 25, 2022		
DESIGNED BY: NSK	CHECKED BY: MJK	DATE: DK
SCALE: AS SHOWN		

BAMBERTON QUARRY
1451 TROWSSE ROAD, MILL BAY, BC
DRAINAGE SPECIFICATIONS

18403
G-S5