EPC Package for Lara Super Thermal Power Project, Stage II (2 X 800 MW)
Amendment No. 1 to Technical specification Section VI of Bidding Document No.: CS-9587-001R-2

S. No.	SPECIFICATION REFERENCE				Existing	Read as
	Section / Part	Sub-Section	Clause No.	Page No.		
D-1-01	VI / B	D-1-7	7.00.00	1 TO 12	Sub-Section D-1-7	Refer revised Sub-section D-1-7 at Annexure A
D-1-02	VI / B	D-1-12 ANNEXURE (C)	----	----	Sub-Section D-1-12 Annexure (C)	Refer revised Sub-Section D-1-12 Annexure(C) at Annexure-B.

CLAUSE NO.	TECHNICAL REQUIREMENTS

7.00.00 **FOUNDATION SYSTEM AND GEOTECHNICAL DATA**

7.01.00 **Soil Data**

Owner has carried out detailed geotechnical investigation at the project site. Bore logs data and Bearing capacity for design of foundations are given at Annexure - C of this specification. The detailed geotechnical investigation report comprising of Boreholes, Laboratory tests, Chemical analysis, etc for the sub-strata prevailing at site would be made available for the Bidder's study at the Owner's office, if required. The onus of correct assessment / interpretation and understanding of the existing subsoil condition / data lies with the Bidder. **In case, bidder feels that the available data is inadequate, he may carry out his own geotechnical investigation. Further, if any change in layout or for any area not covered in the provided geotechnical data, the bidder has to carry out geotechnical investigation in the area at no cost to Owner.** Geotechnical investigation work shall got executed by the Contractor through the agencies as mentioned in Clause No. 7.07.01. However, no time extension shall be given on account of soil investigation carried out by the Bidder. The geotechnical investigation report shall be prepared with detailed recommendations regarding type of foundation and allowable bearing pressure for various structures/ facilities and other soil parameters. Net allowable bearing pressure shall be limited to Table-1 and Table-1a of Annexure-C. The report shall be submitted for Owner's approval prior to commencement of design of foundation.

Bidder may refer enclosed topographical survey drawing and general layout plan along with borelogs for variation in existing/ natural ground level (NGL) and finished ground level (FGL). Wherever ash/coal deposit/brick-bats etc. is found the same shall be treated as filled up soil.

7.01.01 **The furnished borelog details are specific to the co-ordinates where the boreholes have been carried out and are provided for bidder's information only. Soil profile in the proposed area may vary with respect to the borelogs enclosed for bidder's information. Bidder has to consider all such variations in his estimation, over the extent of the work to be carried out. The Bidder should note that nothing extra whatsoever on account of variation between soil data collected by Owner and that found by the Bidder during geotechnical investigation by him or during execution of works, shall be Payable.**

7.01.02 Tank Foundations

a) The tanks shall rest on flexible tank pad foundation, resting on sand with concrete ring wall to retain sand. Base of the concrete ring wall shall not rest on the expansive soil, if any.

b) Entire loose/ soft soil inside the concrete ring wall shall be removed and shall be filled with sand. Sand for filling shall be clean and well graded conforming to IS 383 with grading Zone I to III.

c) Sand shall be spread in layers not exceeding 30cm compacted thickness over the area. Each layer shall be uniformly compacted by mechanical means like plate vibrators, small vibratory rollers, etc to achieve a relative density of not less than 80%.

d) Other requirements of tank foundations shall be as per IS 803 and as specified elsewhere in the specifications.

7.02.00 **Foundation System**

The requirements for the foundation system to be adopted are as given in subsequent clauses. Depending upon the depth of competent strata/stratum, type of structures, functional

requirement of facility, extent of cutting / filling, suitable open or pile foundation shall be adopted with approval of owner.

7.02.01 General Requirements

a) All structures/equipment shall be supported on suitable open foundations (isolated, combined, raft) or pile foundation depending on type of structures/facilities, sub-strata, topography etc.

b) The roads, ground floor slabs, trenches, pipe pedestals (except thrust blocks), channels/drains and staircase foundation with foundation loading intensity less than 4 T / M2 may be supported on open / shallow foundations resting on virgin / controlled compacted filled up soil.

c) No other foundation (other than as mentioned in (b) above and (g) below) shall rest on the filled up ground / soil.

d) All foundations shall be designed in accordance with relevant parts of the latest revisions of Indian Standards.

e) The water table for design purpose shall be considered at Finished Ground Level.

f) A combination of open and pile foundations shall not be permitted under the same equipment / structure / building.

g) Foundation for equipments on ground floor

For equipments of static weight upto 1.5 T, the equipment may be supported on the ground floor slab by locally thickening the slab. Thickening of the ground floor slab shall be done upto an extent of about 0.6 m beyond the plan area of the equipment on all the sides. Further, the load intensity below the equipment shall be limited to 4T/m2. Other requirements of floor slab and compaction below the floor slab shall be adhered, as specified elsewhere in the specifications.

For equipment's of static weight between 1.5 T and 20 T, the equipment may be supported on compacted sand filling from Natural Ground Level (NGL) or excavation level of nearby footing whichever is deeper with the load intensity below the equipment limited to 4T/m2. The minimum depth of foundation is 1.0m below FFL. Other requirements of sand compaction below the foundation shall be adhered, as specified elsewhere in the specifications.

For equipment of static weight more than 20 T, the equipment foundation shall be taken to the founding level or shall be built up with PCC from the level as mentioned in the Table 1 and Table 1a. The pedestal of equipment foundation or the foundation Block shall be isolated from the adjoining floor slab by providing bitumen impregnated fiber board of minimum 50 mm thick, conforming to IS: 1838 all around the equipment pedestal for the full depth of the floor slab.

7.02.02 Open Foundations

In case open foundations are adopted, following shall be adhered to.

a) The minimum width of foundation shall be 1.0 m.

b) In case of soil, minimum founding level shall be 1.0m below Finished ground level (FGL) or, 1.0m below Natural ground level (NGL) whichever is lower.

In case of rock, minimum founding level shall be 0.6m below Finished ground level (FGL) or, 0.6m below Natural ground level (NGL) whichever is lower.

For meeting the bearing capacity and /or functional requirement lower depth to be adopted based on requirement.

c) It shall be ensured that all foundations of a particular structure/ buildings/ facility shall rest on one bearing stratum.

d) Wherever the intended bearing sub-strata is virgin soil stratum but the actual stratum encountered during foundation excavation consists of filled up soil at founding level,

under such cases either the foundation shall be lowered completely into the virgin stratum or the filled up soil upto the virgin layers shall be removed and built up through PCC (1:4:8) up to designed foundation level.

e) Wherever the intended bearing stratum is weathered rock, but the actual strata encountered during excavation consists of both overburden soil and weathered rock at founding level, under such cases, the overburden upto the weathered rock level including 0.5 m into the weathered rock shall be removed and built up through PCC (1:3:6) upto the designed founding level. Thus, maintaining the same founding level for all the footings of a structure.

f) The last layer of about 300 mm before reaching the founding level shall be excavated carefully by such equipment so that soil / rock at the required level will be left in its natural condition.

7.03.00 Special Requirements

7.03.01 Details of treatment for foundations / underground structures required to counteract soil / water chemical environment, cement type, grade of concrete, type of reinforcement, cover to reinforcement and protective coating to foundations, etc. shall be as mentioned in Annexure-C of this specification

7.04.00 Excavation, Filling and Dewatering

7.04.01 For excavation works, comprehensive dewatering with well point or deep wells arrangement, if required, shall be adopted. Scheme for dewatering and design with all computations and back up data for dewatering shall be submitted for the owner's information. The water table shall be maintained at 0.5m below the founding depth.

7.04.02 Excavation for shallow foundations shall be covered with PCC immediately after reaching the founding level. In case of any local loosening of soil or any loose pockets are encountered at founding level during excavation the same shall be removed and compensated by PCC M7.5. The final layer of about 300 mm thickness above the founding level shall be excavated by suitable means, so as to avoid disturbance to founding stratum.

7.04.03 **Backfilling in Power House & Boiler Area**

Backfilling around foundations, trenches, sumps, pits, plinths, etc. shall be carried out with sand in layers not exceeding 300 mm compacted thickness and each layer shall be compacted to minimum 80% of relative density.

Backfilling in other area

Backfilling around foundations, pipes, trenches, sumps, pits, plinths, etc. shall be carried out with approved material in layers not exceeding 300 mm compacted thickness (higher thickness of layers upto 500mm with heavy mechanical compacting equipment) and each layer shall be compacted to 90% of standard proctor density for cohesive soils and to 80% of relative density for non cohesive soils.

Rock pieces having size less than 150 mm and interstices filled with soil may be used for backfilling around foundation, plinths etc. and shall be compacted to minimum of 85% of original stack of material after filling the interstices.

7.04.04 Founding level for trenches/channels shall be decided as per functional requirement. The bottom of excavation shall be properly compacted prior to casting of bottom slab of trenches / channels.

7.04.05 CBR tests for pavement/road design shall be carried out by the Contractor after earth filling (if applicable) has been completed upto the formation level.

7.04.06 The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding of material or article from any bank or side of such excavation which is more

than one and a half meter above the footing by providing adequate piling, shoring, bracing etc. against such bank or sides.

Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.

7.05.00 **EXCAVATION IN ROCK**

Excavation in rock shall be carried out by mechanical means and if blasting is required for founding of some of the structures under this package, control blasting only shall be carried out.

7.05.01 Controlled blasting shall be done by a specialised agency duly approved by Engineer. All controlled blasting shall be done by using time delay detonators (i.e. excel type).

7.05.02
a) Contractor shall engage an agency expert in blasting such as, NIRM (National Institute of Rock Mechanics), CMPDIL, Central Institute of Mining and Fuel Research Dhanbad, Dept. of Mining of Govt. Institutions etc. to design detailed blasting scheme and get the same approved from Engineer before carrying out the blasting operation. All blasting shall be done as per the approved blasting scheme & initial blasting operations shall be done under the supervision & guidance of the representative of the blasting expert.

b) All the statutory laws, (Explosives Act etc.) rules, regulations, Indian Standards, etc. pertaining to the acquisition, transport, storage, handling and use of explosives, etc. shall be strictly followed.

c) The Contractor shall obtain Licenses from Competent Authorities for undertaking blasting work as well as for procuring, transporting to site and storing the explosives as per explosives act. The Contractor shall be responsible for the safe transport, use, custody and proper accounting of the explosive Materials.

d) The Contractor shall be responsible and liable for any accident and injury / damage which may occur to any person or property of the project or public on account of any operations connected with the storage, transportation, handling or use of explosive and blasting operations.

7.06.00 **Sheeting & Shoring**

The contractor shall ascertain for himself the nature of materials to be excavated and difficulties, if any, likely to be encountered in excavation while executing the work. Sheet piling, sheeting and shoring, bracing and maintaining suitable slopes, drainage, etc. shall be provided and installed by the Contractor, to the satisfaction of the Engineer.

7.07.01 **Geotechnical investigation work may be got executed by the Contractor through the following suggested agencies**

1. C.E.TESTING COMPANY Pvt. Ltd, Kolkata

2. Cengrs Geotechnica Pvt. Ltd, New Delhi

3. KCT Consultancy Services, Ahemdabad

4. M.K. Soil Testing Laboratory, Ahemdabad

5. Secon Private Limited, Banglore

6. Soil Engineering Consultants, New Delhi

7. CEG Test House and Research Centre Private Limited, Jaipur

8. Geomarine Consultants Pvt Ltd., Chennai

9. Soiltech India Private Limited, Pune

Annexure-C

SOIL DATA AND FOUNDATION SYSTEM

Employer has carried out geotechnical investigation in the proposed area. Logs of boreholes of proposed area are enclosed with this Annexure.

a) The minimum founding level and the corresponding net allowable bearing pressure shall be as given in Table – 1 below (**except CWPH, FOPH, Swichyard, crusher house and stacker reclaimer area)**.

Table-1

Founding Depth/ Stratum	Net Allowable Bearing Pressure T/m2		
	Isolated and combined footings including raft for 25mm permissible settlement in case of soil and 12mm in case of rocky strata	Isolated and combined footings for 40mm permissible settlement in case of soil and 12mm in case of rocky strata	Rafts (width > 6m) for 75mm permissible settlement in case of soil and 12mm in case of rocky strata
	Width upto 6.0m		
In case of foundation stratum is soil			
1.0m below NGL	8	10	12
2.0m below NGL	12	18	22
3.0m below NGL	15	22	25
4.0m below NGL	20	25	28
5.0m below NGL	25	28	30
6.0m below NGL	30	35	35
7.0m below NGL	35	40	40
8.0m or more than 8.0m below NGL	45	45	45
In case of founding stratum is rock			
0.6m embedment into weathered rock	35	35	35
1.0m embedment into weathered rock	40	40	40
2.0m embedment into weathered rock	50	50	50
3.0m embedment into weathered rock	52	52	52
3.5m or more than 3.5m embedment into weathered rock	55	55	55

The minimum founding level and the corresponding net allowable bearing pressure for **CWPH, FOPH, crusher house, Switchyard and stacker reclaimer area** shall be as given in Table – 1a below.

Table-1a

Founding Depth/ Stratum	Net Allowable Bearing Pressure T/m2		
	Isolated and combined footings including raft for 25mm permissible settlement in case of soil and 12mm in case of rocky strata	Isolated and combined footings for 40mm permissible settlement in case of soil and 12mm in case of rocky strata	Rafts (width > 6m) for 75mm permissible settlement in case of soil and 12mm in case of rocky strata
	Width upto 6.0m		
In case of foundation stratum is soil			
1.0m below NGL	8	10	12
2.0m below NGL	10	12	22
3.0m below NGL	14	15	24
4.0m below NGL	14	16	28
5.0m below NGL	15	18	30
6.0m below NGL	16	19	31
7.0m below NGL	17	21	33
8.0m or more than 8.0m below NGL	19	23	35
In case of founding stratum is rock			
0.6m embedment into weathered rock	35	35	35
1.0m embedment into weathered rock	40	40	40
2.0m embedment into weathered rock	50	50	50

For Finished ground level (FGL) refer General layout plan (GLP)

To determine the Natural Ground Level (NGL) the following two tender drawings titled "TOPGRAPHICAL SURVEY OLD SURVEY DATA FOR NGL PURPOSE" and "TOPGRAPHICAL SURVEY (EXISTING GROUND LEVEL)" shall be referred. Further the above two tender drawings shall also be referred in conjunction with borelog data attached at Annexure to this chapter.
The NGL for any particular structure/facility shall be the lowest of all the NGLs mentioned in the extent of the building/facility.
The NGL of any point shall be the lowest of the levels at (a) TOPGRAPHICAL SURVEY OLD SURVEY DATA FOR NGL PURPOSE (b) TOPGRAPHICAL SURVEY (EXISTING GROUND LEVEL) and (c) Borelog data attached at Annexure to this chapter.
In case any loose/soft pockets is encountered at founding level, the same shall be removed completely upto the hard strata and filled up with PCC (1:4:8).

The net allowable bearing pressure higher than above mentioned values shall not be permitted. At intermediate levels the bearing capacity shall be same as the net allowable bearing pressure corresponding to the immediate shallower level mentioned above.

For open foundations, the total permissible settlement shall be governed by IS: 1904 / IS: 13063 and from functional requirements whichever is more stringent. However, total settlement shall be restricted to the following:

Isolated & Raft (Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	25 mm
Isolated & Strip (other than Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	40 mm
Raft (other than Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	75 mm
Foundations in Weathered rock / rock	12 mm

In case the total permissible settlement is to be restricted to less than as above specified from functional requirements, then the net allowable bearing pressure shall be reduced after review in consultation with Engineer.

c) Special Requirements:

i) Chemicals in ground water and subsoil, as observed during investigation are:

Chemical	Sulphates	Chlorides	pH
Ground Water	60-120 mg/L	57-88 mg/L	7.64-7.95
Sub-soil	<0.05%	0.007-.010	5.04-8.32

ii) In view of the above, the following shall be adopted.

Cement Type	As specified elsewhere in the specifications
Concrete Grade	As specified elsewhere in the specifications
Type of Reinforcement	As specified elsewhere in the specifications
Cover to Reinforcement	As specified elsewhere in the specifications

ANNEXURE-C (Revised) TO AMENDMENT-1

Technical specification of Lara II (2X800 MW)

EPC Package

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ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-22)

Location :	Track Hopper (Future)	Surface Elevation :	RL 212.332 m	Boring Method :	Shell & Auger
UTM Coordinates :	752674 E, 2407273 N	Ground Water Depth :	21.87 m	Casing Depth :	
Survey Coordinates :	2613S, 1254W	Termination Depth :	35.24 m (RL 177.1 m)	Boring Start :	03-Aug-18
		Ground Water Level :	RL 190.5 m	Boring Finish :	05-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Medium dense brown silty sand with gravel (SM)		22	56	22	0													
1.00	1.30	UDS1					2.50									1.71	1.50	13.8						
2.50	2.95	SPT1	20	20		Very stiff to hard brown clayey silt, low plastic (CL)									17									8
4.00	4.30	UDS2				- very stiff, 2.5 to 5.5 m										1.80	1.56	15.2		UU	1 ,2, 3	1.4	11.1	
5.50	5.95	SPT2	55	55		- hard, 5.5 to 10.0 m		10	11	65	14								2.63					13
7.00	7.45	SPT3	75	75		- with gravel, 5.5 to 7.0 m						31.4	19.6	11.8										
8.50	8.95	SPT4	102	102			10.00																	
10.00	10.45	SPT5	101	101		Hard brown clayey silt, medium plastic (CI)		4	9	60	27													
11.50	11.95	SPT6	89	89		- with traces of gravel, 10.0 to 11.5 m						36.1	21.1	15.0										
13.00	13.45	SPT7	102	102																				
14.50	14.95	SPT8	68	68			16.00																	
16.00	16.45	SPT9	56	56		Hard brown clayey silt, low plastic (CL)						32.8	21.2	11.7										

[1] SPT is outside NABL scope.

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Soil Profile (BH-22)

Location :	Track Hopper (Future)	Surface Elevation :	RL 212.332 m	Boring Method :	Shell & Auger
UTM Coordinates :	752674 E, 2407273 N	Ground Water Depth :	21.87 m	Casing Depth :	
Survey Coordinates :	2613S, 1254W	Termination Depth :	35.24 m (RL 177.1 m)	Boring Start :	03-Aug-18
		Ground Water Level :	RL 190.5 m	Boring Finish :	05-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
17.50	17.95	SPT10	62	62		Hard brown clayey silt, low plastic (CL)																		
19.00	19.45	SPT11	62	62																				
20.50	20.95	SPT12	51	51																				
22.00	22.45	SPT13	68	68																				
23.50	23.95	SPT14	56	56																				
25.00	25.45	SPT15	63	63				0	5	66	29													
26.50	26.95	SPT16	24	24								34.0	23.3	10.7										
28.00	28.34	SPT17	105/ 19cm	-																UC		1.3		
29.50	29.83	SPT18	101/ 18cm	-		- with traces of gravel, 29.5 to 31.0 m		2	4	66	28													
31.00	31.37	SPT19	101/ 22cm	-			32.50																	
32.50	32.77	SPT20	101/ 12cm	-		Hard brown clayey silt, medium plastic (CI)		0	2	64	34													
34.00	34.33	SPT21	101/ 18cm	-								37.3	22.4	14.8										

[1] SPT is outside NABL scope.

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Soil Profile (BH-22)

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UTM Coordinates :	752674 E, 2407273 N	Ground Water Depth :	21.87 m	Casing Depth :	
Survey Coordinates :	2613S, 1254W	Termination Depth :	35.24 m (RL 177.1 m)	Boring Start :	03-Aug-18
		Ground Water Level :	RL 190.5 m	Boring Finish :	05-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
35.00	35.24	SPT22	102/ 9cm	-		Hard brown clayey silt, medium plastic (Cl)	35.24																	

[1] SPT is outside NABL scope.

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Soil Profile (BH-56)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 210.071 m	Boring Method :	Shell & Auger
UTM Coordinates :	753201 E, 2407556 N	Ground Water Depth :	Not met	Casing Depth :	
Survey Coordinates :	2280S, 727W	Termination Depth :	20.05 m (RL 190 m)	Boring Start :	11-Aug-18
				Boring Finish :	09-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Dense brown silty fine sand with gravel (SM)	1.00	10	59	27	4													
1.00	1.30	UDS1				Hard brown clayey silt with gravel, medium plastic (CI)										1.79	1.60	12.1		UU	1 ,2, 3	2.8	15.1	
2.50	2.95	SPT1	53	53				13	9	43	35													
4.00	4.45	SPT2	72	72								35.4	20.6	14.9					2.68					
5.50	5.84	SPT3	101/ 19cm																					
7.00	7.32	SPT4	102/ 17cm																					
8.50	8.79	SPT5	102/ 14cm				10.00																	
10.00	10.14	SPT6	Ref*/ 14cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

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ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-56)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 210.071 m	Boring Method :	Rotary Drilling
UTM Coordinates :	753201 E, 2407556 N	Ground Water Depth :	Not met	Casing Depth :	
Survey Coordinates :	2280S, 727W	Termination Depth :	20.05 m (RL 190 m)	Boring Start :	11-Aug-18
				Boring Finish :	09-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Rig : Joy Voltas: 12B				
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
Ref*/ 14cm	10.00	10.00	SPT6				Very weak, Brown GRANITE, disintegrated completely weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	10.50	10.14																				
	11.00		RK-1	1-5					14	0												
Ref*/ 4cm	11.50	11.50	SPT7																			
	12.00	11.54																				
	12.50		WS1						0	0												
Ref*/ 15cm	13.00	13.00	SPT8																			
	13.50	13.15																				
	14.00		WS2						0	0	15											
Ref*/ 4cm	14.50	14.50	SPT9																			
	15.00	14.54																				
	15.50		RK-2	6-11					19	0												
Ref*/ 5cm	16.00	16.00	SPT10																			
	16.50	16.05																				

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

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ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-56)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 210.071 m	Boring Method :	Rotary Drilling
UTM Coordinates :	753201 E, 2407556 N	Ground Water Depth :	Not met	Casing Depth :	
Survey Coordinates :	2280S, 727W	Termination Depth :	20.05 m (RL 190 m)	Boring Start :	11-Aug-18
				Boring Finish :	09-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX / Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity	Rig : Joy Voltas: 12B: Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
	16.50		WS3				Very weak, Brown GRANITE, disintegrated completely weathered		0	0			Light Brown	100%	32 CT Diamond Impregnated Bit							
	17.00																					
Ref*/ 5cm	17.50	17.50	SPT11																			
		17.55																				
	18.00		WS4						0	0	15											
	18.50																					
Ref*/ 4cm	19.00	19.00	SPT12																			
		19.04																				
	19.50		WS5						0	0												
Ref*/ 5cm	20.00	20.00	SPT13																			
		20.05						20.05														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-59)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 206.645 m	Boring Method :	Shell & Auger
UTM Coordinates :	753246 E, 2407432 N	Ground Water Depth :	18.41 m	Casing Depth :	
Survey Coordinates :	2400S, 672W	Termination Depth :	30.04 m (RL 176.6 m)	Boring Start :	13-Aug-18
		Ground Water Level :	RL 188.2 m	Boring Finish :	09-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	1.00	DS1				Very stiff to hard brown clayey silt, low plastic (CL)		4	30	57	9													
1.00	1.45	SPT1	16	16		- very stiff, with traces of gravel, 0.0 to 7.0 m						26.7	15.5	11.1	14									8
2.50	2.80	UDS1														1.78	1.62	10.1		UU	1 ,2, 3	2.4	1.7	
4.00	4.45	SPT2	22	22				3	8	60	29													
5.50	5.80	UDS2														1.91	1.72	11.1						
7.00	7.45	SPT3	79	79		- hard, with gravel, 7.0 to 17.5 m						30.0	21.0	9.0					2.68					
8.50	8.95	SPT4	92	92																				
10.00	10.42	SPT5	101/ 27cm					7	27	47	19													
11.50	11.95	SPT6	91	91																				
13.00	13.41	SPT7	101/ 26cm																					
14.50	14.83	SPT8	101/ 18cm																					
16.00	16.39	SPT9	101/ 24cm																					

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-59)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 206.645 m	Boring Method :	Shell & Auger
UTM Coordinates :	753246 E, 2407432 N	Ground Water Depth :	18.41 m	Casing Depth :	
Survey Coordinates :	2400S, 672W	Termination Depth :	30.04 m (RL 176.6 m)	Boring Start :	13-Aug-18
		Ground Water Level :	RL 188.2 m	Boring Finish :	09-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
17.50	17.82	SPT10	102/ 17cm			Hard brown clayey silt with gravel, low plastic (CL)						26.5	19.0	7.5										
19.00	19.28	SPT11	101/ 13cm																					
20.50	20.95	SPT12	96	96																				
22.00	22.41	SPT13	101/ 26cm																					
23.50	23.70	SPT14	100/ 5cm				25.00																	
25.00	25.14	SPT15	Ref*/ 14cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-59)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 206.645 m	Boring Method :	Rotary Drilling
UTM Coordinates :	753246 E, 2407432 N	Ground Water Depth :	18.41 m	Casing Depth :	
Survey Coordinates :	2400S, 672W	Termination Depth :	30.04 m (RL 176.6 m)	Boring Start :	13-Aug-18
		Ground Water Level :	RL 188.2 m	Boring Finish :	09-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX				Rig : Joy Voltas: 12B				
													Return Water								
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
Ref*/ 14cm	25.00	25.00	SPT15				Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, completely weathered														
	25.50	25.14																			
			RK1	1-5					22	0	18					2.50	2.69	0.071	1.12	112	2454*	
	26.00						- weak, intensely fractured, 25.0 to 26.5														
	26.50	26.50																			
	27.00						- Very weak, disintegrated, 26.5 to 30.04														
			WS1						0	0											
	27.50																				
Ref*/ 4cm	28.00	28.00	SPT16																		
		28.04																			
	28.50		WS2						0	0	15										
Ref*/ 5cm	29.00	29.00	SPT17																		
		29.05																			
	29.50		WS3						0	0											
Ref*/ 4cm	30.00	30.00	SPT18																		
		30.04						30.04					Light Brown	100%	32 CT Diamond Impregnated Bit						

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-63)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 205.820 m	Boring Method :	Shell & Auger
UTM Coordinates :	753606 E, 2407602 N	Ground Water Depth :	17.50 m	Casing Depth :	
Survey Coordinates :	2204S, 431W	Termination Depth :	35.25 m (RL 170.6 m)	Boring Start :	02-Aug-18
		Ground Water Level :	RL 188.3 m	Boring Finish :	29-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown clayey silt, low plastic (CL)		10	25	44	21													
1.00	1.45	SPT1	23	23		- very stiff, with gravel, 0.0 to 4.0 m									14									
2.50	2.80	UDS1														1.80	1.59	12.7		UU	1 ,2, 3	1.7	9.0	
4.00	4.45	SPT2	52	52		- hard, 4.0 to 17.5 m		1	8	70	21													
5.50	5.89	SPT3	101/ 24cm			- with traces of gravel, 4.0 to 13.0 m						32.5	22.8	9.8										
7.00	7.40	SPT4	103/ 25cm																2.70					
8.50	8.95	SPT5	78	78																				
10.00	10.38	SPT6	103/ 23cm									32.6	22.5	10.0										
11.50	11.88	SPT7	104/ 23cm																					
13.00	13.39	SPT8	102/ 24cm			- with gravel, 13.0 to 17.5 m																		
14.50	14.87	SPT9	103/ 22cm									34.3	17.8	16.6										
16.00	16.28	SPT10	102/ 13cm																					

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-63)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 205.820 m	Boring Method :	Shell & Auger
UTM Coordinates :	753606 E, 2407602 N	Ground Water Depth :	17.50 m	Casing Depth :	
Survey Coordinates :	2204S, 431W	Termination Depth :	35.25 m (RL 170.6 m)	Boring Start :	02-Aug-18
		Ground Water Level :	RL 188.3 m	Boring Finish :	29-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
17.50	17.73	SPT11	103/ 8cm			Hard brown clayey silt with gravel, low plastic (CL)		22	36	32	10													
19.00	19.28	SPT12	101/ 13cm									32.5	22.5	10.0										
20.50	20.95	SPT13	96	96																				
22.00	22.45	SPT14	85	85															2.67					
23.50	23.82	SPT15	105/ 17cm																					
25.00	25.29	SPT16	102/ 14cm									30.6	16.2	14.4										
26.50	26.82	SPT17	103/ 17cm																					
28.00	28.29	SPT18	102/ 14cm																					
29.50	29.89	SPT19	103/ 24cm					9	29	49	13													
31.00	31.40	SPT20	101/ 25cm																					
32.50	32.88	SPT21	103/ 23cm																					
34.00	34.32	SPT22	102/ 17cm																					

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-63)

Location :	Crushed Coal Stock Pile	Surface Elevation :	RL 205.820 m	Boring Method :	Shell & Auger
UTM Coordinates :	753606 E, 2407602 N	Ground Water Depth :	17.50 m	Casing Depth :	
Survey Coordinates :	2204S, 431W	Termination Depth :	35.25 m (RL 170.6 m)	Boring Start :	02-Aug-18
		Ground Water Level :	RL 188.3 m	Boring Finish :	29-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
35.00	35.25	SPT23	102/ 10cm			Hard brown clayey silt with gravel, low plastic (CL)	35.25	18	39	36	7													

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-64)

Location :	WTP area (Stage-II)	Surface Elevation :	RL 203.190 m	Boring Method :	Shell & Auger
UTM Coordinates :	753687 E, 2407797 N	Ground Water Depth :	15.20 m	Casing Depth :	12.0 m
Survey Coordinates :	1984S, 270W	Termination Depth :	25.28 m (RL 177.9 m)	Boring Start :	05-Sep-18
		Ground Water Level :	RL 188 m	Boring Finish :	06-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown clayey silt with gravel, low plastic (CL)		5	13	61	21													
1.00	1.35	SPT1	29	29		- very stiff, 0.0 to 4.0 m						32.2	18.0	14.2	9.9									
2.50	2.80	UDS1														1.79	1.58	13.5		UU	1 ,2, 3	1.0	7.9	
4.00	4.45	SPT2	65	65		- hard, 4.0 to 17.5 m																		
5.50	5.95	SPT3	67	67															2.68					
7.00	7.45	SPT4	73	73																				
8.50	8.95	SPT5	54	54				13	7	68	12													
10.00	10.45	SPT6	65	65																				
11.50	11.95	SPT7	82	82																				
13.00	13.38	SPT8	103/ 23cm																					
14.50	14.89	SPT9	101/ 24cm									30.7	22.2	8.6										
16.00	16.39	SPT10	102/ 24cm																					

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-64)

Location :	WTP area (Stage-II)	Surface Elevation :	RL 203.190 m	Boring Method :	Shell & Auger
UTM Coordinates :	753687 E, 2407797 N	Ground Water Depth :	15.20 m	Casing Depth :	12.0 m
Survey Coordinates :	1984S, 270W	Termination Depth :	25.28 m (RL 177.9 m)	Boring Start :	05-Sep-18
		Ground Water Level :	RL 188 m	Boring Finish :	06-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
17.50	17.82	SPT11	101/ 17cm			Hard brown clayey silt with traces of gravel, low plastic (CL)		4	13	73	10								2.69					
19.00	19.33	SPT12	101/ 18cm									34.5	21.0	13.5										
20.50	20.82	SPT13	101/ 17cm																					
22.00	22.20	SPT14	102/ 5cm																					
23.50	23.67	SPT15	103/ 2cm																					
25.00	25.28	SPT16	101/ 13cm				25.28																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-65)

Location :	WTP area (Stage-II)	Surface Elevation :	RL 205.770 m	Boring Method :	Shell & Auger
UTM Coordinates :	753616 E, 2407905 N	Ground Water Depth :	17.18 m	Casing Depth :	17.2 m
Survey Coordinates :	1890S, 353W	Termination Depth :	25.04 m (RL 180.7 m)	Boring Start :	04-Sep-18
		Ground Water Level :	RL 188.6 m	Boring Finish :	20-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt with gravel, medium plastic (CI)		10	8	56	26													
1.00	1.45	UDS1														1.69	1.54	9.5						
2.50	2.82	SPT1	100/ 17cm									39.1	21.8	17.3	14				2.67					
4.00	4.32	SPT2	101/ 17cm																					
5.50	5.83	SPT3	101/ 18cm				7.00																	
7.00	7.09	SPT4	Ref*/ 9cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-65)

Location :	WTP area (Stage-II)	Surface Elevation :	RL 205.770 m	Boring Method :	Rotary Drilling
UTM Coordinates :	753616 E, 2407905 N	Ground Water Depth :	17.18 m	Casing Depth :	17.2 m
Survey Coordinates :	1890S, 353W	Termination Depth :	25.04 m (RL 180.7 m)	Boring Start :	04-Sep-18
		Ground Water Level :	RL 188.6 m	Boring Finish :	20-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX / Return Water: Colour	Size of Hole: NX / Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity	Rig : Joy Voltas: 12B: Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
Ref*/ 9cm	7.00	7.00	SPT4		NX		Very weak, Brown GRANITE, disintegrated completely weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	7.50	7.09	RK-1	1-4					11	0												
	8.00																					
Ref*/ 5cm	8.50	8.50	SPT5																			
	9.00	8.55	WS-1						0	0												
	9.50																					
Ref*/ 6cm	10.00	10.00	SPT6																			
	10.50	10.06	WS-2						0	0	15											
	11.00																					
Ref*/ 6cm	11.50	11.50	SPT7																			
	12.00	11.56	RK-2	5-6					5	0												
	12.50																					
Ref*/ 7cm	13.00	13.00	SPT8																			
	13.50	13.07																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-65)

Location :	WTP area (Stage-II)	Surface Elevation :	RL 205.770 m	Boring Method :	Rotary Drilling
UTM Coordinates :	753616 E, 2407905 N	Ground Water Depth :	17.18 m	Casing Depth :	17.2 m
Survey Coordinates :	1890S, 353W	Termination Depth :	25.04 m (RL 180.7 m)	Boring Start :	04-Sep-18
		Ground Water Level :	RL 188.6 m	Boring Finish :	20-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX / Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity	Rig : Joy Voltas: 12B: Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
	13.50		WS3				Very weak, Brown GRANITE, disintegrated completely weathered		0	0												
	14.00																					
Ref*/ 4cm	14.50	14.50	SPT9																			
		14.54																				
	15.00		WS4						0	0												
	15.50																					
Ref*/ 3cm	16.00	16.00	SPT10																			
		16.03																				
	16.50		WS5						0	0	15											
	17.00																					
Ref*/ 4cm	17.50	17.50	SPT11		17.2																	
		17.54																				
	18.00		WS6						0	0												
	18.50																					
Ref*/ 5cm	19.00	19.00	SPT12																			
		19.05																				
	19.50		WS7						0	0												
	20.00																					

Colour: Light Brown; Loss: 100%; Bits Used: 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-65)

Location :	WTP area (Stage-II)	Surface Elevation :	RL 205.770 m	Boring Method :	Rotary Drilling
UTM Coordinates :	753616 E, 2407905 N	Ground Water Depth :	17.18 m	Casing Depth :	17.2 m
Survey Coordinates :	1890S, 353W	Termination Depth :	25.04 m (RL 180.7 m)	Boring Start :	04-Sep-18
		Ground Water Level :	RL 188.6 m	Boring Finish :	20-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX / Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity	Rig : Joy Voltas: 12B: Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
	20.00						Very weak, Brown GRANITE, disintegrated completely weathered															
Ref*/ 5cm	20.50	20.50	SPT13																			
	21.00	20.55	WS8						0	0												
	21.50																					
Ref*/ 3cm	22.00	22.00	SPT14																			
	22.50	22.03	WS9						0	0	15											
	23.00																					
	23.50	23.50																				
	24.00		RK-3	7-10					12	0												
	24.50																					
Ref*/ 4cm	25.00	25.00	SPT16																			
		25.04						25.04														

Light Brown; 100%; 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-52)

Location :	ESP	Termination Depth :	30 m (RL 177.7 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752609 E, 2407824 N	Ground Water Depth :	20.19 m	Casing Depth :	13.0 m
Survey Coordinates :	2059S, 1053W	Surface Elevation :	RL 207.74 m	Boring Start :	23-Aug-18
		Ground Water Level :	RL 187.6 m	Boring Finish :	18-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Medium dense to dense brown clayey sand with gravels, low plastic (SC)		10	54	36		28.1	16.0	12.1									
1.00	1.45	SPT1	28	44		- medium dense, 0.0 to 4.0 m		25	42	13	20												
2.50	2.80	UDS1													1.69	1.53	10.5		UC		0.7		
4.00	4.45	SPT2	31	34		- dense, 4.0 to 5.5 m	5.50	15	52	33								2.70					
5.50	5.80	UDS2				Hard brown clayey silt, medium plastic (CI)																	
7.00	7.45	SPT3	72	72																			
8.50	8.95	SPT4	76	76								43.6	24.1	19.5									
10.00	10.45	SPT5	83	83			11.50																
11.50	11.95	SPT6	84	64		Very dense brown silty fine to coarse sand intermixed with gravels (SP-GP)	12.50	44	48	8	0												
12.50	12.64	SPT7	Ref*/ 14cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-52)

Location : ESP
UTM Coordinates : 752609 E, 2407824 N
Survey Coordinates : 2059S, 1053W
Termination Depth : 30 m (RL 177.7 m)
Ground Water Depth : 20.19 m
Surface Elevation : RL 207.74 m
Ground Water Level : RL 187.6 m
Boring Method : Rotary Drilling
Casing Depth : 13.0 m
Boring Start : 23-Aug-18
Boring Finish : 18-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 14cm	12.50	12.50	SPT7				Weak, grey GRANITE, very intensely fractured, highly fractured, highly weathered															
		12.64																				
	13.00		RK1	1-4					22	0												
	13.50																					
	14.00	14.00																				
	14.50																					
	15.00		RK2	5-9					21	0												
	15.50	15.50																				
	16.00																					
	16.50		RK3	10-12					22	0	18											
	17.00	17.00																				
	17.50																					
	18.00		RK4	13-16					24	0												
	18.50	18.50																				
	19.00																					

Return Water: Colour — Light Brown
Return Water: Loss — Partial
Bits Used — 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-52)

Location : ESP
UTM Coordinates : 752609 E, 2407824 N
Survey Coordinates : 2059S, 1053W
Termination Depth : 30 m (RL 177.7 m)
Ground Water Depth : 20.19 m
Surface Elevation : RL 207.74 m
Ground Water Level : RL 187.6 m
Boring Method : Rotary Drilling
Casing Depth : 13.0 m
Boring Start : 23-Aug-18
Boring Finish : 18-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	19.00						Weak to moderately strong grey Granite, very intensely to intensely fractured, highly to moderately weathered															
	19.50		RK5	17-21					23	0												
	20.00	20.00					- weak, very intensely fractured, highly weathered, 12.5 to 21.5 m				18											
	20.50																					
	21.00		RK6	22-25					21	0												
	21.50	21.50																				
	22.00						- moderately strong, intensely fractured, moderately weathered, 21.5 to 27.5m															
	22.50		RK7	26-33					40	0						2.75	-	-	0.89	71	1562*	
	23.00	23.00																				
	23.50																					
	24.00		RK8	34-39					45	23	22					2.71	2.85	0.050	0.59	-	361	
	24.50	24.50																				
	25.00																					
	25.50		RK9	40-45					57	35												

Light Brown
Partial
32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-52)

Location : ESP
UTM Coordinates : 752609 E, 2407824 N
Survey Coordinates : 2059S, 1053W
Termination Depth : 30 m (RL 177.7 m)
Ground Water Depth : 20.19 m
Surface Elevation : RL 207.74 m
Ground Water Level : RL 187.6 m
Boring Method : Rotary Drilling
Casing Depth : 13.0 m
Boring Start : 23-Aug-18
Boring Finish : 18-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	25.50						Moderately strong to strong, grey Granite, intensely to moderately fractured , moderately weathered						Light Brown	Partial	32 CT Diamond Impregnated Bit							
	26.00	26.00																				
	26.50						- moderately strong, intensely fractured, moderately weathered, 21.5 to 27.5m															
	27.00		RK10	46-49					40	16	22					2.75	2.82	0.024	0.48	-	597	
	27.50	27.50																				
	28.00						- strong, moderately fractured, moderately weathered, 27.5 to 30 m															
	28.50		RK11	50-54					85	72	40											
	29.00	29.00																				
	29.50		RK12	55-57					60	50												
	30.00	30.00						30.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-53)

Location :	Space for FGD	Termination Depth :	25 m (RL 181.6 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752767 E, 2407998 N	Ground Water Depth :	20.80 m	Casing Depth :	16.0 m
Survey Coordinates :	1877S, 1204W	Surface Elevation :	RL 206.56 m	Boring Start :	23-Aug-18
		Ground Water Level :	RL 185.8 m	Boring Finish :	12-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff brown sandy silt with gravels, low plastic (CL)	1.00	23	39	29	9												
1.00	1.45	SPT1	22	22		Very stiff to hard brown clayey silt, medium plastic (CI)						37.1	23.8	13.3									13
2.50	2.80	UDS1				- very stiff, 1.0 to 4.0 m																	
4.00	4.45	SPT2	83	83		- hard, 4.0 to 10.0 m																	
5.50	5.95	SPT3	89	89								35.5	20.5	14.9				2.69					
7.00	7.45	SPT4	97	97																			
8.50	8.95	SPT5	55	55		- with traces of gravel, 8.5 to 10.0 m		3	5	44	48												
10.00	10.45	SPT6	26	26		- very stiff, 10.0 to 14.5 m						40.9	23.9	17.0									
11.50	11.95	UDS2													1.89	1.68	12.5		UU	1 ,2, 3	3.9	9.7	
13.00	13.45	SPT7	28	28		- with gravels, 13.0 to 14.5 m	14.50	24	20	10	46												
14.50	14.70	SPT8	102/ 5cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-53)

Location : Space for FGD
UTM Coordinates : 752767 E, 2407998 N
Survey Coordinates : 1877S, 1204W
Termination Depth : 25 m (RL 181.6 m)
Ground Water Depth : 20.80 m
Surface Elevation : RL 206.56 m
Ground Water Level : RL 185.8 m
Boring Method : Rotary Drilling
Casing Depth : 16.0 m
Boring Start : 23-Aug-18
Boring Finish : 12-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
102*/ 5cm	14.50	14.50	SPT8				Weak, grey GRANITE, very intensely fract															
	14.70	14.70					fractured, highly weathered,															
	15.00		RK1	1-4					23	0												
	15.50																					
	16.00	16.00																				
	16.50		RK2	5-12					33	0												
	17.00																					
	17.50	17.50																				
	18.00		RK3	13-18					35	0	18											
	18.50																					
	19.00	19.00																				
	19.50		RK4	19-25					37	0												
	20.00																					
	20.50	20.50																				
	21.00																					

Return Water: Colour = Light Brown; Return Water: Loss = 100%; Bits Used = 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-53)

Location :	Space for FGD	Termination Depth :	25 m (RL 181.6 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752767 E, 2407998 N	Ground Water Depth :	20.80 m	Casing Depth :	16.0 m
Survey Coordinates :	1877S, 1204W	Surface Elevation :	RL 206.56 m	Boring Start :	23-Aug-18
		Ground Water Level :	RL 185.8 m	Boring Finish :	12-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	21.00		RK5	26-32			Weak, grey GRANITE, very intensely fract fractured, highly weathered,		36	0			Light Brown	100%	32 CT Diamond Impregnated Bit							
	21.50																					
	22.00	22.00																				
	22.50		RK6	33-38					27	0	18											
	23.00																					
	23.50	23.50																				
	24.00		RK7	39-45					39	0						2.47	-	-	0.75	105	2314*	
	24.50																					
	25.00	25.00						25.00														

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-72)

Location :	ESP	Termination Depth :	17 m (RL 187.1 m)
UTM Coordinates :	752449 E, 2407946 N	Ground Water Depth :	
Survey Coordinates :	1544S, 1942W	Surface Elevation :	RL 204.09 m
		Ground Water Level :	m

Boring Method :	Shell & Auger
Casing Depth :	8.5 m
Boring Start :	21-Sep-18
Boring Finish :	03-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown clayey silt, medium plastic (CI)		0	9	71	20												
1.00	1.45	SPT1	10	10		- stiff, 0.0 to 4.0 m						58.5	23.7	34.8									
2.50	2.80	UDS1													1.78	1.60	11.6		UU	1 ,2, 3	1.5	18.6	
4.00	4.45	SPT2	21	21		- very stiff, 4.0 to 6.0 m		17	32	40	11							2.69					
5.50	5.80	DS2				- with gravels, 4.0 to 5.5 m	6.00																
6.00	6.09	SPT3	Ref*/ 9cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-72)

Location : ESP
UTM Coordinates : 752449 E, 2407946 N
Survey Coordinates : 1544S, 1942W
Termination Depth : 17 m (RL 187.1 m)
Ground Water Depth :
Surface Elevation : RL 204.09 m
Ground Water Level : m
Boring Method : Rotary Drilling
Casing Depth : 8.5 m
Boring Start : 21-Sep-18
Boring Finish : 03-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 9cm	6.00	6.00	SPT3				Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered															
		6.09																				
	6.50		RK1	1-4					16	0	15											
	7.00						- weak, very intensely fractured, highly weathered, 6.0 to 12.0 m															
Ref*/ 5cm	7.50	7.50	SPT4																			
		7.55																				
	8.00																					
	8.50		RK2	5-9					21	0						2.69	-	-	0.26	111	2452*	
	9.00	9.00																				
	9.50																					
			RK3	10-17					26	0	18											
	10.00																					
	10.50	10.50																				
	11.00																					
			RK4	18-26					28	0												
	11.50																					
	12.00	12.00																				
	12.50						- strong, moderately fractured, moderately weathered, 12.0 to 17m															

Return Water: Colour = Light Brown; Return Water: Loss = Partial; Bits Used = 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-72)

Location : ESP
UTM Coordinates : 752449 E, 2407946 N
Survey Coordinates : 1544S, 1942W
Termination Depth : 17 m (RL 187.1 m)
Ground Water Depth :
Surface Elevation : RL 204.09 m
Ground Water Level : m
Boring Method : Rotary Drilling
Casing Depth : 8.5 m
Boring Start : 21-Sep-18
Boring Finish : 03-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	12.50		RK5	27-39			Strong, grey Granite, moderately fractured, moderately weathered		97	60			Light Brown	Partial	32 CT Diamond Impregnated Bit	2.76	2.84	0.027	0.26	-	388	
	13.00																					
	13.50	13.50																				
	14.00		RK6	40-53					88	52	40					2.65	-	-	0.31	178	3909*	
	14.50																					
	15.00	15.00																				
	15.50		RK7	54-60					83	58												
	16.00	16.00																				
	16.50		RK8	61-68					93	59						2.72	2.80	0.028	0.13	-	393	
	17.00	17.00						17.00								2.58	2.81	0.082	0.58	199	4368*	

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-73)

Location :	ESP	Termination Depth :	35 m (RL 169.5 m)
UTM Coordinates :	752631 E, 2407910 N	Ground Water Depth :	22.04 m
Survey Coordinates :	1388S, 1966W	Surface Elevation :	RL 204.48 m
		Ground Water Level :	RL 182.4 m
Boring Method :	Shell & Auger		
Casing Depth :	8.5 m		
Boring Start :	22-Sep-18		
Boring Finish :	09-Oct-18		

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very dense brown silty fine sand with gravels (SM)	1.00	20	67	13	0												
1.00	1.30	UDS1				Hard brown clayey silt, medium plastic (CI)						46.7	19.2	27.5	1.68	1.54	8.9		UU	1 ,2, 3	0.9	14.8	
2.50	2.95	SPT1	52	52																			
4.00	4.41	SPT2	102/ 26cm				5.50	0	7	60	33							2.68					
5.50	5.58	SPT3	Ref*/ 8cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-73)

Location :	ESP	Termination Depth :	35 m (RL 169.5 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752631 E, 2407910 N	Ground Water Depth :	22.04 m	Casing Depth :	8.5 m
Survey Coordinates :	1388S, 1966W	Surface Elevation :	RL 204.48 m	Boring Start :	22-Sep-18
		Ground Water Level :	RL 182.4 m	Boring Finish :	09-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water		Bits Used	Density (g/cc)	Specific Gravity					
													Colour	Loss								
Ref*/ 8cm	5.50	5.50	SPT3				Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered															
	6.00	5.58																				
	6.50		RK1	1-2					7	0	15											
							- very weak, disintegrated, completely weathered, 5.5 to 7.0 m															
Ref*/ 5cm	7.00	7.00	SPT4																			
	7.50	7.05					- weak, very intensely fractured, highly weathered, 7.0 to 25.0 m															
	8.00		RK2	3-8					22	0												
	8.50	8.50																				
	9.00																					
	9.50		RK3	9-13					26	0	18											
	10.00	10.00																				
	10.50																					
	11.00		RK4	14-19					25	0												
	11.50	11.50																				
	12.00																					

Light Brown; 100%; 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-73)

Location :	ESP	Termination Depth :	35 m (RL 169.5 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752631 E, 2407910 N	Ground Water Depth :	22.04 m	Casing Depth :	8.5 m
Survey Coordinates :	1388S, 1966W	Surface Elevation :	RL 204.48 m	Boring Start :	22-Sep-18
		Ground Water Level :	RL 182.4 m	Boring Finish :	09-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity					
	12.00		RK5	20-22			Weak, grey GRANITE, very intensely fract		27	10												
	12.50						fractured, highly weathered,															
	13.00	13.00																				
	13.50																					
			RK6	23-28					29	0												
	14.00																					
	14.50	14.50																				
	15.00																					
			RK7	29-32					25	7	18											
	15.50																					
	16.00	16.00																				
	16.50																					
			RK8	33-36					23	0												
	17.00																					
	17.50	17.50																				
	18.00																					
			RK9	37-41					27	0												
	18.50																					

Light Brown | 100% | 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-73)

Location :	ESP	Termination Depth :	35 m (RL 169.5 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752631 E, 2407910 N	Ground Water Depth :	22.04 m	Casing Depth :	8.5 m
Survey Coordinates :	1388S, 1966W	Surface Elevation :	RL 204.48 m	Boring Start :	22-Sep-18
		Ground Water Level :	RL 182.4 m	Boring Finish :	09-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity					
	18.50						Weak, grey GRANITE, very intensely fract															
	19.00	19.00					fractured, highly weathered,															
	19.50																					
			RK10	42-48					26	0												
	20.00																					
	20.50	20.50																				
	21.00																					
			RK11	49-53					33	6	18					2.70	2.81	0.039	1.68	-	636	
	21.50																					
	22.00	22.00																				
	22.50																					
			RK12	54-58					28	0						2.54	-	-	0.30	56	1228*	
	23.00																					
	23.50	23.50																				
	24.00																					
			RK13	59-62					31	0						2.73	2.83	0.036	0.24	-	394	
	24.50																					
	25.00	25.00											Light Brown	100%	32 CT Diamond Impregnated Bit							

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-73)

Location :	ESP	Termination Depth :	35 m (RL 169.5 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752631 E, 2407910 N	Ground Water Depth :	22.04 m	Casing Depth :	8.5 m
Survey Coordinates :	1388S, 1966W	Surface Elevation :	RL 204.48 m	Boring Start :	22-Sep-18
		Ground Water Level :	RL 182.4 m	Boring Finish :	09-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity					
	25.00						Very weak, Brown GRANITE, disintegrated completely weathered															
	25.50		WS1						0	0												
	26.00																					
Ref*/ 5cm	26.50	26.50	SPT5																			
	27.00	26.55																				
	27.50		WS2						0	0												
Ref*/ 4cm	28.00	28.00	SPT6																			
	28.50	28.04																				
	29.00		WS3						0	0	15											
Ref*/ 4cm	29.50	29.50	SPT7																			
	30.00	29.54																				
	30.50		WS4						0	0												
Ref*/ 6cm	31.00	31.00	SPT8																			
	31.50	31.06																				

Light Brown

100%

32 CT Diamond Impregnated Bit

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-73)

Location :	ESP	Termination Depth :	35 m (RL 169.5 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752631 E, 2407910 N	Ground Water Depth :	22.04 m	Casing Depth :	8.5 m
Survey Coordinates :	1388S, 1966W	Surface Elevation :	RL 204.48 m	Boring Start :	22-Sep-18
		Ground Water Level :	RL 182.4 m	Boring Finish :	09-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity					
	31.50																					
	32.00		WS5				Very weak, Brown GRANITE, disintegrated completely weathered		0	0												
Ref*/ 8cm	32.50	32.50	SPT9																			
		32.58																				
	33.00		WS6						0	0	15		Light Brown	100%	32 CT Diamond Impregnated Bit							
	33.50																					
Ref*/ 5cm	34.00	34.00	SPT10																			
		34.05																				
			WS7						0	0												
Ref*/ 4cm	35.00	35.00	SPT11																			
		35.04																				

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-87)

Location :	Boiler	Termination Depth :	25 m (RL 179.521 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752440 E, 2407772 N	Ground Water Depth :	22.13 m	Casing Depth :	13.0 m
Survey Coordinates :	2128S, 1512W	Surface Elevation :	RL 204.52 m	Boring Start :	12-Oct-18
		Ground Water Level :	RL 182.391 m	Boring Finish :	26-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Dense brown silty fine sand with gravels (SM)	1.00	15	64	21	0												
1.00	1.45	SPT1	35	35		Hard to very stiff brown clayey silt, medium plastic (CI)						37.1	23.8	13.3									
2.50	2.80	UDS1				- hard, 1.0 to 4.0 m									1.82	1.59	14.7		UU	1 ,2, 3	0.7	12.7	
4.00	4.45	SPT2	28	28		- very stiff, 4.0 to 7.0 m		0	17	46	37							2.68					
5.50	5.80	UDS2													1.92	1.71	12.8						
7.00	7.45	SPT3	40	40		- hard, 7.0 to 11.5 m						46.1	22.8	23.4									
8.50	8.80	UDS3																					
10.00	10.45	SPT4	66	66		- with traces of gravel, 10.0 to 11.5 m	11.50	2	12	38	48												
11.50	11.63	SPT5	Ref*/ 13cm			Disintegrated Rock	12.00																
						Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-87)

Location :	Boiler	Termination Depth :	25 m (RL 179.521 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752440 E, 2407772 N	Ground Water Depth :	22.13 m	Casing Depth :	13.0 m
Survey Coordinates :	2128S, 1512W	Surface Elevation :	RL 204.52 m	Boring Start :	12-Oct-18
		Ground Water Level :	RL 182.391 m	Boring Finish :	26-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	12.00	12.00					Weak, grey GRANITE, very intensely fract															
	12.50		RK1	1-5			fractured, highly weathered,		15	0												
	13.00																					
Ref*/ 6cm	13.50	13.50	SPT6																			
		13.56																				
	14.00		RK2	6-9					17	0						2.63	-	-	0.15	144	3166*	
	14.50																					
Ref*/ 4cm	15.00	15.00	SPT7																			
		15.04																				
	15.50		RK3	10-13					16	0	15					2.80	-	-	0.1	46	1003*	
	16.00																					
Ref*/ 5cm	16.50	16.50	SPT8																			
		16.55																				
	17.00																					
	17.50		RK4	14-16					15	0												
Ref*/ 6cm	18.00	18.00	SPT9																			
		18.06																				
	18.50																					

Light Brown

100% Loss

32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-87)

Location :	Boiler	Termination Depth :	25 m (RL 179.521 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752440 E, 2407772 N	Ground Water Depth :	22.13 m	Casing Depth :	13.0 m
Survey Coordinates :	2128S, 1512W	Surface Elevation :	RL 204.52 m	Boring Start :	12-Oct-18
		Ground Water Level :	RL 182.391 m	Boring Finish :	26-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	18.50		RK5	17-21			Weak, grey GRANITE, very intensely fract		25	0			Light Brown	100%	32 CT Diamond Impregnated Bit							
	19.00						fractured, highly weathered,															
	19.50	19.50																				
	20.00		RK6	22-27					21	0												
	20.50																					
	21.00	21.00																				
	21.50		RK7	28-32					23	0	18											
	22.00																					
	22.50	22.50																				
	23.00		RK8	33-38					31	0												
	23.50																					
	24.00	24.00																				
	24.50		RK9	39-45					31	0						2.42	-	-	0.64	91	2003*	
	25.00	25.00						25.00														

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-88)

Location :	Boiler	Termination Depth :	25 m (RL 181.037 m)
UTM Coordinates :	752506 E, 2407831 N	Ground Water Depth :	21.80 m
Survey Coordinates :	2055S, 1448W	Surface Elevation :	RL 206.04 m
		Ground Water Level :	RL 184.237 m
Boring Method :	Shell & Auger		
Casing Depth :	9.5 m		
Boring Start :	29-Oct-18		
Boring Finish :	08-Nov-18		

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Dense brown silty fine sand with gravels (SM)	1.00	24	54	22	0												
1.00	1.30	UDS1				Hard brown silty clay, high plastic (CH)									1.69	1.52	11.1						
2.50	2.95	SPT1	30	30								51.8	20.6	31.2				2.65					
4.00	4.30	UDS2													1.89	1.68	12.5		UU	1 ,2, 3	4.1	12.9	
5.50	5.95	SPT2	38	38			7.00	0	9	58	33												
7.00	7.30	UDS3				Hard brown clayey silt, medium plastic (CI)																	
8.50	8.95	SPT3	89	89			9.00					39.6	24.1	15.5									
9.00	9.17	SPT4	102/ 2cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-88)

Location : Boiler
UTM Coordinates : 752506 E, 2407831 N
Survey Coordinates : 2055S, 1448W
Termination Depth : 25 m (RL 181.037 m)
Ground Water Depth : 21.80 m
Surface Elevation : RL 206.04 m
Ground Water Level : RL 184.237 m
Boring Method : Rotary Drilling
Casing Depth : 9.5 m
Boring Start : 29-Oct-18
Boring Finish : 08-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
100/ 2cm	9.00	9.00	SPT4				Weak, grey GRANITE, very intensely fract fractured, highly weathered,															
	9.17																					
	9.50		RK1	1-5					22	0						2.83	-	-	0.50	106.0	2329*	
	10.00																					
	10.50	10.50																				
	11.00																					
	11.50		RK2	6-10					23	0												
	12.00	12.00																				
	12.50																					
	13.00		RK3	11-14					31	10	18											
	13.50	13.50																				
	14.00																					
	14.50		RK4	15-18					24	7						2.65	2.67	0.0	0.29	190.0	4174*	
	15.00	15.00																				
	15.50																					

Colour: Light Brown
Loss: 100%
Bits Used: 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-88)

Location :	Boiler	Termination Depth :	25 m (RL 181.037 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752506 E, 2407831 N	Ground Water Depth :	21.80 m	Casing Depth :	9.5 m
Survey Coordinates :	2055S, 1448W	Surface Elevation :	RL 206.04 m	Boring Start :	29-Oct-18
		Ground Water Level :	RL 184.237 m	Boring Finish :	08-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	15.50		RK5	19-24			Weak, grey GRANITE, very intensely fract fractured, highly weathered,		21	0			Light Brown	100%	32 CT Diamond Impregnated Bit							
	16.00																					
	16.50	16.50																				
	17.00		RK6	25-29					29	7						2.55	-	-	0.73	197	4334*	
	17.50																					
	18.00	18.00																				
	18.50		RK7	30-33					22	0	18											
	19.00																					
	19.50	19.50																				
	20.00		RK8	34-38					24	0												
	20.50																					
	21.00	21.00																				
	21.50		RK9	39-41					19	0												
	22.00																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-88)

Location :	Boiler	Termination Depth :	25 m (RL 181.037 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752506 E, 2407831 N	Ground Water Depth :	21.80 m	Casing Depth :	9.5 m
Survey Coordinates :	2055S, 1448W	Surface Elevation :	RL 206.04 m	Boring Start :	29-Oct-18
		Ground Water Level :	RL 184.237 m	Boring Finish :	08-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	22.00						Weak, grey GRANITE, very intensely fract															
	22.50	22.50					fractured, highly weathered,															
	23.00																					
	23.50		RK10	42-44					16	0	18		Light Brown	100%	32 CI Diamond Impregnated Bit	2.60	2.78	0.065	0.59	99	2176*	
	24.00	24.00																				
	24.50		RK11	45-48					22	0						2.78	-	-	0.68	223	4901*	
	25.00	25.00						25.00														

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-89)

Location :	Boiler	Termination Depth :	13 m (RL 191.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752444 E, 2407872 N	Ground Water Depth :	Not met	Casing Depth :	5.0 m
Survey Coordinates :	2021S, 1512W	Surface Elevation :	RL 204.69 m	Boring Start :	27-Oct-18
				Boring Finish :	03-Nov-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Dense grey fine sand with gravels (SP-SM)	1.00	11	81	8	0												
1.00	1.30	UDS1				Hard brown silty clay, high plastic (CH)									1.81	1.65	9.6		UU	1 ,2, 3	2.3	13.6	
2.50	2.95	SPT1	31	31			3.50	0	7	61	32							2.69					
3.50	3.62	SPT2	Ref*/ 12cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-89)

Location : Boiler
UTM Coordinates : 752444 E, 2407872 N
Survey Coordinates : 2021S, 1512W
Termination Depth : 13 m (RL 191.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 204.69 m
Boring Method : Rotary Drilling
Casing Depth : 5.0 m
Boring Start : 27-Oct-18
Boring Finish : 03-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 12cm	3.50	3.50	SPT2				Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered															
		3.62																				
	4.00		RK1	1-6					27	0												
	4.50						- weak, very intensely fractured, highly weathered, 3.5 to 8.0 m															
	5.00	5.00																				
	5.50		RK2	7-12					28	0	18											
	6.00																					
	6.50	6.50																				
	7.00		RK3	13-20					36	0												
	7.50																					
	8.00	8.00																				
	8.50		RK4	21-30			- strong, moderately fractured, moderately weathered, 8.0 to 13m		88	56	40		Light Brown	100%	32 CT Diamond Impregnated Bit	2.75	2.83	0.028	0.33	-	588	
	9.00																					
	9.50	9.50																				
	10.00																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-89)

Location : Boiler
UTM Coordinates : 752444 E, 2407872 N
Survey Coordinates : 2021S, 1512W
Termination Depth : 13 m (RL 191.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 204.69 m
Boring Method : Rotary Drilling
Casing Depth : 5.0 m
Boring Start : 27-Oct-18
Boring Finish : 03-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	10.00		RK5	31-38			Strong, grey Granite, moderately fractured, moderately weathered		87	61			Light Brown	100%	32 C I Diamond Impregnated Bit	2.79	2.83	0.014	0.32	-	509	
	10.50																					
	11.00	11.00														2.71	-	-	0.29	122.0	2677*	
	11.50		RK6	39-43					65	52	40											
	12.00	12.00																				
	12.50		RK7	44-48					82	54												
	13.00	13.00						13.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-90)

Location :	Boiler	Termination Depth :	10 m (RL 194.487 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752518 E, 2407967 N	Ground Water Depth :	Not met	Casing Depth :	4.5 m
Survey Coordinates :	1923S, 1459W	Surface Elevation :	RL 204.49 m	Boring Start :	25-Oct-18
				Boring Finish :	28-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt with traces of gravel, medium plastic (CI)		4	20	63	13												
1.00	1.30	UDS1													1.78	1.61	10.5		UU	1 ,2, 3	2.5	8.3	
2.50	2.95	SPT1	43	43			3.50					36.0	20.5	15.5				2.67					
3.50	3.67	SPT2	101/ 2cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-90)

Location : Boiler
UTM Coordinates : 752518 E, 2407967 N
Survey Coordinates : 1923S, 1459W
Termination Depth : 10 m (RL 194.487 m)
Ground Water Depth : Not met
Surface Elevation : RL 204.49 m
Boring Method : Rotary Drilling
Casing Depth : 4.5 m
Boring Start : 25-Oct-18
Boring Finish : 28-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
101/ 2cm	3.50	3.50	SPT2				Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered															
	4.00	3.67	RK1	1-5					23	0	18											
	4.50						- weak, very intensely fractured, highly weathered, 3.5 to 5.0 m															
	5.00	5.00																				
	5.50		RK2	6-12			- strong, moderately fractured, moderately weathered, 5.0 to 10m		80	57						2.74	2.88	0.049	1.23	-	490	
	6.00																					
	6.50	6.50																				
	7.00		RK3	13-22					87	51	40					2.74	-	-	0.39	46	1005*	
	7.50																					
	8.00	8.00																				
	8.50		RK4	23-25					80	59						2.78	2.82	0.013	0.48	-	662	
	9.00	9.00																				
	9.50		RK5	26-30					79	54												
	10.00	10.00						10.00					Light Brown	100%	32 CT Diamond Impregnated Bit							

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-91)

Location :	ESP	Termination Depth :	13 m (RL 189.787 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752447 E, 2408023 N	Ground Water Depth :	Not met	Casing Depth :	4.0 m
Survey Coordinates :	1867S, 1513W	Surface Elevation :	RL 202.79 m	Boring Start :	16-Nov-18
				Boring Finish :	19-Nov-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown sandy silt with gravels, low plastic (CL)		10	45	34	11							2.68					
1.00	1.30	UDS1					2.50					34.5	20.4	14.0	1.79	1.61	11.0		UU	1 ,2, 3	2.2	9.5	
2.50	2.95	SPT1	48	61		Dense brown silty fine sand with gravels (SM)	3.50	21	57	22													
3.50	3.58	SPT2	Ref*/ 8cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-91)

Location : ESP
UTM Coordinates : 752447 E, 2408023 N
Survey Coordinates : 1867S, 1513W
Termination Depth : 13 m (RL 189.787 m)
Ground Water Depth : Not met
Surface Elevation : RL 202.79 m
Boring Method : Rotary Drilling
Casing Depth : 4.0 m
Boring Start : 16-Nov-18
Boring Finish : 19-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 8cm	3.50	3.50	SPT2				Very weak to strong grey Granite, very intensely to moderately fractured, completely to moderately weathered															
	4.00	3.58																				
	4.50		RK1	1-2					9	0												
							- very weak, disintegrated, completely weathered, 3.5 to 8.0 m															
Ref*/ 5cm	5.00	5.00	SPT3																			
	5.50	5.05																				
	6.00		RK2	3-4					11	0	15											
Ref*/ 6cm	6.50	6.50	SPT4																			
	7.00	6.56																				
	7.50		RK3	5-8					12	0												
Ref*/ 4cm	8.00	8.00	SPT5																			
	8.50	8.04					- strong, moderately fractured, moderately weathered, 8.0 to 13m															
	9.00		RK4	9-13					65	53	40					2.70	2.83	0.047	2.14	-	243.0	
	9.50	9.50														2.60	-	-	2.15	54	1181*	
	10.00												Light Brown	100%	32 CT Diamond Impregnated Bit							

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-91)

Location : ESP
UTM Coordinates : 752447 E, 2408023 N
Survey Coordinates : 1867S, 1513W
Termination Depth : 13 m (RL 189.787 m)
Ground Water Depth : Not met
Surface Elevation : RL 202.79 m
Boring Method : Rotary Drilling
Casing Depth : 4.0 m
Boring Start : 16-Nov-18
Boring Finish : 19-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	10.00		RK5	14-18			Strong, grey Granite, moderately fractured, moderately weathered		57	55			Light Brown	100%	32 C I Diamond Impregnated Bit							
	10.50																					
	11.00	11.00																				
	11.50		RK6	19-23					90	60	40											
	12.00	12.00																				
	12.50		RK7	24-29					95	64						2.71	2.82	0.040	0.49	-	459.0	
	13.00	13.00						13.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-92)

Location :	Boiler	Termination Depth :	25 m (RL 176.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752578 E, 2408004 N	Ground Water Depth :	22.03 m	Casing Depth :	12.0 m
Survey Coordinates :	1872S, 1383W	Surface Elevation :	RL 201.69 m	Boring Start :	08-Nov-18
		Ground Water Level :	RL 179.657 m	Boring Finish :	15-Nov-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt with gravels, medium plastic (CI)		10	20	53	17												
1.00	1.30	UDS1					2.50					45.5	16.5	29.1	1.70	1.56	9.1		UU	1 ,2, 3	3.0	5.9	
2.50	2.95	SPT1	43	54		Dense brown silty fine sand intermixed with gravels (SM)	4.00	45	39	16	0							2.75					
4.00	4.10	SPT2	Ref*/ 10cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-92)

Location :	Boiler	Termination Depth :	25 m (RL 176.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752578 E, 2408004 N	Ground Water Depth :	22.03 m	Casing Depth :	12.0 m
Survey Coordinates :	1872S, 1383W	Surface Elevation :	RL 201.69 m	Boring Start :	08-Nov-18
		Ground Water Level :	RL 179.657 m	Boring Finish :	15-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 10cm	4.00	4.00	SPT2				Weak, grey GRANITE, very intensely fract fractured, highly weathered,															
	4.50	4.10	RK1	1-3					21	7												
	5.00																					
	5.50	5.50																				
	6.00		RK2	4-7					30	13												
	6.50																					
	7.00	7.00																				
	7.50		RK3	8-12					22	0	18											
	8.00																					
	8.50	8.50																				
	9.00		RK4	13-17					21	0												
	9.50																					
	10.00	10.00																				
	10.50																					

Light Brown

100%

32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-92)

Location :	Boiler	Termination Depth :	25 m (RL 176.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752578 E, 2408004 N	Ground Water Depth :	22.03 m	Casing Depth :	12.0 m
Survey Coordinates :	1872S, 1383W	Surface Elevation :	RL 201.69 m	Boring Start :	08-Nov-18
		Ground Water Level :	RL 179.657 m	Boring Finish :	15-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	10.50						Weak, grey GRANITE, very intensely fract						Light Brown	100%	32 CT Diamond Impregnated Bit							
	11.00		RK5	18-23			fractured, highly weathered,		31	0												
	11.50	11.50																				
	12.00																					
	12.50		RK6	24-28					34	0												
	13.00	13.00																				
	13.50																					
	14.00		RK7	29-31					15	0	18											
Ref*/ 5cm	14.50	14.50	SPT3																			
	15.00	14.55																				
	15.50		RK8	32-35					24	0												
	16.00	16.00																				
	16.50																					
	17.00		RK9	36-41					22	0												

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-92)

Location :	Boiler	Termination Depth :	25 m (RL 176.687 m)
UTM Coordinates :	752578 E, 2408004 N	Ground Water Depth :	22.03 m
Survey Coordinates :	1872S, 1383W	Surface Elevation :	RL 201.69 m
		Ground Water Level :	RL 179.657 m

Boring Method :	Rotary Drilling		
Casing Depth :	12.0 m		
Boring Start :	08-Nov-18		
Boring Finish :	15-Nov-18		

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	17.00						Weak, grey GRANITE, very intensely fract						Light Brown	100%	32 CT Diamond Impregnated Bit							
	17.50	17.50					fractured, highly weathered,															
	18.00																					
	18.50		RK10	42-44					29	0												
	19.00	19.00																				
	19.50																					
	20.00		RK11	45-50					35	7	18											
	20.50	20.50																				
	21.00																					
	21.50		RK12	51-55					25	0												
	22.00	22.00																				
	22.50																					
	23.00		RK13	56-59					40	23						2.77	2.84	0.026	0.35	-	534.0	
	23.50															2.76	2.83	0.026	0.68	-	640.0	

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-92)

Location :	Boiler	Termination Depth :	25 m (RL 176.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752578 E, 2408004 N	Ground Water Depth :	22.03 m	Casing Depth :	12.0 m
Survey Coordinates :	1872S, 1383W	Surface Elevation :	RL 201.69 m	Boring Start :	08-Nov-18
		Ground Water Level :	RL 179.657 m	Boring Finish :	15-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used	Density (g/cc)	Specific Gravity					
	23.50	23.50					Weak, grey GRANITE, very intensely fract															
	24.00						fractured, highly weathered,															
	24.50		RK14	60-66					44	7	18		Light Brown	100%	IMP Bit	2.66	-	-	1.20	70	1549*	
	25.00	25.00						25.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-94)

Location :	ESP	Termination Depth :	25.06 m (RL 182.527 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752559 E, 2407750 N	Ground Water Depth :	20.15 m	Casing Depth :	12.0 m
Survey Coordinates :	2129S, 1384W	Surface Elevation :	RL 207.59 m	Boring Start :	26-Nov-18
		Ground Water Level :	RL 187.437 m	Boring Finish :	29-Nov-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown clayey silt, medium plastic (Cl)																	
1.00	1.45	SPT1	27	27		- very stiff, 0.0 to 4.0 m		42	16	24	18												
2.50	2.80	DS2				- intermixed with gravels, 1.0 to 2.5 m																	
4.00	4.45	SPT2	53	53		- hard, 4.0 to 13.0 m																	
5.50	5.95	SPT3	60	60																			
7.00	7.45	SPT4	63	63																			
8.50	8.95	SPT5	63	63		- with gravels, 8.5 to 10.0 m		14	23	37	26												
10.00	10.45	SPT6	67	67																			
11.50	11.95	SPT7	75	75			13.00																
13.00	13.30	SPT8	102/ 15cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-94)

Location :	ESP	Termination Depth :	25.06 m (RL 182.527 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752559 E, 2407750 N	Ground Water Depth :	20.15 m	Casing Depth :	12.0 m
Survey Coordinates :	2129S, 1384W	Surface Elevation :	RL 207.59 m	Boring Start :	26-Nov-18
		Ground Water Level :	RL 187.437 m	Boring Finish :	29-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
102/ 15cm	13.00	13.00	SPT8				Very weak, Brown GRANITE, disintegrate completely weathered						Light Brown	Partial	32 CT Diamond Impregnated Bit							
		13.30																				
	13.50		WS1						0	0												
	14.00																					
Ref*/ 6cm	14.50	14.50	SPT9																			
		14.56																				
	15.00		WS2						0	0												
	15.50																					
Ref*/ 5cm	16.00	16.00	SPT 10																			
		16.05																				
	16.50		WS3						0	0	15											
	17.00																					
Ref*/ 8cm	17.50	17.50	SPT 11																			
		17.58																				
	18.00		WS4						0	0												
	18.50																					
Ref*/ 4cm	19.00	19.00	SPT 12																			
		19.04																				
	19.50																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-94)

Location :	ESP	Termination Depth :	25.06 m (RL 182.527 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752559 E, 2407750 N	Ground Water Depth :	20.15 m	Casing Depth :	12.0 m
Survey Coordinates :	2129S, 1384W	Surface Elevation :	RL 207.59 m	Boring Start :	26-Nov-18
		Ground Water Level :	RL 187.437 m	Boring Finish :	29-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	19.50		WS5				Very weak, Brown GRANITE, disintegrate completely weathered		0	0												
	20.00																					
Ref*/ 6cm	20.50	20.50	SPT																			
		20.56	13																			
	21.00		WS6						0	0												
	21.50																					
Ref*/ 8cm	22.00	22.00	SPT																			
		22.08	14																			
	22.50		WS7						0	0	15											
	23.00																					
Ref*/ 5cm	23.50	23.50	SPT																			
		23.55	15																			
	24.00		WS8						0	0												
	24.50																					
Ref*/ 6cm	25.00	25.00	SPT																			
		25.06	16					25.06					Light Brown	Partial	32 CT Diamond Impregnated Bit							

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-96)

Location :	ESP	Termination Depth :	20 m (RL 183.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752729 E, 2407823 N	Ground Water Depth :	Not met	Casing Depth :	6.0 m
Survey Coordinates :	2043S, 1224W	Surface Elevation :	RL 203.69 m	Boring Start :	21-Nov-18
				Boring Finish :	24-Nov-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt, medium plastic (CI)																	
1.00	1.30	UDS1													1.76	1.62	8.7						
2.50	2.95	SPT1	65	65																			
4.00	4.45	SPT2	62	62		- with gravels, 4.0 to 5.5 m		12	23	40	25												
5.50	5.95	SPT3	87	87			6.50																
6.50	6.59	SPT4	Ref*/ 9cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-96)

Location : ESP
UTM Coordinates : 752729 E, 2407823 N
Survey Coordinates : 2043S, 1224W
Termination Depth : 20 m (RL 183.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 203.69 m
Boring Method : Rotary Drilling
Casing Depth : 6.0 m
Boring Start : 21-Nov-18
Boring Finish : 24-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 9cm	6.50	6.50	SPT4				Very weak, Brown GRANITE, disintegrate completely weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
		6.59																				
	7.00		WS1						0	0												
	7.50																					
Ref*/ 5cm	8.00	8.00	SPT5																			
		8.05																				
	8.50		WS2						0	0												
	9.00																					
Ref*/ 4cm	9.50	9.50	SPT6																			
		9.54																				
	10.00		WS3						0	0	15											
	10.50																					
Ref*/ 5cm	11.00	11.00	SPT7																			
		11.05																				
	11.50		WS4						0	0												
	12.00																					
Ref*/ 6cm	12.50	12.50	SPT8																			
		12.56																				
	13.00																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-96)

Location : ESP
UTM Coordinates : 752729 E, 2407823 N
Survey Coordinates : 2043S, 1224W
Termination Depth : 20 m (RL 183.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 203.69 m
Boring Method : Rotary Drilling
Casing Depth : 6.0 m
Boring Start : 21-Nov-18
Boring Finish : 24-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	13.00		RK1	1-3			Weak, grey GRANITE, very intensely fract		15	0												
	13.50						fractured, highly weathered,															
Ref*/ 6cm	14.00	14.00	SPT9																			
		14.06																				
	14.50		RK2	4-8					20	0						2.72	2.77	0.018	0.40	97	2124*	
	15.00																					
	15.50	15.50																				
	16.00																					
			RK3	9-12					14	0	18		Light Brown	100%	32 CT Diamond Impregnated Bit							
	16.50																					
	17.00	17.00																				
	17.50																					
			RK4	13-15					16	0												
	18.00																					
	18.50	18.50																				
	19.00		RK5	16-21					23	0												
	20.00	20.00						20.00														

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-97)

Location :	ESP	Termination Depth :	20 m (RL 185.481 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752747 E, 2407866 N	Ground Water Depth :	Not met	Casing Depth :	6.0 m
Survey Coordinates :	2003S, 1213W	Surface Elevation :	RL 205.48 m	Boring Start :	27-Oct-18
				Boring Finish :	20-Nov-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff brown clayey silt with traces of gravel , medium plastic (CI)		4	30	52	14												
1.00	1.45	SPT1	18	18								40.9	23.9	17.0									
2.50	2.80	UDS1													1.76	1.62	8.9						
4.00	4.45	SPT2	30	30			5.00	1	25	46	28							2.68					
5.00	5.12	SPT3	Ref*/ 12cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-97)

Location : ESP
UTM Coordinates : 752747 E, 2407866 N
Survey Coordinates : 2003S, 1213W
Termination Depth : 20 m (RL 185.481 m)
Ground Water Depth : Not met
Surface Elevation : RL 205.48 m
Boring Method : Rotary Drilling
Casing Depth : 6.0 m
Boring Start : 27-Oct-18
Boring Finish : 20-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
Ref*/ 12cm	5.00	5.00	SPT3				Very weak, Brown GRANITE, disintegrate completely weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	5.50	5.12																				
	6.00		RK1	1-4					11	0												
Ref*/ 6cm	6.50	6.50	SPT4																			
	7.00	6.56																				
	7.50		RK2	5-8					17	0						2.88	-	-	0.60	169	3720*	
Ref*/ 3cm	8.00	8.00	SPT5																			
	8.50	8.03																				
	9.00		RK3	9-12					15	0	15					2.68	2.76	0.029	0.85	158	3469*	
Ref*/ 6cm	9.50	9.50	SPT6																			
	10.00	9.56																				
	10.50		RK4	13-14					13	0												
Ref*/ 4cm	11.00	11.00	SPT7																			
	11.50	11.04																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-97)

Location : ESP
UTM Coordinates : 752747 E, 2407866 N
Survey Coordinates : 2003S, 1213W
Termination Depth : 20 m (RL 185.481 m)
Ground Water Depth : Not met
Surface Elevation : RL 205.48 m
Boring Method : Rotary Drilling
Casing Depth : 6.0 m
Boring Start : 27-Oct-18
Boring Finish : 20-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	11.50						Weak, grey GRANITE, very intensely fract						Light Brown	100%	32 CT Diamond Impregnated Bit							
	12.00		RK5	15-18			fractured, highly weathered,		21	0												
	12.50	12.50																				
	13.00																					
	13.50		RK6	19-22					22	0						2.83	-	-	0.21	279	6133*	
	14.00	14.00																				
	14.50																					
	15.00		RK7	23-26					21	0	18					2.66	-	-	0.31	255	5600*	
	15.50	15.50														2.73	2.83	0.035	0.20	100	2188*	
	16.00																					
	16.50		RK8	27-34					33	0						2.70	-	-	0.41	216	4752*	
	17.00	17.00																				
	17.50																					
	18.00		RK9	35-40					34	0												

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-97)

Location : ESP
UTM Coordinates : 752747 E, 2407866 N
Survey Coordinates : 2003S, 1213W
Termination Depth : 20 m (RL 185.481 m)
Ground Water Depth : Not met
Surface Elevation : RL 205.48 m
Boring Method : Rotary Drilling
Casing Depth : 6.0 m
Boring Start : 27-Oct-18
Boring Finish : 20-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	18.00						Weak, grey GRANITE, very intensely fract															
	18.50	18.50					fractured, highly weathered,															
	19.00																					
	19.50		RK10	41-51					48	0	18		Light Brown	100%	32 CT IMP Bit							
	20.00	20.00						20.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-98)

Location :	ESP	Termination Depth :	25 m (RL 180.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752696 E, 2407850 N	Ground Water Depth :	21.32 m	Casing Depth :	9.0 m
Survey Coordinates :	2021S, 1258W	Surface Elevation :	RL 205.69 m	Boring Start :	20-Nov-19
		Ground Water Level :	RL 184.367 m	Boring Finish :	23-Nov-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	1.00	DS1				Hard brown silty clay, high plastic (CH)																	
1.00	1.42	SPT1	102/ 27cm					0	4	42	54												
2.50	2.95	SPT2	46	46			3.50					59.2	23.3	35.9									
3.50	3.60	SPT3	Ref*/ 10cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-98)

Location :	ESP	Termination Depth :	25 m (RL 180.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752696 E, 2407850 N	Ground Water Depth :	21.32 m	Casing Depth :	9.0 m
Survey Coordinates :	2021S, 1258W	Surface Elevation :	RL 205.69 m	Boring Start :	20-Nov-19
		Ground Water Level :	RL 184.367 m	Boring Finish :	23-Nov-19

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 10cm	3.50	3.50	SPT3				Very weak, Brown GRANITE, disintegrate completely weathered															
		3.60																				
	4.00		WS1						0	0												
	4.50																					
Ref*/ 5cm	5.00	5.00	SPT4																			
		5.05																				
	5.50		WS2						0	0												
	6.00																					
Ref*/ 3cm	6.50	6.50	SPT5																			
		6.53																				
	7.00		WS3						0	0	15											
	7.50																					
Ref*/ 6cm	8.00	8.00	SPT6																			
		8.06																				
	8.50		WS4						0	0												
	9.00																					
Ref*/ 6cm	9.50	9.50	SPT7																			
		9.56																				
	10.00												Light Brown	100%	32 CT Diamond Impregnated Bit							

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-98)

Location :	ESP	Termination Depth :	25 m (RL 180.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752696 E, 2407850 N	Ground Water Depth :	21.32 m	Casing Depth :	9.0 m
Survey Coordinates :	2021S, 1258W	Surface Elevation :	RL 205.69 m	Boring Start :	20-Nov-19
		Ground Water Level :	RL 184.367 m	Boring Finish :	23-Nov-19

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity					
	10.00						Very weak, Brown GRANITE, disintegrate completely weathered															
			WS5						0	0												
	10.50																					
Ref*/ 3cm	11.00	11.00	SPT8																			
		11.03																				
	11.50																					
			WS6						0	0												
	12.00																					
Ref*/ 4cm	12.50	12.50	SPT9																			
		12.54																				
	13.00																					
			WS7						0	0	15											
	13.50																					
Ref*/ 6cm	14.00	14.00	SPT 10																			
		14.06																				
	14.50																					
			WS8						0	0												
	15.00																					
Ref*/ 6cm	15.50	15.00	SPT 11																			
		15.56																				
	16.00																					
			WS9						0	0												
	16.50																					

Light Brown

Partial

32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-98)

Location : ESP
UTM Coordinates : 752696 E, 2407850 N
Survey Coordinates : 2021S, 1258W
Termination Depth : 25 m (RL 180.687 m)
Ground Water Depth : 21.32 m
Surface Elevation : RL 205.69 m
Ground Water Level : RL 184.367 m
Boring Method : Rotary Drilling
Casing Depth : 9.0 m
Boring Start : 20-Nov-19
Boring Finish : 23-Nov-19

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	16.50						Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered															
Ref*/ 4cm	17.00	17.00	SPT 12																			
		17.04																				
	17.50		WS10				- very weak, disintegrated, completely weathered, 3.5 to 20.0 m		0	0	15											
	18.00																					
Ref*/ 15cm	18.50	18.50	SPT 13																			
		18.65																				
	19.00		WS11						0	0												
	19.50																					
Ref*/ 5cm	20.00	20.00	SPT 14																			
		20.05																				
	20.50		RK1				- weak, very intensely fractured, highly weathered, 20.0 to 25.0 m		18	0												
	21.00																					
Ref*/ 6cm	21.50	21.50	SPT 15								18											
		21.56																				
	22.00		RK2						26	0												
	22.50																					
	23.00	23.00																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-98)

Location :	ESP	Termination Depth :	25 m (RL 180.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752696 E, 2407850 N	Ground Water Depth :	21.32 m	Casing Depth :	9.0 m
Survey Coordinates :	2021S, 1258W	Surface Elevation :	RL 205.69 m	Boring Start :	20-Nov-19
		Ground Water Level :	RL 184.367 m	Boring Finish :	23-Nov-19

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water									
													Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity					
	23.00	23.00					Weak, grey GRANITE, very intensely fract															
	23.50		RK3				fractured, highly weathered,		30	0												
	24.00	24.00									18											
	24.50		RK4						32	0												
	25.00	25.00						25.00					Light Brown	Partial	IMP Bit							

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-67)

Location :	Space for Future Provision	Termination Depth :	25.05 m (RL 181.399 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752045 E, 2407645 N	Ground Water Depth :	20.10 m	Casing Depth :	15.0 m
Survey Coordinates :	2293S, 1893W	Surface Elevation :	RL 206.449 m	Boring Start :	25-Aug-18
		Ground Water Level :	RL 186.349 m	Boring Finish :	25-Aug-18

Depth, m			SPT [1]				Grain Size Analysis				Atterberg Limits			Density and Moisture				Shear Tests					
From	To	Sample No.	Field Value, N_f	Corrected Value, N"	Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)	Specific Gravity	Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	Free Swell Index, (%)
0.00	0.50	DS1				Very dense brown medium to coarse sand intermixed with gravel (SM)																	
1.00	1.30	SPT1	100/ 15cm	-				28	52	20	0												
2.50	2.89	SPT2	101/ 24cm	-			4.00																
4.00	4.45	SPT3	76	76		Hard brown clayey silt (CI)		5	8	64	23												
5.50	5.95	SPT4	57	57		- with gravel, 4.0 to 10.0 m						47.0	14.1	32.9									
7.00	7.30	UDS1													1.66	1.48	12.1		UC	1.2			
8.50	8.95	SPT5	65	65														2.68					
10.00	10.45	SPT6	77	77		- with traces of gravel, 10.0 to 14.5 m		2	6	46	46												
11.50	11.95	SPT7	89	89								46.0	25.1	20.9									
13.00	13.45	SPT8	94	94			14.50																
14.50	14.70	SPT9	102/ 5cm	-		Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-67)

Location :	Space for Future Provision	Termination Depth :	25.05 m (RL 181.399 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752045 E, 2407645 N	Ground Water Depth :	20.10 m	Casing Depth :	15.0 m
Survey Coordinates :	2293S, 1893W	Surface Elevation :	RL 206.449 m	Boring Start :	25-Aug-18
		Ground Water Level :	RL 186.349 m	Boring Finish :	25-Aug-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
100/ 5cm	14.50	14.50	SPT9				Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered														
	15.00	14.70																			
	15.50		RK1	1-3					22	12	18				2.77	2.89	0.04	0.45	-	664	
	16.00	16.00					- weak, very intensely fractured, highly weathered, 14.5 to 16.0 m														
	16.50						- very weak, disintegrated, completely weathered, 16.0 to 22.0 m														
	17.00		RK2	4-5					11	0					2.38	-	-	1.57	21.00	470*	
Ref*/ 6cm	17.50	17.50	SPT 10																		
	18.00	17.56																			
	18.50		RK3	6-8					12	0	15										
Ref*/ 5cm	19.00	19.00	SPT 11									Light Brown	100%	32 CT Diamond Impregnated Bit							
	19.50	19.05																			
	20.00		WS1	-					0	0											
Ref*/ 6cm	20.50	20.50	SPT 12																		
	21.00	20.56																			

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-67)

Location :	Space for Future Provision	Termination Depth :	25.05 m (RL 181.399 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752045 E, 2407645 N	Ground Water Depth :	20.10 m	Casing Depth :	15.0 m
Survey Coordinates :	2293S, 1893W	Surface Elevation :	RL 206.449 m	Boring Start :	25-Aug-18
		Ground Water Level :	RL 186.349 m	Boring Finish :	25-Aug-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX									
												Return Water									
												Colour	Loss	Bits Used	Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
	21.00																				
	21.50		WS2	-			Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered		0	0	15										
Ref*/ 7cm	22.00	22.00	SPT				- very weak, disintegrated, completely weathered, 16.0 to 22.0 m														
		22.07	13																		
	22.50		RK4	9-12			- weak, very intensely fractured, highly weathered, 22.0 to 25.05 m		18	0		Light Brown	100%	32 CT Diamond Impregnated Bit	2.47	-	-	0.15	63.00	1394*	
	23.00																				
Ref*/ 8cm	23.50	23.50	SPT								18										
		23.58	14																		
	24.00																				
			RK5	13-16					16	0											
	24.50																				
Ref*/ 5cm	25.00	25.00	SPT																		
		25.05	15					25.05													

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-68)

Location :	Space for Future Provision	Termination Depth :	30 m (RL 176.02 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752290 E, 2407626 N	Ground Water Depth :	20.32 m	Casing Depth :	12.0 m
Survey Coordinates :	2291S, 1647W	Surface Elevation :	RL 206.020 m	Boring Start :	22-Aug-18
		Ground Water Level :	RL 185.7 m	Boring Finish :	17-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt with gravels (CI)																	
1.00	1.30	UDS1													1.84	1.56	17.8						
2.50	2.95	SPT1	46	46				5	25	34	36												
4.00	4.30	UDS2													1.87	1.62	15.5		UU	1 ,2, 3	2.2	8.2	
5.50	5.95	SPT2	52	52								40.2	24.6	15.6				2.67					
7.00	7.45	SPT3	53	53																			
8.50	8.95	SPT4	59	59				4	17	45	34												
10.00	10.45	SPT5	65	65			11.50					43.5	24.8	18.8									
11.50	11.52	SPT6	Ref*/ 2cm	-		Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-68)

Location :	Space for Future Provision	Termination Depth :	30 m (RL 176.02 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752290 E, 2407626 N	Ground Water Depth :	20.32 m	Casing Depth :	12.0 m
Survey Coordinates :	2291S, 1647W	Surface Elevation :	RL 206.02 m	Boring Start :	22-Aug-18
		Ground Water Level :	RL 185.7 m	Boring Finish :	17-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 2cm	11.50	11.50	SPT6				Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered														
		11.52																			
	12.00		RK-1	1-4					41	32											
	12.50						- weak, very intensely fractured, highly weathered, 11.0 to 16.0 m														
	13.00	13.00																			
	13.50																				
			RK-2	5-6					24	15	18										
	14.00																				
	14.50	14.50																			
	15.00																				
			RK-3	7-8					27	15											
	15.50																				
	16.00	16.00																			
	16.50						- very weak, disintegrated, completely weathered, 16.0 to 28.0 m														
			RK-4	9-10					8	0	15										
	17.00																				
Ref*/ 12cm	17.50	17.50	SPT7																		
		17.62																			
	18.00																				

Light Brown | 100% | 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-68)

Location :	Space for Future Provision	Termination Depth :	30 m (RL 176.02 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752290 E, 2407626 N	Ground Water Depth :	20.32 m	Casing Depth :	12.0 m
Survey Coordinates :	2291S, 1647W	Surface Elevation :	RL 206.02 m	Boring Start :	22-Aug-18
		Ground Water Level :	RL 185.7 m	Boring Finish :	17-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
	18.00		WS-1				Very weak, Brown GRANITE, disintegrated completely weathered		0	0											
	18.50																				
Ref*/ 10cm	19.00	19.00	SPT8																		
		19.10																			
	19.50		RK-5	11-12					9	0					-	2.77	-	0.16	-	-	
	20.00																				
Ref*/ 11cm	20.50	20.50	SPT9																		
		20.61																			
	21.00		WS2						0	0	15										
	21.50																				
Ref*/ 13cm	22.00	22.00	SPT10																		
		22.13																			
	22.50		WS3						0	0											
	23.00																				
Ref*/ 11cm	23.50	23.50	SPT11																		
		23.61																			
	24.00		WS4						0	0											
	24.50																				

Light Brown; 100%; 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-68)

Location :	Space for Future Provision	Termination Depth :	30 m (RL 176.02 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752290 E, 2407626 N	Ground Water Depth :	20.32 m	Casing Depth :	12.0 m
Survey Coordinates :	2291S, 1647W	Surface Elevation :	RL 206.02 m	Boring Start :	22-Aug-18
		Ground Water Level :	RL 185.7 m	Boring Finish :	17-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	24.50						Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered														
Ref*/ 9cm	25.00	25.00	SPT12																		
		25.09					- very weak, disintegrated, completely weathered, 16.0 to 28.0 m														
	25.50		WS5						0	0	15										
	26.00																				
Ref*/ 12cm	26.50	26.50	SPT13																		
		26.62																			
	27.00		WS6						0	0											
	27.50																				
Ref*/ 8cm	28.00	28.00	SPT14																		
		28.08					- weak, very intensely fractured, highly weathered, 28.0 to 30.0 m														
	28.50		RK6	13-17					69	33					2.71	-	-	-	-	565	
	29.00	29.00									18										
	29.50		RK7	18-22					54	36					2.44	-	-	0.37	52.00	1152*	
	30.00	30.00						30.00							2.79	-	-	0.30	-	548	

Light Brown; 100%; 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-69)

Location :	Switchyard	Termination Depth :	35 m (RL 169.825 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752117 E, 2408014 N	Ground Water Depth :	18.15 m	Casing Depth :	16.0 m
Survey Coordinates :	1921S, 1854W	Surface Elevation :	RL 204.825 m	Boring Start :	26-Aug-18
		Ground Water Level :	RL 186.675 m	Boring Finish :	22-Oct-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt with traces of gravel (CI)		2	23	60	15												
1.00	1.40	SPT1	102/ 25cm				2.50																
2.50	2.55	DS2				Very dense gravel (GP)	4.00	96	1	3	0												
4.00	4.38	SPT2	103/ 23cm			Hard brown clayey silt (CI)		2	27	45	26							2.68					
5.50	5.95	SPT3	43	43		- with traces of gravel, 4.0 to 8.5 m						49.8	18.9	30.9									
7.00	7.30	UDS1													1.89	1.68	12.2		UU	1 ,2, 3	2.0	6.0	
8.50	8.79	SPT4	101/ 14cm			- with gravel, 8.5to 10.0 m	10.00	7	23	51	19												
10.00	10.21	SPT5	103/ 6cm			Very dense sandy gravel (GP-SM)						29.4	18.0	11.4									
11.50	11.63	SPT6	Ref*/ 13cm																				
13.00	13.14	SPT7	Ref*/ 14cm					78	14	8	0												
14.50	14.58	SPT8	Ref*/ 8cm				15.50					28.0	16.3	11.7									
15.50	15.80	SPT9	103/ 15cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-69)

Location :	Switchyard	Termination Depth :	35 m (RL 169.825 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752117 E, 2408014 N	Ground Water Depth :	18.15 m	Casing Depth :	16.0 m
Survey Coordinates :	1921S, 1854W	Surface Elevation :	RL 204.83 m	Boring Start :	26-Aug-18
		Ground Water Level :	RL 186.675 m	Boring Finish :	22-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
103/ 15cm	15.50	15.50	SPT10				Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered														
	15.80	15.80																			
	16.00		RK-1	1-6					21	0											
	16.50						- weak, very intensely fractured, highly weathered, 15.5 to 21.5 m														
	17.00	17.00																			
	17.50																				
	18.00		RK-2	7-10					41	28					2.84	-	-	0.37	-	586	
	18.50	18.50																			
	19.00																				
	19.50		RK-3	11-15					22	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
	20.00	20.00																			
	20.50																				
	21.00		RK-4	16-19					26	12											
	21.50	21.50																			
	22.00						- strong, moderately fractured, moderately weathered, 21.5 to 23.0m														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-69)

Location : Switchyard
UTM Coordinates : 752117 E, 2408014 N
Survey Coordinates : 1921S, 1854W
Termination Depth : 35 m (RL 169.825 m)
Ground Water Depth : 18.15 m
Surface Elevation : RL 204.83 m
Ground Water Level : RL 186.675 m
Boring Method : Rotary Drilling
Casing Depth : 16.0 m
Boring Start : 26-Aug-18
Boring Finish : 22-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	22.00						Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered								-	2.81	-	0.70	-	-	
	22.50		RK-5	20-24					47	39	35										
	23.00	23.00					- strong, moderately fractured, moderately weathered, 21.5 to 23.0m								-	-	-	-	-	470	
	23.50		RK6	25-33					60	10											
	24.00	24.00					- weak, very intensely fractured, highly weathered, 23.0 to 34.0 m														
	24.50		RK7	34-42					61	12											
	25.00	25.00																			
	25.50																				
	26.00		RK8	43-48					29	0	18				-	-	-	0.25	-	-	
	26.50	26.50																			
	27.00																				
	27.50		RK9	49-52					27	13											
	28.00	28.00																			
	28.50																				

Light Brown
100%
32 CT Diamond Impregnated Bit

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-69)

Location : Switchyard
UTM Coordinates : 752117 E, 2408014 N
Survey Coordinates : 1921S, 1854W

Termination Depth : 35 m (RL 169.825 m)
Ground Water Depth : 18.15 m
Surface Elevation : RL 204.83 m
Ground Water Level : RL 186.675 m

Boring Method : Rotary Drilling
Casing Depth : 16.0 m
Boring Start : 26-Aug-18
Boring Finish : 22-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
	28.50						Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered														
	29.00		RK10	53-58					28	0											
	29.50	29.50					- weak, very intensely fractured, highly weathered, 23.0 to 34.0 m														
	30.00																				
	30.50		RK11	59-63					31	0											
	31.00	31.00									18										
	31.50																				
	32.00		RK12	64-68					34	0											
	32.50	32.50																			
	33.00																				
	33.50		RK13	69-73					65	0											
	34.00	34.00																			
	34.50		RK14	74-75			- strong, moderately fractured, moderately weathered, 34.0 to 35.0m		57	42	35										
	35.00	35.00						35.00				Light Brown	100%	32 CT Diamond Impregnated Bit							

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-75)

Location :	Switchyard	Termination Depth :	25 m (RL 179.987 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752091 E, 2407936 N	Ground Water Depth :	21.01 m	Casing Depth :	15.0 m
Survey Coordinates :	2027S, 1915W	Surface Elevation :	RL 204.987 m	Boring Start :	27-Nov-18
		Ground Water Level :	RL 183.977 m	Boring Finish :	29-Nov-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	46	72			1.00																
2.50	2.80	DS2				Very dense brown clayey garvel, medium plastic (GC)																	
4.00	4.45	SPT2	62	62				26	39	35													
5.50	5.95	SPT3	70	70																			
7.00	7.45	SPT4	75	75																			
8.50	8.95	SPT5	58	58																			
10.00	10.45	SPT6	65	65								46.9	22.7	24.2									
11.50	11.95	SPT7	83	83																			
13.00	13.45	SPT8	93	93			14.50																
14.50	14.59	SPT9	Ref*/ 9cm	-		Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-75)

Location :	Switchyard	Termination Depth :	25 m (RL 179.987 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752091 E, 2407936 N	Ground Water Depth :	21.01 m	Casing Depth :	15.0 m
Survey Coordinates :	2027S, 1915W	Surface Elevation :	RL 204.987 m	Boring Start :	27-Nov-18
		Ground Water Level :	RL 183.977 m	Boring Finish :	29-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX — Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
Ref*/ 9cm	14.50	14.50	SPT10				Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered					Light Brown	100%	32 CT Diamond Impregnated Bit							
	15.00	14.59	RK1	1-4			- very weak, disintegrated, completely weathered, 14.5 to 17.5 m		13	0											
	15.50																				
Ref*/ 6cm	16.00	16.00	SPT11								15										
	16.50	16.06																			
	17.00		RK2	5-8					15	0											
Ref*/ 5cm	17.50	17.50	SPT12																		
	18.00	17.55					- weak, very intensely fractured, highly weathered, 17.5 to 25.0 m														
	18.50		RK3	9-12					21	0	18										
	19.00	19.00																			
	19.50																				
	20.00		RK4	13-16					28	0											
	20.50	20.50																			
	21.00																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-75)

Location :	Switchyard	Termination Depth :	25 m (RL 179.987 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752091 E, 2407936 N	Ground Water Depth :	21.01 m	Casing Depth :	15.0 m
Survey Coordinates :	2027S, 1915W	Surface Elevation :	RL 204.987 m	Boring Start :	27-Nov-18
		Ground Water Level :	RL 183.977 m	Boring Finish :	29-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	21.00						Weak, grey GRANITE, very intensely fract														
	21.50		RK5	17-22			fractured, highly weathered,		28	0					2.7	2.7	-	0.3	212.0	4661*	
	22.00	22.00																			
	22.50																				
	23.00		RK6	23-26					21	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
	23.50	23.50																			
	24.00																				
	24.50		RK7	27-32					29	0					2.5	-	-	1.1	112.0	2463*	
	25.00	25.00						25.00													

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-77)

Location :	Transformer yard	Termination Depth :	25 m (RL 179.287 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752331 E, 2407939 N	Ground Water Depth :	20.50 m	Casing Depth :	12.5 m
Survey Coordinates :	2004S, 1773W	Surface Elevation :	RL 204.287 m	Boring Start :	29-Nov-18
		Ground Water Level :	RL 183.787 m	Boring Finish :	04-Dec-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	53	83																			
2.50	2.95	SPT2	69	87			4.00																
4.00	4.45	SPT3	62	62		Hard brown clayey silt with gravel, medium plastic (CI)													UC	1.3			
5.50	5.95	SPT4	66	66																			
7.00	7.45	SPT5	71	71																			
8.50	8.95	SPT6	92	92																			
10.00	10.45	SPT7	97	97																			
11.50	11.90	SPT8	122	122																			
11.60	12.00	DS2					12.00																
						Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-77)

Location :	Transformer yard	Termination Depth :	25 m (RL 179.287 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752331 E, 2407939 N	Ground Water Depth :	20.50 m	Casing Depth :	12.5 m
Survey Coordinates :	2004S, 1773W	Surface Elevation :	RL 204.287 m	Boring Start :	29-Nov-18
		Ground Water Level :	RL 183.787 m	Boring Finish :	04-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water		Bits Used							
												Colour	Loss								
	12.00	12.00					Weak, grey GRANITE, very intensely fract fractured, highly weathered,														
	12.50																				
			RK1	1-5					21	0											
	13.00																				
	13.50	13.50																			
	14.00																				
			RK2	6-11					23	0											
	14.50																				
	15.00	15.00																			
	15.50																				
			RK3	12-18					28	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
	16.00																				
	16.50	16.50																			
	17.00																				
			RK4	19-27					26	0											
	17.50																				
	18.00	18.00																			
	18.50																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-77)

Location :	Transformer yard	Termination Depth :	25 m (RL 179.287 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752331 E, 2407939 N	Ground Water Depth :	20.50 m	Casing Depth :	12.5 m
Survey Coordinates :	2004S, 1773W	Surface Elevation :	RL 204.287 m	Boring Start :	29-Nov-18
		Ground Water Level :	RL 183.787 m	Boring Finish :	04-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX									
												Return Water		Bits Used	Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Colour	Loss								
	18.50		RK5	28-37			Weak, grey GRANITE, very intensely fract fractured, highly weathered,		27	0		Light Brown	100%	32 CT Diamond Impregnated Bit							
	19.00																				
	19.50	19.50																			
	20.00		RK6	38-48					31	0											
	20.50																				
	21.00	21.00																			
	21.50		RK7	49-60					33	0	18										
	22.00																				
	22.50	22.50																			
	23.00		RK8	61-75					36	0											
	23.50																				
	24.00	24.00																			
	24.50		RK9	76-83					41	0											
	25.00	25.00						25.00													

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-78)

Location :	CPU Regeneration	Termination Depth :	25 m (RL 178.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752277 E, 2408064 N	Ground Water Depth :	21.06 m	Casing Depth :	8.0 m
Survey Coordinates :	1874S, 1742W	Surface Elevation :	RL 203.687 m	Boring Start :	30-Nov-18
		Ground Water Level :	RL 182.627 m	Boring Finish :	02-Dec-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown silty clay with gravel, high plastic (CH)																	
1.00	1.45	SPT1	43	43				7	11	31	51												
2.50	2.80	DS2																					
4.00	4.35	SPT2	102/ 20cm									59.0	25.3	33.8									
5.00	5.12	SPT3	Ref*/ 12cm																				
5.00	5.12	SPT3	Ref*/ 12cm																				
5.00	5.50	DS3					5.50																
						Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-78)

Location :	CPU Regeneration	Termination Depth :	25 m (RL 178.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752277 E, 2408064 N	Ground Water Depth :	21.06 m	Casing Depth :	8.0 m
Survey Coordinates :	1874S, 1742W	Surface Elevation :	RL 203.687 m	Boring Start :	30-Nov-18
		Ground Water Level :	RL 182.627 m	Boring Finish :	02-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	5.50	5.50					Weak, grey GRANITE, very intensely fract					Light Brown	100%	32 CT Diamond Impregnated Bit							
	6.00		RK1	1-6			fractured, highly weathered,		21	0											
	6.50																				
	7.00	7.00																			
	7.50		RK2	7-12					24	0											
	8.00																				
	8.50	8.50																			
	9.00		RK3	13-18					27	0	18										
	9.50																				
	10.00	10.00																			
	10.50		RK4	19-25					23	0											
	11.00																				
	11.50	11.50																			
	12.00																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-78)

Location :	CPU Regeneration	Termination Depth :	25 m (RL 178.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752277 E, 2408064 N	Ground Water Depth :	21.06 m	Casing Depth :	8.0 m
Survey Coordinates :	1874S, 1742W	Surface Elevation :	RL 203.687 m	Boring Start :	30-Nov-18
		Ground Water Level :	RL 182.627 m	Boring Finish :	02-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water		Bits Used	Density (g/cc)	Specific Gravity					
												Colour	Loss								
	12.00		RK5	26-33			Weak, grey GRANITE, very intensely fract		25	0											
	12.50						fractured, highly weathered,														
	13.00	13.00																			
	13.50																				
			RK6	34-43					28	0											
	14.00																				
	14.50	14.50																			
	15.00																				
			RK7	44-49					30	0	18										
	15.50																				
	16.00	16.00																			
	16.50																				
			RK8	50-59					35	0											
	17.00																				
	17.50	17.50																			
	18.00																				
			RK9	60-71					32	0											
	18.50																				

Light Brown | 100% | 32 CT Diamond Impregnated Bit

[1]Outside NABL scope. * Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-78)

Location :	CPU Regeneration	Termination Depth :	25 m (RL 178.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752277 E, 2408064 N	Ground Water Depth :	21.06 m	Casing Depth :	8.0 m
Survey Coordinates :	1874S, 1742W	Surface Elevation :	RL 203.687 m	Boring Start :	30-Nov-18
		Ground Water Level :	RL 182.627 m	Boring Finish :	02-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	18.50						Weak, grey GRANITE, very intensely fract					Light Brown	100%	32 CT Diamond Impregnated Bit							
	19.00	19.00					fractured, highly weathered,														
	19.50																				
			RK10	72-81					34	0											
	20.00																				
	20.50	20.50																			
	21.00																				
			RK11	82-95					39	15	18										
	21.50																				
	22.00	22.00																			
	22.50																				
			RK12	96-102					46	19											
	23.00																				
	23.50	23.50																			
	24.00																				
			RK13	103-113					52	25	20										
	24.50																				
	25.00	25.00						25.00													

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-79)

Location :	Transformer yard	Termination Depth :	20 m (RL 183.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752335 E, 2408008 N	Ground Water Depth :	Not met	Casing Depth :	4.8 m
Survey Coordinates :	1922S, 1675W	Surface Elevation :	RL 203.687 m	Boring Start :	02-Dec-18
				Boring Finish :	04-Dec-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown clayey silt with gravel, high plastic (CI)																	
1.00	1.45	SPT1	63	63				8	26	49	17												
2.50	2.95	SPT2	73	73																			
3.50	3.85	SPT3	102/ 20cm				4.50																
4.50	4.59	SPT4	Ref*/ 9cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-79)

Location : Transformer yard
UTM Coordinates : 752335 E, 2408008 N
Survey Coordinates : 1922S, 1675W
Termination Depth : 20 m (RL 183.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 203.687 m
Boring Method : Rotary Drilling
Casing Depth : 4.8 m
Boring Start : 02-Dec-18
Boring Finish : 04-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water		Bits Used	Density (g/cc)	Specific Gravity					
												Colour	Loss								
Ref*/ 9cm	4.50	4.50	SPT4				Weak, grey GRANITE, very intensely fract fractured, highly weathered,														
		4.59																			
	5.00		RK1	1-5					22	0											
	5.50																				
	6.00	6.00																			
	6.50																				
	7.00		RK2	6-11					24	0											
	7.50	7.50																			
	8.00																				
	8.50		RK3	12-16					28	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
	9.00	9.00																			
	9.50																				
	10.00		RK4	17-22					32	0											
	10.50	10.50																			
	11.00																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-79)

Location : Transformer yard
UTM Coordinates : 752335 E, 2408008 N
Survey Coordinates : 1922S, 1675W
Termination Depth : 20 m (RL 183.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 203.687 m
Boring Method : Rotary Drilling
Casing Depth : 4.8 m
Boring Start : 02-Dec-18
Boring Finish : 04-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX									
												Return Water		Bits Used	Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Colour	Loss								
	11.00		RK5	23-28			Weak, grey GRANITE, very intensely fract fractured, highly weathered,		35	0		Light Brown	100%	32 CT Diamond Impregnated Bit							
	11.50																				
	12.00	12.00																			
	12.50		RK6	29-34					28	0											
	13.00																				
	13.50	13.50																			
	14.00		RK7	35-39					26	0	18										
	14.50																				
	15.00	15.00																			
	15.50		RK8	40-46					31	15											
	16.00																				
	16.50	16.50																			
	17.00		RK9	47-52					35	19											
	17.50																				

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-79)

Location : Transformer yard
UTM Coordinates : 752335 E, 2408008 N
Survey Coordinates : 1922S, 1675W
Termination Depth : 20 m (RL 183.687 m)
Ground Water Depth : Not met
Surface Elevation : RL 203.687 m
Boring Method : Rotary Drilling
Casing Depth : 4.8 m
Boring Start : 02-Dec-18
Boring Finish : 04-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water		Bits Used	Density (g/cc)	Specific Gravity					
												Colour	Loss								
	17.50						Weak, grey GRANITE, very intensely fract fractured, highly weathered,														
	18.00	18.00																			
	18.50		RK10	53-59					42	27	20	Light Brown	100%	32 CI Diamond Impregnated Bit							
	19.00	19.00																			
	19.50		RK11	60-68					44	26											
	20.00	20.00						20.00													

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-81)

Location :	Transformer yard	Termination Depth :	16 m (RL 186.887 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752338 E, 2407956 N	Ground Water Depth :	Not met	Casing Depth :	10.0 m
Survey Coordinates :	1946S, 1617W	Surface Elevation :	RL 202.887 m	Boring Start :	25-Oct-18
				Boring Finish :	30-Oct-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Dense brown silty coarse sand with gravel (SM)		32	53	15	0												
1.00	1.45	SPT1	32	50			2.50	14	65	21	0												
2.50	2.80	UDS1				Hard brown silty clay, high plastic (CH)									1.81	1.61	12.1						
4.00	4.45	SPT2	37	37				0	9	63	28							2.68					
5.50	5.80	UDS2													1.85	1.63	13.7		UU	1 ,2, 3	2.2	5.1	
7.00	7.45	SPT3	44	44								62.8	27.0	35.8									
8.50	8.80	UDS3					9.50								1.88	1.70	10.8						
9.50	9.68	SPT4	102/ 3cm	-		Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-81)

Location :	Transformer yard	Termination Depth :	16 m (RL 186.887 m)
UTM Coordinates :	752338 E, 2407956 N	Ground Water Depth :	Not met
Survey Coordinates :	1946S, 1617W	Surface Elevation :	RL 202.89 m

Boring Method :	Rotary Drilling
Casing Depth :	10.0 m
Boring Start :	25-Oct-18
Boring Finish :	30-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
102/ 3cm	9.50	9.50	SPT4				Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered														
		9.68																			
	10.00		RK1	1-9					39	0	18										
	10.50						- weak, very intensely fractured, highly weathered, 9.5 to 11.0 m														
	11.00	11.00																			
	11.50						- strong, moderately fractured, moderately weathered, 11.0 to 16m														
	12.00		RK2	10-21					98	53		Light Brown	Partial	32 CT Diamond Impregnated Bit	2.77	2.87	0.03	0.51	-	942	
	12.50	12.50																			
	13.00																				
	13.50		RK3	22-34					100	68	40										
	14.00	14.00																			
	14.50		RK4	35-43					94	50											
	15.00	15.00																			
	15.50		RK5	44-48					95	77					2.79	2.89	0.04	0.29	-	751	
	16.00	16.00						16.00													

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-82)

Location :	Transformer yard	Termination Depth :	17.5 m (RL 186.487 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752273 E, 2407911 N	Ground Water Depth :	Not met	Casing Depth :	4.0 m
Survey Coordinates :	1999S, 1675W	Surface Elevation :	RL 203.987 m	Boring Start :	23-Oct-18
				Boring Finish :	28-Oct-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown silty clay, high plastic (CH)		0	19	61	20												
1.00	1.30	UDS1				- very stiff, 0.0 to 3.0 m									1.79	1.64	9.3		UU	1 ,2, 3	1.9	4.5	
2.50	2.95	SPT1	28	28		- hard, 3.0 to 3.5	3.50					61.1	24.6	36.5				2.68					
3.50	3.59	SPT2	Ref*/ 9cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

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Certified Laboratory
(NABL)
Certificate No. TC-7134

Rock Profile (BH-82)

Location :	Transformer yard	Termination Depth :	17.5 m (RL 186.487 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752273 E, 2407911 N	Ground Water Depth :	Not met	Casing Depth :	4.0 m
Survey Coordinates :	1999S, 1675W	Surface Elevation :	RL 203.99 m	Boring Start :	23-Oct-18
				Boring Finish :	28-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	3.50	3.50					Weak, grey GRANITE, very intensely fract														
	4.00		RK-1	1-4			fractured, highly weathered,		25	0											
	4.50																				
	5.00	5.00																			
	5.50		RK-2	5-8					17	0											
	6.00																				
Ref*/ 4cm	6.50	6.50	SPT3																		
	7.00	6.54																			
	7.50		RK-3	9-11					18	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
Ref*/ 6cm	8.00	8.00	SPT4																		
	8.50	8.06																			
	9.00		RK-4	12-17					32	12					2.62	-	-	0.50	88.00	1932*	
	9.50	9.50																			
	10.00																				

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-82)

Location :	Transformer yard	Termination Depth :	17.5 m (RL 186.487 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752273 E, 2407911 N	Ground Water Depth :	Not met	Casing Depth :	4.0 m
Survey Coordinates :	1999S, 1675W	Surface Elevation :	RL 203.99 m	Boring Start :	23-Oct-18
				Boring Finish :	28-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	10.00						Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered														
	10.50		RK-5	18-23					47	21											
	11.00	11.00					- weak, very intensely fractured, highly weathered, 3.5 to 12.5 m				18										
	11.50																				
	12.00		RK-6	24-32					61	18											
	12.50	12.50																			
	13.00						- strong, moderately fractured, moderately weathered, 12.5 to 17.5m														
	13.50		RK-7	33-40					97	69											
	14.00	14.00																			
	14.50																				
	15.00		RK-8	41-46					98	89	40	Light Brown	100%	32 CT Diamond Impregnated Bit	2.78	2.83	0.02	0.25	-	626	
	15.50	15.50																			
	16.00		RK-9	47-52					73	51											
	16.50																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-82)

Location : Transformer yard
UTM Coordinates : 752273 E, 2407911 N
Survey Coordinates : 1999S, 1675W
Termination Depth : 17.5 m (RL 186.487 m)
Ground Water Depth : Not met
Surface Elevation : RL 203.99 m
Boring Method : Rotary Drilling
Casing Depth : 4.0 m
Boring Start : 23-Oct-18
Boring Finish : 28-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	16.50	16.50					Strong, grey Granite, moderately fractured, moderately weathered														
	17.00		RK-10	53-58					92	66	40	Light Brown	100%	32 CT Diamond Impregnated Bit	2.71	2.80	0.03	0.28	-	916	
	17.50	17.50						17.50				↓	↑	↑	2.90	-	-	0.16	98.00	2167*	

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-84)

Location :	SWGR	Termination Depth :	17 m (RL 187.387 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752364 E, 2407871 N	Ground Water Depth :	Not met	Casing Depth :	8.0 m
Survey Coordinates :	2037S, 1616W	Surface Elevation :	RL 204.387 m	Boring Start :	14-Oct-18
				Boring Finish :	22-Oct-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff brown silty clay with traces of gravel (CH)		3	12	67	18												
1.00	1.30	UDS1													1.78	1.56	14.2		UU	1 ,2, 3	1.5	9.8	
2.50	2.95	SPT1	15	15			3.00					62.8	26.3	36.5				2.67					
3.00	3.08	SPT2	Ref*/ 8cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-84)

Location : SWGR
UTM Coordinates : 752364 E, 2407871 N
Survey Coordinates : 2037S, 1616W
Termination Depth : 17 m (RL 187.387 m)
Ground Water Depth : Not met
Surface Elevation : RL 204.39 m
Boring Method : Rotary Drilling
Casing Depth : 8.0 m
Boring Start : 14-Oct-18
Boring Finish : 22-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 8cm	3.00	3.00	SPT2				Very weak, Brown GRANITE, disintegrate completely weathered					Light Brown	100%	32 CT Diamond Impregnated Bit							
		3.08																			
	3.50		RK1	1-2					8	0											
	4.00																				
Ref*/ 4cm	4.50	4.50	SPT3																		
		4.54																			
	5.00		RK2	3-4					10	0											
	5.50																				
Ref*/ 4cm	6.00	6.00	SPT4																		
		6.04																			
	6.50		RK3	5-7					11	0	15										
	7.00																				
Ref*/ 6cm	7.50	7.50	SPT5																		
		7.56																			
	8.00		RK4	8-10					15	0					2.84	-	-	0.13	63.00	1377*	
	8.50																				
Ref*/ 4cm	9.00	9.00	SPT6																		
		9.04																			
	9.50																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-84)

Location : SWGR
UTM Coordinates : 752364 E, 2407871 N
Survey Coordinates : 2037S, 1616W
Termination Depth : 17 m (RL 187.387 m)
Ground Water Depth : Not met
Surface Elevation : RL 204.39 m
Boring Method : Rotary Drilling
Casing Depth : 8.0 m
Boring Start : 14-Oct-18
Boring Finish : 22-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	9.50		RK5	11-12			Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered		18	0											
	10.00																				
Ref*/ 6cm	10.50	10.50	SPT7				- weak, very intensely fractured, highly weathered, 3.0 to 12.0 m														
	10.56																				
	11.00		RK6	13-15					25	12	18				2.70	2.81	0.04	0.30	-	220	
	11.50																				
	12.00	12.00																			
	12.50						- strong, moderately fractured, moderately weathered, 12.0 to 17m														
	13.00		RK7	16-21					73	52		Light Brown	Partial	32 CT Diamond Impregnated Bit	2.78	2.86	0.03	0.46	-	696	
	13.50	13.50																			
	14.00																				
	14.50		RK8	22-26					61	54	40										
	15.00	15.00																			
	15.50		RK9	27-29					60	55											
	16.00	16.00																			

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-84)

Location : SWGR
UTM Coordinates : 752364 E, 2407871 N
Survey Coordinates : 2037S, 1616W
Termination Depth : 17 m (RL 187.387 m)
Ground Water Depth : Not met
Surface Elevation : RL 204.39 m
Boring Method : Rotary Drilling
Casing Depth : 8.0 m
Boring Start : 14-Oct-18
Boring Finish : 22-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
	16.00	16.00					Strong, grey Granite, moderately fractured, moderately weathered														
	16.50		RK10	30-31					78	69	40	Light Brown	Partial	IMP Bit							
	17.00	17.00						17.00													

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-85)

Location :	Transformer yard	Termination Depth :	22.5 m (RL 181.387 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752263 E, 2407822 N	Ground Water Depth :	21.05 m	Casing Depth :	8.0 m
Survey Coordinates :	2092S, 1675W	Surface Elevation :	RL 203.887 m	Boring Start :	30-Oct-18
		Ground Water Level :	RL 182.837 m	Boring Finish :	05-Nov-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Dense brown clayey sand with gravel (SC)		15	43	8	34												
1.00	1.45	SPT1	36	56			2.50	13	42	28	17												
2.50	2.80	UDS1				Hard brown clayey silt with gravel (CI)									1.81	1.62	11.5		UU	1 ,2, 3	1.6	9.3	
4.00	4.45	SPT2	45	45				0	8	56	36							2.67					
5.50	5.80	UDS2					7.00					41.2	21.9	19.4	1.85	1.64	12.5						
7.00	7.18	SPT3	104/ 3cm	-		Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-85)

Location :	Transformer yard	Termination Depth :	22.5 m (RL 181.387 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752263 E, 2407822 N	Ground Water Depth :	21.05 m	Casing Depth :	8.0 m
Survey Coordinates :	2092S, 1675W	Surface Elevation :	RL 203.89 m	Boring Start :	30-Oct-18
		Ground Water Level :	RL 182.837 m	Boring Finish :	05-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
100/ 3cm	7.00	7.00	SPT3				Weak, grey GRANITE, very intensely fract fractured, highly weathered,														
		7.18																			
	7.50		RK-1	1-5					27	7					2.63	-	-	1.08	70.00	1534*	
	8.00																				
	8.50	8.50																			
	9.00																				
			RK-2	6-10					24	0											
	9.50																				
	10.00	10.00																			
	10.50																				
			RK-3	11-19					40	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
	11.00																				
	11.50	11.50																			
	12.00																				
			RK-4	20-27					43	9											
	12.50																				
	13.00	13.00																			
	13.50																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-85)

Location :	Transformer yard	Termination Depth :	22.5 m (RL 181.387 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752263 E, 2407822 N	Ground Water Depth :	21.05 m	Casing Depth :	8.0 m
Survey Coordinates :	2092S, 1675W	Surface Elevation :	RL 203.89 m	Boring Start :	30-Oct-18
		Ground Water Level :	RL 182.837 m	Boring Finish :	05-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	13.50						Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered														
	14.00		RK-5	28-34					49	7											
	14.50	14.50					- weak, very intensely fractured, highly weathered, 7.0 to 17.5 m														
	15.00																				
	15.50		RK-6	35-39					40	13	18										
	16.00	16.00																			
	16.50																				
	17.00		RK-7	40-48					64	17					2.76	2.80	0.02	0.42	-	504	
	17.50	17.50					- strong, moderately fractured, moderately weathered, 17.5 to 22.5m					Light Brown	100%	32 CT Diamond Impregnated Bit							
	18.00																				
	18.50		RK-8	49-54					80	67					2.78	2.81	0.01	0.58	-	1253	
	19.00	19.00									40										
	19.50																				
	20.00		RK-9	55-61					85	65											

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

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Rock Profile (BH-85)

Location :	Transformer yard	Termination Depth :	22.5 m (RL 181.387 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752263 E, 2407822 N	Ground Water Depth :	21.05 m	Casing Depth :	8.0 m
Survey Coordinates :	2092S, 1675W	Surface Elevation :	RL 203.89 m	Boring Start :	30-Oct-18
		Ground Water Level :	RL 182.837 m	Boring Finish :	05-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	20.00						Strong, grey Granite, moderately fractured, moderately weathered					Light Brown	100%	32 Cl Diamond Impregnated Bit							
	20.50	20.50																			
	21.00		RK-10	62-65					76	56											
	21.50	21.50									40										
	22.00		RK-11	66-71					83	54											
	22.50	22.50						22.50													

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-86)

Location :	Transformer yard	Termination Depth :	23 m (RL 181.687 m)	Boring Method :	Shell & Auger
UTM Coordinates :	752185 E, 2407814 N	Ground Water Depth :	19.08 m	Casing Depth :	11.0 m
Survey Coordinates :	2109S, 1749W	Surface Elevation :	RL 204.687 m	Boring Start :	06-Nov-18
		Ground Water Level :	RL 185.607 m	Boring Finish :	14-Nov-18

Depth, m		Sample No.	SPT (1)		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Stiff to hard brown clayey silt, medium plastic (CI)		2	23	56	19												
1.00	1.45	SPT1	12	12		- stiff, with traces of gravel,0.0 m to 2.5m						42.3	16.3	26.0									
2.50	2.80	UDS1													1.80	1.59	12.9		UU	1 ,2, 3	1.2	3.2	
4.00	4.45	SPT2	52	52		- hard, 2.5 to 9.0 m																	
5.50	5.95	SPT3	72	72				0	15	47	38							2.68					
7.00	7.45	SPT4	83	83								45.0	22.0	23.1									
8.50	8.90	SPT5	101/ 25cm	-			9.00																
9.00	9.10	SPT6	Ref*/ 8cm	-		Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																	

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Rock Profile (BH-86)

Location :	Transformer yard	Termination Depth :	23 m (RL 181.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752185 E, 2407814 N	Ground Water Depth :	19.08 m	Casing Depth :	11.0 m
Survey Coordinates :	2109S, 1749W	Surface Elevation :	RL 204.69 m	Boring Start :	06-Nov-18
		Ground Water Level :	RL 185.607 m	Boring Finish :	14-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 8cm	9.00	9.00	SPT6				Weak, grey GRANITE, very intensely fract fractured, highly weathered,														
		9.08																			
	9.50		RK-1	1-4					17	0											
	10.00																				
Ref*/ 4cm	10.50	10.50	SPT7																		
		10.54																			
	11.00																				
			RK-2	5-9					31	0											
	11.50																				
	12.00	12.00																			
	12.50																				
			RK-3	10-15					27	0	18	Light Brown	100%	32 CT Diamond Impregnated Bit							
	13.00																				
	13.50	13.50																			
	14.00																				
			RK-4	16-20					24	0											
	14.50																				
	15.00	15.00																			
	15.50																				

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-86)

Location : Transformer yard
UTM Coordinates : 752185 E, 2407814 N
Survey Coordinates : 2109S, 1749W
Termination Depth : 23 m (RL 181.687 m)
Ground Water Depth : 19.08 m
Surface Elevation : RL 204.69 m
Ground Water Level : RL 185.607 m
Boring Method : Rotary Drilling
Casing Depth : 11.0 m
Boring Start : 06-Nov-18
Boring Finish : 14-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	15.50						Weak to strong grey Granite, very intensely to moderately fractured, highly to moderately weathered														
	16.00		RK-5	21-26					30	0											
	16.50	16.50					- weak, very intensely fractured, highly weathered, 9.0 to 18.0 m				18										
	17.00																				
	17.50		RK-6	27-32					32	0											
	18.00	18.00																			
	18.50						- strong, moderately fractured, moderately weathered, 18.0 to 23.0m														
	19.00		RK-7	33-41					80	52											
	19.50	19.50																			
	20.00																				
	20.50		RK-8	42-50					88	57	40	Light Brown	100%	32 CT Diamond Impregnated Bit	2.8	2.8	0.0	0.5	-	1182	
	21.00	21.00													2.7	2.7	0.0	0.4	107.0	2352*	
	21.50		RK-9	51-55					75	61											
	22.00	22.00																			

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-86)

Location :	Transformer yard	Termination Depth :	23 m (RL 181.687 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	752185 E, 2407814 N	Ground Water Depth :	19.08 m	Casing Depth :	11.0 m
Survey Coordinates :	2109S, 1749W	Surface Elevation :	RL 204.69 m	Boring Start :	06-Nov-18
		Ground Water Level :	RL 185.607 m	Boring Finish :	14-Nov-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
												Return Water: Colour	Return Water: Loss	Bits Used							
	22.00																				
	22.50		RK-10	56-60			Strong, grey Granite, moderately fractured, moderately weathered		78	63	40	Light Brown	100%	32 CT Diamond Impregnated Bit	2.8	-	-	0.2	-	1380	
	23.00	23.00						23.00													

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

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Soil Profile (BH-10)

Location :	Lagoon-1	Surface Elevation :	RL 205.242 m	Boring Method :	Shell & Auger
UTM Coordinates :	753266 E, 2408325 N	Ground Water Depth :	0.00 m	Casing Depth :	8.1 m
Survey Coordinates :	1506S, 740W	Termination Depth :	15.45 m (RL 189.8 m)	Boring Start :	27-Aug-18
		Ground Water Level :	RL 205.2 m	Boring Finish :	27-Aug-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown silty clay, high plastic (CH)																		
1.00	1.45	SPT1	30	30		- with gravel, 0.0 to 1.0 m						66.6	27.6	39.0	14									21
2.50	2.80	UDS1														1.72	1.50	14.7		UC		1.8		
4.00	4.45	SPT2	42	42				0	3	59	38													
5.50	5.80	UDS2																						
7.00	7.45	SPT3	53	53								58.2	25.0	33.2					2.67					
8.50	8.95	SPT4	62	62																				
10.00	10.45	SPT5	73	73				0	6	62	32													
11.50	11.95	SPT6	79	79																				
13.00	13.45	SPT7	92	92																				
14.50	14.92	SPT8	101/ 27cm	-																				
15.00	15.45	SPT9	81	81		- with traces of gravel, 15.0 to 15.45 m	15.45																	

[1] SPT is outside NABL scope.

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ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-54)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 207.279 m	Boring Method :	Shell & Auger
UTM Coordinates :	752888 E, 2407788 N	Ground Water Depth :	20.09 m	Casing Depth :	9.0 m
Survey Coordinates :	2079S, 1063W	Termination Depth :	25 m (RL 182.3 m)	Boring Start :	22-Aug-18
		Ground Water Level :	RL 187.2 m	Boring Finish :	07-Oct-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown clayey silt, medium plastic (CI)		14	35	40	11													8
1.00	1.45	SPT1	15	15		- very stiff, 0.0 to 7.0 m						47.1	27.0	20.1	13				2.68					
2.50	2.80	DS2				- with gravel, 0.0 to 1.0 m																		
4.00	4.45	SPT2	22	22																				
5.50	5.80	UDS1														1.85	1.67	11.1		UU	1 ,2, 3	9.9	7.2	
7.00	7.45	SPT3	57	57		- hard, 7.0 to 8.5 m	8.50																	
8.50	8.78	SPT4	102/ 13cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-54)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 207.279 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752888 E, 2407788 N	Ground Water Depth :	20.09 m	Casing Depth :	9.0 m
Survey Coordinates :	2079S, 1063W	Termination Depth :	25 m (RL 182.3 m)	Boring Start :	22-Aug-18
		Ground Water Level :	RL 187.2 m	Boring Finish :	07-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
102*/ 13cm	8.50	8.50	SPT4				Weak, grey GRANITE, very intensely fractured, highly weathered															
		8.78																				
	9.00		RK-1	1-6					26	0												
	9.50																					
	10.00	10.00																				
	10.50																					
	11.00		RK-2	7-10					28	8						2.77	2.86	0.03	0.37	-	398	
	11.50	11.50																				
	12.00																					
	12.50		RK-3	11-14					33	8	18		Light Brown	100%	32 CT Diamond Impregnated Bit	2.77	2.83	0.02	0.48	-	257	
	13.00	13.00																				
	13.50																					
	14.00		RK-4	15-17					29	0												
	14.50	14.50																				
	15.00																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-54)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 207.279 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752888 E, 2407788 N	Ground Water Depth :	20.09 m	Casing Depth :	9.0 m
Survey Coordinates :	2079S, 1063W	Termination Depth :	25 m (RL 182.3 m)	Boring Start :	22-Aug-18
		Ground Water Level :	RL 187.2 m	Boring Finish :	07-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	15.00						Weak, grey GRANITE, very intensely fractured, highly weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	15.50		RK-5	18-22					30	0												
	16.00	16.00																				
	16.50																					
	17.00		RK-6	23-25					21	0												
	17.50	17.50																				
	18.00																					
	18.50		RK-7	26-29					22	0	18											
	19.00	19.00																				
	19.50																					
	20.00		RK-8	30-33					23	0												
	20.50	20.50																				
	21.00																					
	21.50		RK-9	34-38					34	0						2.59	-	-	1.86	60.00	1315*	

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-54)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 207.279 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752888 E, 2407788 N	Ground Water Depth :	20.09 m	Casing Depth :	9.0 m
Survey Coordinates :	2079S, 1063W	Termination Depth :	25 m (RL 182.3 m)	Boring Start :	22-Aug-18
		Ground Water Level :	RL 187.2 m	Boring Finish :	07-Oct-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	21.50						Weak, grey GRANITE, very intensely fractured, highly weathered															
	22.00	22.00																				
	22.50		RK-10	39-46					30	0			Light Brown	100%	32 CT Diamond Impregnated Bit							
	23.00																					
	23.50	23.50									18											
	24.00		RK-11	47-54					36	0												
	24.50																					
	25.00	25.00						25.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-70)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 201.378 m	Boring Method :	Shell & Auger
UTM Coordinates :	752494 E, 2408434 N	Ground Water Depth :	19.19 m	Casing Depth :	8.0 m
Survey Coordinates :	1470S, 15.2W	Termination Depth :	25 m (RL 176.4 m)	Boring Start :	08-Dec-18
		Ground Water Level :	RL 182.2 m	Boring Finish :	09-Dec-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown silty clay, high plastic (CH)																		
1.00	1.45	SPT1	54	54																				
2.50	2.95	SPT2	60	60																				
4.00	4.45	SPT3	76	76			6.50																	
6.50	6.53	SPT4	Ref*/ 3cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-70)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 201.378 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752494 E, 2408434 N	Ground Water Depth :	19.19 m	Casing Depth :	8.0 m
Survey Coordinates :	1470S, 15.2W	Termination Depth :	25 m (RL 176.4 m)	Boring Start :	08-Dec-18
		Ground Water Level :	RL 182.2 m	Boring Finish :	09-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 3cm	6.50	6.50	SPT4		NX		Weak, grey GRANITE, very intensely fractured, highly weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	7.00	6.53																				
	7.50		RK1	1-4					21	0												
	8.00	8.00			8.00																	
	8.50																					
	9.00		RK2	5-8					24	0												
	9.50	9.50																				
	10.00																					
	10.50		RK3	9-14					28	0	18											
	11.00	11.00																				
	11.50																					
	12.00		RK4	15-21					32	11												
	12.50	12.50																				
	13.00																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-70)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 201.378 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752494 E, 2408434 N	Ground Water Depth :	19.19 m	Casing Depth :	8.0 m
Survey Coordinates :	1470S, 15.2W	Termination Depth :	25 m (RL 176.4 m)	Boring Start :	08-Dec-18
		Ground Water Level :	RL 182.2 m	Boring Finish :	09-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	13.00						Weak, grey GRANITE, very intensely fractured, highly weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	13.50		RK5	22-28					31	13												
	14.00	14.00																				
	14.50																					
	15.00		RK6	29-37					40	15												
	15.50	15.50																				
	16.00																					
	16.50		RK7	38-44					43	10	18											
	17.00	17.00																				
	17.50																					
	18.00		RK8	45-52					44	17												
	18.50	18.50																				
	19.00																					
	19.50		RK9	53-60					48	18												

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-70)

Location :	Space for Raw Water Reservoir (Future)	Surface Elevation :	RL 201.378 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752494 E, 2408434 N	Ground Water Depth :	19.19 m	Casing Depth :	8.0 m
Survey Coordinates :	1470S, 15.2W	Termination Depth :	25 m (RL 176.4 m)	Boring Start :	08-Dec-18
		Ground Water Level :	RL 182.2 m	Boring Finish :	09-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
	19.50						Weak, grey GRANITE, very intensely fractured, highly weathered															
	20.00	20.00																				
	20.50																					
			RK10	61-67					43	21												
	21.00																					
	21.50	21.50																				
	22.00																					
			RK11	68-75					47	20	18		Light Brown	100%	32 CT Diamond Impregnated Bit							
	22.50																					
	23.00	23.00																				
	23.50		RK12	76-84					53	23												
	24.00	24.00																				
	24.50		RK13	85-92					65	15												
	25.00	25.00						25.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-74)

Location :	OAC	Surface Elevation :	RL 204.923 m	Boring Method :	Shell & Auger
UTM Coordinates :	752832 E, 2407862 N	Ground Water Depth :		Casing Depth :	8.5 m
Survey Coordinates :	1934S, 1136W	Termination Depth :	17.5 m (RL 187.4 m)	Boring Start :	25-Sep-18
		Ground Water Level :	m	Boring Finish :	30-Sep-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown silty clay, high plastic (CH)																		
1.00	1.45	UDS1														1.75	1.56	12.0						
2.50	2.95	SPT1	56	56																				
4.00	4.45	SPT2	64	64			5.00																	
5.00	5.09	SPT3	Ref*/ 9 cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-74)

Location : OAC
UTM Coordinates : 752832 E, 2407862 N
Survey Coordinates : 1934S, 1136W

Surface Elevation : RL 204.923 m
Ground Water Depth :
Termination Depth : 17.5 m (RL 187.4 m)
Ground Water Level : m

Boring Method : Rotary Drilling
Casing Depth : 8.5 m
Boring Start : 25-Sep-18
Boring Finish : 30-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
Ref*/ 9cm	5.00	5.00	SPT3		NX		Weak, grey GRANITE, very intensely fractured, highly weathered															
	5.09																					
	5.50		RK-1	1-7					35	0												
	6.00																					
	6.50	6.50																				
	7.00																					
	7.50		RK2	8-14					33	0												
	8.00	8.00																				
	8.50																					
	9.00		RK3	15-20	8.50				28	0	18											
	9.50	9.50																				
	10.00																					
	10.50		RK4	21-25					29	0			Light Brown	100%	32 CT Diamond Impregnated Bit	2.72	-	-	0.73	151.0	3315*	
	11.00	11.00																				
	11.50																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-74)

Location : OAC
UTM Coordinates : 752832 E, 2407862 N
Survey Coordinates : 1934S, 1136W
Surface Elevation : RL 204.923 m
Ground Water Depth :
Termination Depth : 17.5 m (RL 187.4 m)
Ground Water Level : m
Boring Method : Rotary Drilling
Casing Depth : 8.5 m
Boring Start : 25-Sep-18
Boring Finish : 30-Sep-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	11.50		RK5	26-32			Weak to moderately strong grey GRANITE very intensely to moderately fractured, highly to moderately weathered		37	0												
	12.00																					
	12.50	12.50					- weak, very intensely fractured, highly weathered, 5.0 to 12.5 m															
	13.00																					
	13.50		RK6	33-34					70	60						2.77	2.84	0.03	1.10	-	848	
	14.00	14.00					- moderately strong, moderately fractured, moderately weathered 12.5 to 17.5 m															
	14.50																					
	15.00		RK7	35-43					66	51	30		Light Brown	100%	32 CT Diamond Impregnated Bit	2.79	2.86	0.03	0.30	-	742	
	15.50	15.50																				
	16.00		RK8	44-45					58	53												
	16.50	16.50																				
	17.00		RK9	46-52					82	65												
	17.50	17.50						17.50														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-93)

Location :	Lagoon-1	Surface Elevation :	RL 208.640 m	Boring Method :	Shell & Auger
UTM Coordinates :	752995 E, 2408464 N	Ground Water Depth :	21.82 m	Casing Depth :	9.5 m
Survey Coordinates :	1380S, 1011W	Termination Depth :	30 m (RL 178.64 m)	Boring Start :	19-Dec-18
		Ground Water Level :	RL 186.82 m	Boring Finish :	21-Dec-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown silty clay, high plastic (CH)																		
1.00	1.45	SPT1	51	51																				
2.50	2.95	SPT2	64	64																				
4.00	4.45	SPT3	72	72																				
5.50	5.95	SPT4	83	83																				
7.00	7.45	SPT5	93	93								52.4	25.1	27.3										
8.50	8.83	SPT6	101/ 18cm				10.00																	
10.00	10.06	SPT7	Ref*/ 6cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-93)

Location : Lagoon-1
UTM Coordinates : 752995 E, 2408464 N
Survey Coordinates : 1380S, 1011W

Surface Elevation : RL 208.640 m
Ground Water Depth : 21.82 m
Termination Depth : 30 m (RL 178.64 m)
Ground Water Level : RL 186.82 m

Boring Method : Rotary Drilling
Casing Depth : 9.5 m
Boring Start : 19-Dec-18
Boring Finish : 21-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water		Bits Used	Density (g/cc)	Specific Gravity					
													Colour	Loss								
Ref*/ 6cm	10.00	10.00	SPT7				Weak, grey GRANITE, very intensely fractured, highly weathered															
	10.06																					
	10.50		RK1	1-4					22	0												
	11.00																					
	11.50	11.50																				
	12.00																					
	12.50		RK2	5-10					28	0												
	13.00	13.00																				
	13.50																					
	14.00		RK3	11-17					37	13	18											
	14.50	14.50																				
	15.00																					
	15.50		RK4	18-26					48	16												
	16.00																					
	16.50																					

Light Brown; 100%; 32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-93)

Location : Lagoon-1
UTM Coordinates : 752995 E, 2408464 N
Survey Coordinates : 1380S, 1011W

Surface Elevation : RL 208.640 m
Ground Water Depth : 21.82 m
Termination Depth : 30 m (RL 178.64 m)
Ground Water Level : RL 186.82 m

Boring Method : Rotary Drilling
Casing Depth : 9.5 m
Boring Start : 19-Dec-18
Boring Finish : 21-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
	16.50						Weak to moderately strong grey GRANITE very intensely to moderately fractured, highly to moderately weathered															
	17.00	17.00																				
	17.50		RK5	27-37			- weak, very intensely fractured, highly weathered, 10.0 to 18.5 m		55	21	18											
	18.00																					
	18.50	18.50																				
	19.00		RK6	38-46			- moderately strong, moderately fractured, moderately weathered 18.5 to 30.0 m		61	37												
	19.50																					
	20.00	20.00																				
	20.50		RK7	47-57					68	31	30		Light Brown	100%	32 CT Diamond Impregnated Bit							
	21.00																					
	21.50	21.50																				
	22.00		RK8	58-69					73	40												
	22.50																					
	23.00	23.00																				

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-93)

Location : Lagoon-1
UTM Coordinates : 752995 E, 2408464 N
Survey Coordinates : 1380S, 1011W

Surface Elevation : RL 208.640 m
Ground Water Depth : 21.82 m
Termination Depth : 30 m (RL 178.64 m)
Ground Water Level : RL 186.82 m

Boring Method : Rotary Drilling
Casing Depth : 9.5 m
Boring Start : 19-Dec-18
Boring Finish : 21-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water		Bits Used	Density (g/cc)	Specific Gravity					
													Colour	Loss								
	23.00						Moderately strong grey GRANITE, moderately fractured, moderately weathered															
	23.50		RK9	70-77					76	43												
	24.00	24.00																				
	24.50		RK10	78-87					79	45												
	25.00	25.00																				
	25.50																					
	26.00		RK11	88-97					80	40	30											
	26.50	26.50																				
	27.00																					
	27.50		RK12	98-107					84	42												
	28.00	28.00																				
	28.50		RK13	108-116					81	45												
	29.00	29.00																				
	29.50																					

Light Brown
100%
32 CT Diamond Impregnated Bit

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-93)

Location : Lagoon-1
UTM Coordinates : 752995 E, 2408464 N
Survey Coordinates : 1380S, 1011W

Surface Elevation : RL 208.640 m
Ground Water Depth : 21.82 m
Termination Depth : 30 m (RL 178.64 m)
Ground Water Level : RL 186.82 m

Boring Method : Rotary Drilling
Casing Depth : 9.5 m
Boring Start : 19-Dec-18
Boring Finish : 21-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used	Density (g/cc)	Specific Gravity					
	29.50		RK14	117-124			Moderately strong grey GRANITE, moderately fractured, moderately weathered		83	46	30		Light Brown	100 %	32 CT							
	30.00	30.00						30.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-101)

Location :	SWGR Room	Surface Elevation :	RL 207.817 m	Boring Method :	Shell & Auger
UTM Coordinates :	752854 E, 2407944 N	Ground Water Depth :	22.80 m	Casing Depth :	15.0 m
Survey Coordinates :	1933S, 1145W	Termination Depth :	25 m (RL 182.817 m)	Boring Start :	03-Dec-18
		Ground Water Level :	RL 185.017 m	Boring Finish :	05-Dec-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very dense brown sandy gravels (GM)																		
1.00	1.45	SPT1	74	74			2.50	65	27	8	0													
2.50	2.95	SPT2	89	89		Hard brown silty clay, high plastic (CH)																		
4.00	4.45	SPT3	56	56																				
5.50	5.95	SPT4	70	70																				
7.00	7.45	SPT5	82	82		- with traces of gravel, 7.0 to 8.5 m		4	14	50	32													
8.50	8.95	SPT6	82	82																				
10.00	10.45	SPT7	59	59																				
11.50	11.95	SPT8	63	63								58.6	27.3	31.3										
13.00	13.45	SPT9	93	93			14.50																	
14.50	14.62	SPT10	Ref*/ 12cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-101)

Location : SWGR Room
UTM Coordinates : 752854 E, 2407944 N
Survey Coordinates : 1933S, 1145W

Surface Elevation : RL 207.817 m
Ground Water Depth : 22.80 m
Termination Depth : 25 m (RL 182.817 m)
Ground Water Level : RL 185.017 m

Boring Method : Rotary Drilling
Casing Depth : 15.0 m
Boring Start : 03-Dec-18
Boring Finish : 05-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
Ref*/ 12cm	14.50	14.50	SPT 10				Very weak to weak, grey GRANITE, disintegrated to very intensely fractured, highly to completely weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	15.00	14.62																				
			WS1	-					0	0												
	15.50						- very weak, disintegrated, completely weathered, 14.5 to 19.0 m															
Ref*/ 6cm	16.00	16.00	SPT 11																			
	16.50	16.06																				
			WS2	-					0	0												
	17.00																					
Ref*/ 5cm	17.50	17.50	SPT 12																			
	18.00	17.55																				
			WS3	-					0	0												
	18.50																					
Ref*/ 7cm	19.00	19.00	SPT 13				- weak, very intensely fractured, highly weathered, 19.0 to 25.0 m															
	19.50	19.07																				
	20.00		RK1	1-5					21	0												
	20.50	20.50																				
	21.00																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-101)

Location :	SWGR Room	Surface Elevation :	RL 207.817 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752854 E, 2407944 N	Ground Water Depth :	22.80 m	Casing Depth :	15.0 m
Survey Coordinates :	1933S, 1145W	Termination Depth :	25 m (RL 182.817 m)	Boring Start :	03-Dec-18
		Ground Water Level :	RL 185.017 m	Boring Finish :	05-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	21.00						Weak, grey GRANITE, very intensely fractured, highly weathered															
	21.50		RK2	6-10					26	0												
	22.00	22.00																				
	22.50																					
	23.00		RK3	11-18					28	0	18											
	23.50	23.50																				
	24.00																					
	24.50		RK4	19-26					32	0												
	25.00	25.00						25.00					Light Brown	100%	32 CT Diamond Impregnated Bit							

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-102)

Location :	Space for Lime & Gypsum Handling Area	Surface Elevation :	RL 208.087 m	Boring Method :	Shell & Auger
UTM Coordinates :	752960 E, 2407959 N	Ground Water Depth :	18.32 m	Casing Depth :	13.5 m
Survey Coordinates :	1906S, 1039W	Termination Depth :	30 m (RL 178.087 m)	Boring Start :	05-Dec-18
		Ground Water Level :	RL 189.767 m	Boring Finish :	07-Dec-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Hard brown silty clay with gravel, high plastic (CH)																		
1.00	1.45	SPT1	52	52																				
2.50	2.95	SPT2	63	63				11	3	38	48													
4.00	4.45	SPT3	66	66																				
5.50	5.95	SPT4	71	71																				
7.00	7.45	SPT5	76	76								58.5	26.3	32.2										
8.50	8.95	SPT6	85	85																				
10.00	10.45	SPT7	80	80																				
11.50	11.95	SPT8	90	90			13.00																	
13.00	13.09	SPT9	Ref*/ 9cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-102)

Location :	Space for Lime & Gypsum Handling Area	Surface Elevation :	RL 208.087 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752960 E, 2407959 N	Ground Water Depth :	18.32 m	Casing Depth :	13.5 m
Survey Coordinates :	1906S, 1039W	Termination Depth :	30 m (RL 178.087 m)	Boring Start :	05-Dec-18
		Ground Water Level :	RL 189.767 m	Boring Finish :	07-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
Ref*/ 9cm	13.00	13.00	SPT9				Weak, grey GRANITE, very intensely fractured, highly weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	13.09																					
	13.50		RK1	1-5					24	0												
	14.00																					
	14.50	14.50																				
	15.00																					
	15.50		RK2	6-13					26	0												
	16.00	16.00																				
	16.50																					
	17.00		RK3	14-18					28	0	18											
	17.50	17.50																				
	18.00																					
	18.50		RK4	19-27					29	14												
	19.00	19.00																				
	19.50																					

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-102)

Location :	Space for Lime & Gypsum Handling Area	Surface Elevation :	RL 208.087 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752960 E, 2407959 N	Ground Water Depth :	18.32 m	Casing Depth :	13.5 m
Survey Coordinates :	1906S, 1039W	Termination Depth :	30 m (RL 178.087 m)	Boring Start :	05-Dec-18
		Ground Water Level :	RL 189.767 m	Boring Finish :	07-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water Colour	Return Water Loss	Bits Used							
	19.50						Weak, grey GRANITE, very intensely fractured, highly weathered						Light Brown	100%	32 CT Diamond Impregnated Bit							
	20.00		RK5	28-35					32	13												
	20.50	20.50																				
	21.00																					
	21.50		RK6	36-43					28	0												
	22.00	22.00																				
	22.50																					
	23.00		RK7	44-52					26	0	18											
	23.50	23.50																				
	24.00																					
	24.50		RK8	53-61					27	12												
	25.00	25.00																				
	25.50																					
	26.00		RK9	62-72					35	15												

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-102)

Location :	Space for Lime & Gypsum Handling Area	Surface Elevation :	RL 208.087 m	Boring Method :	Rotary Drilling
UTM Coordinates :	752960 E, 2407959 N	Ground Water Depth :	18.32 m	Casing Depth :	13.5 m
Survey Coordinates :	1906S, 1039W	Termination Depth :	30 m (RL 178.087 m)	Boring Start :	05-Dec-18
		Ground Water Level :	RL 189.767 m	Boring Finish :	07-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX			Density (g/cc)	Specific Gravity	Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used							
	26.00						Weak, grey GRANITE, very intensely fractured, highly weathered															
	26.50	26.50																				
	27.00																					
			RK10	73-83					42	19												
	27.50																					
	28.00	28.00																				
	28.50		RK11	84-95					44	15	18											
	29.00	29.00																				
	29.50		RK12	96-104					49	18												
	30.00	30.00						30.00					Light Brown	100%	32 CT Diamond Impregnated Bit							

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-103)

Location :	Ash Classifier	Surface Elevation :	RL 206.887 m	Boring Method :	Shell & Auger
UTM Coordinates :	752864 E, 2407826 N	Ground Water Depth :	20.12 m	Casing Depth :	14.0 m
Survey Coordinates :	2048S, 1121W	Termination Depth :	25 m (RL 181.887 m)	Boring Start :	10-Dec-18
		Ground Water Level :	RL 186.767 m	Boring Finish :	11-Dec-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown clayey silt, medium plastic (CI)																		
1.00	1.45	SPT1	26	26		- very stiff, 0.0 to 4.0 m																		
2.50	2.45	SPT2	30	30																				
4.00	4.45	SPT3	41	41		- hard, 4.0 to 13.0 m																		
5.50	5.95	SPT4	52	52																				
7.00	7.45	SPT5	70	70				0	4	60	36													
8.50	8.95	SPT6	78	78																				
10.00	10.45	SPT7	90	90								41.2	19.2	22.0										
11.50	11.95	SPT8	98	98			13.00																	
13.00	13.26	SPT9	102/ 11cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-103)

Location : Ash Classifier
UTM Coordinates : 752864 E, 2407826 N
Survey Coordinates : 2048S, 1121W

Surface Elevation : RL 206.887 m
Ground Water Depth : 20.12 m
Termination Depth : 25 m (RL 181.887 m)
Ground Water Level : RL 186.767 m

Boring Method : Rotary Drilling
Casing Depth : 14.0 m
Boring Start : 10-Dec-18
Boring Finish : 11-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water		Bits Used	Density (g/cc)	Specific Gravity					
													Colour	Loss								
	13.50	13.50					Weak, grey GRANITE, very intensely fractured, highly weathered															
	14.00		RK1	1-5					31	0												
	14.50																					
	15.00	15.00																				
	15.50		RK2	6-11					28	0												
	16.00																					
	16.50	16.50																				
	17.00		RK3	12-19					34	14	18											
	17.50																					
	18.00	18.00																				
	18.50		RK4	20-25					26	0												
	19.00																					
	19.50	19.50																				
	20.00																					

Light Brown
100%
32 CT Diamond Impregnated Bit

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-103)

Location : Ash Classifier
UTM Coordinates : 752864 E, 2407826 N
Survey Coordinates : 2048S, 1121W

Surface Elevation : RL 206.887 m
Ground Water Depth : 20.12 m
Termination Depth : 25 m (RL 181.887 m)
Ground Water Level : RL 186.767 m

Boring Method : Rotary Drilling
Casing Depth : 14.0 m
Boring Start : 10-Dec-18
Boring Finish : 11-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water: Colour	Return Water: Loss	Bits Used	Density (g/cc)	Specific Gravity					
	20.00		RK5	26-31			Moderately strong ro weak, grey GRANITE very intensely fractured, highly weathered		25	10			Light Brown	100%	32 CT Diamond Impregnated Bit							
	20.50						- weak, 13.5 to 21.0 m															
	21.00	21.00					- moderately strong, 21.0 to 25.0 m															
	21.50		RK6	32-43					46	31												
	22.00																					
	22.50	22.50																				
	23.00		RK7	44-53					63	38	22											
	23.50																					
	24.00	24.00																				
	24.50		RK8	54-60					69	30												
	25.00	25.00						25.00														

[1]Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Soil Profile (BH-104)

Location :	TAC	Surface Elevation :	RL 208.237 m	Boring Method :	Shell & Auger
UTM Coordinates :	752848 E, 2407736 N	Ground Water Depth :	23.82 m	Casing Depth :	11.0 m
Survey Coordinates :	2138S, 1129W	Termination Depth :	35 m (RL 173.237 m)	Boring Start :	12-Dec-18
		Ground Water Level :	RL 184.417 m	Boring Finish :	15-Dec-18

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)	
0.00	1.00	DS1				Very stiff to hard brown clayey silt, medium plastic (CI)																		
1.00	1.45	SPT1	27	27		- very stiff, 0.0 to 4.0 m																		
2.50	2.95	SPT2	28	28																				
4.00	4.45	SPT3	52	52		- hard, 4.0 to 13.0 m																		
5.50	5.95	SPT4	60	60								41.6	21.7	19.8										
7.00	7.45	SPT5	63	63																				
8.50	8.95	SPT6	71	71																				
10.00	10.45	SPT7	76	76																				
11.50	11.95	SPT8	90	90								40.8	23.2	17.6										
13.00	13.45	SPT9	96	96			14.00																	
14.00	14.02	SPT10	Ref*/ 2cm			Refusal met on Rock. Core drilling through rock adopted. Refer to next page for details.																		

[1] SPT is outside NABL scope.

CENGRS

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. TC-7134

Rock Profile (BH-104)

Location : TAC
UTM Coordinates : 752848 E, 2407736 N
Survey Coordinates : 2138S, 1129W

Surface Elevation : RL 208.237 m
Ground Water Depth : 23.82 m
Termination Depth : 35 m (RL 173.237 m)
Ground Water Level : RL 184.417 m

Boring Method : Rotary Drilling
Casing Depth : 11.0 m
Boring Start : 12-Dec-18
Boring Finish : 15-Dec-18

SPT N- Value (N_f) [1]	Depth (m)	Drill Run (m)	Sample No.	Serial No. of Cores	Casing Lowered (Size)	Symbol	ROCK DESCRIPTION	Depth of Strata, (m)	Percent Recovery (%) [1]	Rock Quality Designation (RQD, %) [1]	Rock Mass Rating (RMR) [1]	Penetration Rate (minutes/cm)	Size of Hole: NX					Porosity (%)	Water Absorption (%)	Point Load Index (kg/cm^2)	Unconfined Compressive Strength (kg/cm^2)	Modulus of Elasticity (kg/cm^2)
													Return Water		Bits Used	Density (g/cc)	Specific Gravity					
													Colour	Loss								
Ref*/ 2cm	14.00	14.00	SPT				Weak, grey GRANITE, very intensely fractured, highly weathered															
	14.50	14.02	10																			
	15.00		RK1	1-4					24	0												
	15.50	15.50																				
	16.00																					
	16.50		RK2	5-9					28	13												
	17.00	17.00																				
	17.50																					
	18.00		RK3	10-15					38	15	18											
	18.50	18.50																				
	19.00																					
	19.50		RK4	16-21					31	0												
	20.00	20.00																				
	20.50												Light Brown	100%	32 CT Diamond Impregnated Bit							

[1] Outside NABL scope.

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index