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Geotechnical Investigation

West Wyalong Solar Farm

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Executive Summary

This executive summary presents the findings of the geotechnical investigation (GI) undertaken by SMEC Australia Pty Ltd (SMEC) for the West Wyalong Solar Farm (WWSF) project, on behalf of Lightsource BP. The proposed site for WWSF is located approximately 20 km North West of West Wyalong, New South Wales.

It is understood that the proposed solar facility development is a 112 Megawatt utility-scale renewable energy project, covering an area of about 285 hectares.

The geotechnical investigation was conducted from the 24th July to 27th July 2018, where the fieldwork involved the drilling of thirty (30) boreholes to a nominal depth of 6 m or prior refusal. Electrical resistivity testing was undertaken at five locations with five traverses across the site to assess the in-situ electrical resistivity (ER) at the site.

A geotechnical ground model was developed from the investigations undertaken by SMEC and is summarised here:

Unit No.	Material Description	Depth of Unit (m bgl)
1	**Topsoil** Sandy Clay with grass root mat cover	0.0 to [T]0.2
2a	**Alluvial Soil** CLAY / Sandy CLAY; dark to pale grey-brown; occasional bands of sandy silt; typically, stiff.	[T]0.2 to 2.5
2b	**Alluvial Soil** CLAY / Sandy CLAY; dark to pale grey-brown; occasional bands of sandy silt; typically, very stiff or better.	2.5 to *5.95
3a	**Residual Soil** Clayey SILT / Sandy SILT; pale grey mottled brown; typically, very stiff to hard; only encountered in BH05 and BH08.	2.5 to [R] 4.8
3b	**Residual Soil** Silty CLAY / CLAY; red-brown mottled grey and orange; typically, hard; only encountered in BH06 and BH24.	2.5 to [R] 5.75

* Maximum depth of investigation; [R] Refusal on inferred granite rock / boulder (HW-MW), [T] Disturbed natural topsoil

From the geotechnical investigation it was apparent that the site primarily consisted of topsoil over stiff to very stiff alluvial clays, with residual soils encountered prior to refusal on inferred granitic rock or boulders (HW-MW) at five borehole locations (BH05, BH06, BH08, BH24 and BH28), between 3.25 m and 5.75 m bgl.

Soil resistivity ground models were developed from the electrical resistivity testing undertaken at the substation and the rest of the site. From the electrical resistivity testing at the substation, a soil model of two layers was prepared:

Layer	Depth (m)	Resistivity (Ω-m)
1	0 – 0.431	28.91
2	0.431 to infinite	6.86

From the electrical resistivity testing at the rest of the site, the following soil model of two layers was prepared:

Layer	Depth	Resistivity
	(m)	(Ω-m)
1	0 – 0.276	68.35
2	0.276 to infinite	5.34

The durability criteria of AS2159-2009, indicate that for concrete piles, the ground conditions have an exposure classification of Mild. Results also indicate that for durability of steel piles, the ground conditions have an exposure classification of Moderate.

The soil materials encountered in the investigation can generally be excavated with conventional earth moving equipment such as excavators, backhoes, dozers, etc. Solid flight auger refusal was encountered towards the north-western and western portions of the site, with refusal not encountered towards the middle and east of the site.

Advice from experienced piling contractor must be sought if piling requires pre-drilling into rock. Given that current scope of works did not involve coring into rock, further investigation may be required to identify weathering grade, strength and discontinuity of rock. Additional geotechnical investigation may be required after preliminary design stage of the development to delineate lateral extent of shallow rock encountered if effected for pile foundation.

The excavatability of the rock mass (i.e. Granite) in unconfined situations is a function of several variables including rock strength, fracture spacing and size and orientation of the excavation. Depending on excavation depths, heavy ripping conditions should be expected which would require the use of larger plant (i.e. D9 or larger) together with rock breaking equipment to facilitate excavation and removal. It is recommended that a trial excavation be carried out to assess the general rippability of the rock and establish rates of production.

Temporary unsupported excavations in the site clay soils can be excavated at batters of 1 H: 1 V to a maximum depth of 2 m, provided that surcharge loads are kept well clear of the crest of batters. For long-term deeper excavations into soils where 2 H : 1 V batters are not feasible, the excavation should be reinforced or retained.

The geotechnical interpretive report must be read as a whole and the executive summary is not a substitute for this.

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References

Jayasekara, S. and Mohajerani, A. (2003). SOME RELATIONSHIPS BETWEEN SHRINK-SWELL INDEX, LIQUID LIMIT, PLASTICITY INDEX, ACTIVITY AND FREE SWELL INDEX. *Australian Geomechanics Journal*, 53-58.

1 Introduction

This report presents the results of a geotechnical investigation performed by SMEC Australia Pty Ltd (SMEC) for the proposed West Wyalong Solar Farm (WWSF) development in West Wyalong, NSW. It is understood that the proposed solar facility development is a 112 Megawatt utility-scale renewable energy project, covering an area of about 285 hectares.

This geotechnical investigation and interpretive report provides comments to aid in the conceptual design of the solar plant, including assessing foundation types, earthworks, haul roads, resistivity and soil parameters to support the solar plant design and installation. The design development drawings were not available at the time of preparing this report. Indicative loads were also not available at the time of preparing this report.

The work has been commissioned by Lightsource BP (LBP) to undertake the geotechnical investigation under the SMEC Short-Form Consultancy agreement. The purpose of the investigation presented herein is to assess subsurface conditions relevant to design and construction of the solar farm. The work has been performed in general accordance with SMEC proposal 1031562 Rev0, dated 11 July 2018.

2 Scope of works

The scope of works for the geotechnical investigation are summarised below:

- Conduct a site walkover to obtain an understanding of the project site;
- Coordination of field investigation, including preparation of a site health and safety plan;
- Review of existing geological and geotechnical information;
- Underground services check for existing services across the site;
- Provide site supervision of field investigation works;
- Drill boreholes and carry out standard penetration tests (SPT);
- Electrical resistivity testing at nominated locations;
- Collection of representative soil samples for subsequent laboratory testing;
- Geotechnical laboratory testing, including thermal resistivity tests; and
- Prepare a report presenting the factual findings of the investigation, together with interpretation and advice pertaining to the project, including:
    - Location maps and site plans showing the logged locations of site investigation points;
    - Observation findings and site photographs from site walkover assessment;
    - Detailed description of surface and subsurface conditions likely to be experienced during construction of roads, foundations, and civil infrastructures;
    - Description of the presence/depth of groundwater and recommendations for groundwater management (if encountered);
    - Recommendations on earthquake site factor in accordance with AS1170.4 Structure Design Actions - Earthquake action of Australia;
    - Foundation design parameters in accordance with Australian Standard AS2159-2009 Piling – Design and Installation;
    - Laboratory test results;
    - Aggressivity characteristics of the in-situ soil on steel and concrete durability;
    - Electrical and thermal characteristics of the soils that relate to the design of electrical earthing and power reticulation network;
    - Recommendations for site preparation, road works, and earthwork including stripping, grubbing, compaction criteria, imported fill criteria, and suitability of the onsite soils for use as fill (if at all required); and
    - Recommendations for shallow foundations and equipment pads including bearing capacity, lateral resistance, and estimated total and differential settlement.

3 Site Description

3.1 General

The proposed site for WWSF is located approximately 20 km North West of West Wyalong, New South Wales. The site is bounded by Blands Lane to the North, Bodells Lane to the East, vacant lands to the South and Clear Ride Road to the West. The proposed site covers an area of approximately 285 hectares. The approximate extents of the site and location is shown in Figure 1.

Figure 1: Approximate site location

3.2 Anticipated Geological Setting

Reference to the Geological Survey of New South Wales 1:100,000 scale 'Wyalong' map indicates that the site is underlain by Tertiary age, Cainozoic Formation (Czr) that is described as shallow slope colluvial plains, some residual veneer, with inactive alluvial plains. This type of strata typically comprises of silt, sand and clay with gravels.

The Wyalong geological map also indicates that the areas to the east of the site comprise of Quaternary age Cainozoic Formation (Qa) that typically comprise - alluvium and west of the site comprise of Tertiary age Cainozoic Formation (Czg) that typically comprise highly weathered granite and colluvial sediments. An extract of the Geological Map of New South Wales, Wyalong (1:100,000 scale) is shown in Figure 2.

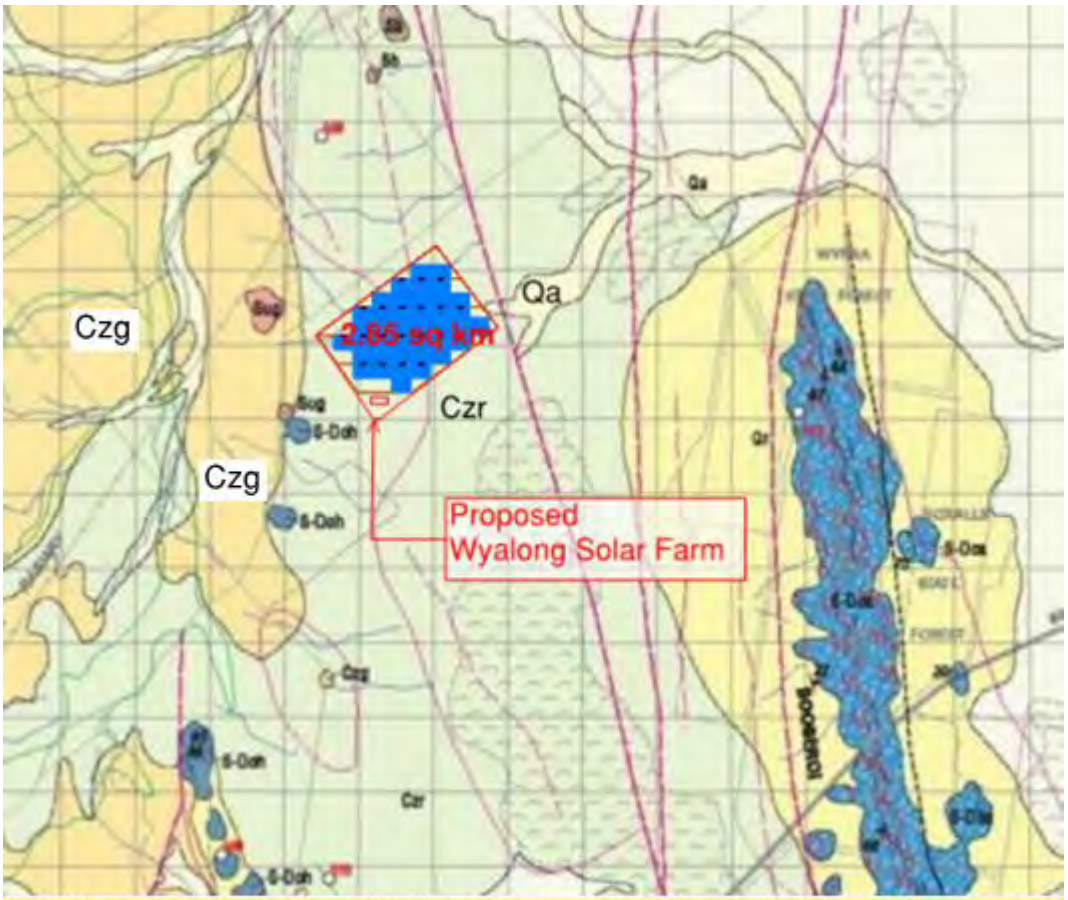


Figure 2: Extract of geological map of New South Wales, Wyalong sheet, 1:100,000 scale (Not To Scale)

4 Investigation Methodology

4.1 Fieldwork – Borehole Drilling

The geotechnical investigation was conducted from the 24th July to 27th July 2018. Based on the review of Dial Before You Digs (DBYD) plans and discussions with the land owner, it was confirmed that no underground services were present on-site which were at risk for the investigation works. The fieldwork involved the drilling of thirty (30) boreholes to depths of 6 m or prior refusal. All boreholes were completed in wheat fields.

The borehole co-ordinates and surface RL's are summarised in Table 4-1. No surveying of the subject locations was conducted; the coordinates of the boreholes were recorded using a hand-held GPS device and elevations were checked against google earth. It should be noted that the reported reduced levels are approximate only. A site locality plan and a borehole location plan is presented in Appendix A. Site photographs are presented in Appendix B.

The boreholes were drilled using a 4WD mounted drill rig, supplied and operated by Apex Drilling Pty Ltd. The boreholes were advanced using solid flight auguring techniques. Standard Penetration Tests (SPTs) were collected at nominal depth intervals in soil strata. The SPTs were conducted to assess soil consistencies and to collect disturbed samples at select depths. Bulk samples were collected via shallow pits excavated by hand.

Fieldwork was supervised by a SMEC Geotechnical Engineer who was responsible for positioning the boreholes at the nominated locations, preparing borehole logs in general accordance with AS1726-2017 'Geotechnical Site Investigations' and coordinating soil sampling. On completion of drilling, all boreholes were backfilled with drill cuttings and reinstated to match the existing ground surface.

The selected samples were sent for laboratory testing to assist in determining the engineering properties of site soils. The laboratory tests were undertaken in a NATA accredited laboratory.

Borehole engineering logs together with explanatory notes describing terms and symbols used in their preparation are provided in Appendix C.

Table 4-1: Summary of borehole locations (UTM 55H coordinate system)

Borehole ID	Easting (m)	Northing (m)	Final Depth (m)	Approximate Elevation m AHD
BH01	529681	6257971	5.95	235
BH02	530382	6259587	5.95	231
BH03	530110	6259399	5.95	234
BH04	529857	6259210	5.95	231
BH05	529576	6259028	4.80	233
BH06	529338	6258835	3.70	231
BH07	529594	6258646	5.93	232
BH08	529587	6258456	3.25	235
BH09	529855	6258460	5.95	234
BH10	530106	6258265	5.95	232
BH11	530379	6258948	5.95	233
BH12	530634	6258645	5.95	231
BH13	530622	6258828	5.95	230
BH14	530630	6259004	5.95	231
BH15	530884	6259067	5.95	231
BH16	530626	6259201	5.95	232
BH17	530382	6259394	5.95	233
BH18	530109	6259203	5.95	229
BH19	529856	6259010	5.95	233
BH20	529857	6258832	5.95	233
BH21	529854	6258646	5.95	232
BH22	530108	6258641	5.95	231
BH23	530365	6258645	5.95	233
BH24	529614	6259383	5.75	232

Continued from previous page.				
Borehole ID	**Easting (m)**	**Northing (m)**	**Final Depth (m)**	**Approximate Elevation * m AHD**
BH25	530380	6259021	5.95	232
BH26	530111	6258981	5.95	233
BH27	530108	6258829	5.95	231
BH28	526921	6258271	3.60	235
BH29	530883	6258830	5.95	231
BH30	529338	6258643	5.95	234

4.2 Geotechnical Laboratory Testing

Laboratory testing on selected soil samples was undertaken in a NATA registered Laboratory. The laboratory testing was undertaken in accordance with the relevant sections of AS1289 *"Methods of Testing Soils for Engineering Purposes"*. The laboratory testing completed include:

- 5 x Atterberg limits and linear shrinkage tests;
- 5 x Field moisture content tests;
- 5 x Particle size distribution tests (AS1289 3.6.1);
- 1 x Hydrometer test (AS1289 3.6.3)
- 8 x Emerson Dispersion tests (AS1289 3.8.1);
- 8 x pH, Chloride, Sulphate and Sulphide
- 3 x Thermal Resistivity tests
- 8 x Standard Compaction tests
- 8 x Californian Bearing Ratio (CBR) tests

The laboratory test result certificates are presented in Appendix D. There were 9 samples submitted for CBR and standard compaction testing, but one of the samples did not have sufficient material for CBR testing and standard compaction.

4.3 Fieldwork – Electrical Resistivity Testing

All electrical resistivity testing (ERT) locations were intended to spread out across the site. The ERT was conducted from 21st Aug to 22nd Aug 2018. All traverses were completed in dry wheat fields with damp soil below surface.

ERTs were undertaken at five locations with five traverses across the site to assess the in-situ electrical resistivity (ER) at the site. Testing was undertaken by a SMEC Electrical Engineers using the Wenner four Electrode Method in accordance with ASTM G57-06. Following steps were adopted for the Wenner method.

- Select a test site and mark a centre point as reference point of the test location;
- Insert four earth electrode rods into ground. The electrode rods to be inserted at equal spacing (a spacing = electrode spacing);

- Ensure that the test electrode rods are in a straight line and the inserted depth (b) is no more than 1/20th of the electrode spacing. (b = a / 20)
- Using appropriate testing equipment, current was injected into the earth via the two outer rods and the voltage between the two inner rods was measured.

Testing was conducted with two perpendicular axes (Traverse 1 and Traverse 2) at the substation area of the site to test for anisotropy in the results, such as might indicate lateral variations in site conditions contrary to the assumptions of the sounding method (i.e. horizontal, homogeneous and isotropic layering). Single traverses were conducted in the southwestern, northern and eastern portions of the site, outside the substation area. The orientation of the ERT axes are shown on the Test Site Location Plan, in Appendix A.

A summary of the ERT traverses is presented in Table 4-2.

Table 4-2: ERT Traverse Summary

ERT Traverse ID	ERT Traverse Direction	Easting	Northing
		(m)	(m)
Traverse 1	N/W Corner End Point 1	529604	6258059
	N/W Corner End Point 2	529749	6257876
Traverse 2	N/E Corner End Point 1	529561	6257968
	N/E Corner End Point 2	529797	6257963
Traverse 3	N-S Direction	529651	6259018
Traverse 4	E-W Direction	529586	6258460
Traverse 5	N-S Direction	530467	6259335

5 Fieldwork Results

5.1 Site Walkover

From the site walkover, the site was observed to be generally flat with dry wheat crops (vegetation) on the surface. Some undulations were observed towards the southern and south-eastern sides of the site (noted around boreholes BH29, BH15, BH21). There were large trees intermittently spread on site; most trees near boreholes BH26 and BH21. There was an abandoned structure near borehole BH26 and a small dam near borehole BH21. Site photographs are presented in Appendix B.

5.2 Subsurface Conditions

This section provides a general description of the subsurface conditions encountered across the site. For conditions encountered at specific borehole locations, reference should be made to the engineering borehole logs provided in Appendix C. The sub-surface conditions encountered in the boreholes were generally consistent with those anticipated from published geological sources. Summary tables of the encountered subsurface conditions are presented here in Tables 5-1 and 5-2.

5.3 Groundwater

Standpipe installation was not undertaken during the investigation as it was not in the scope of works. Groundwater was not observed during drilling within borehole drill depths. However, it should be noted that the boreholes were also not opened long enough to establish any groundwater inflows. Increased moisture content in soils was noted in borehole BH16 at 1 m below ground level.

5.4 Laboratory Test Results

Geotechnical laboratory test results of soils are summarised in Table 5-3. Aggressivity testing (pH, Sulphate, Chloride, and electrical conductivity) and Thermal Resistivity of soil are summarised in Table 5-4 and Table 5-5, respectively.

5.5 Electrical Resistivity Test Results

In accordance with accepted practice, the resistivity soundings were interpreted using standard industry inversion software (CDEGS) assuming a horizontally layered earth model. The software results are based on an algorithm converted into a two (2) layer soil model.

Resistivity calculations were made in accordance with the formula:

$$Pa = 2 \pi a R$$

- Pa = Apparent Earth Resistance (Ωm)
- a = Spacing in metres between each electrode (m)
- R = Instrument resistance reading (Ω)

Results of electrical resistivity tests are presented in Appendix E.

Table 5-1: Summary of ground conditions (BH01 to BH15)

Ground Condition	Depth Below Ground Level to the Base of the Layer (m BGL)														
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15
Top Soil / Grass root mat cover	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2[T]	0.2[T]	0.2[T]	0.2[T]	0.1	0.2[T]
CLAY / Sandy CLAY / Silty CLAY; dark to pale grey-brown; occasional bands of sandy silt; typically, stiff to very stiff. **Alluvial Deposits**	5.95*	5.95*	5.95*	5.95*	2.5	2.5	5.93*	2.85	5.95*	5.95*	5.95*	5.95*	5.95*	5.95*	5.95*
Clayey SILT / Silty CLAY / Sandy SILT / CLAY; grey mottled brown; typically, hard. **Residual Granitic Deposits**	-	-	-	-	4.8[R]	3.6[R]	-	3.25[R]	-	-	-	-	-	-	-

Notes: [*] Target Depth of Borehole, [R] Refusal on inferred granite rock / boulder (HW-MW), [T] Disturbed natural topsoil

Table 5-2: Summary of ground conditions (BH16 to BH30)

Ground Condition	Depth Below Ground Level to the Base of the Layer (m BGL)														
	BH16	BH17	BH18	BH19	BH20	BH21	BH22	BH23	BH24	BH25	BH26	BH27	BH28	BH29	BH30
Top Soil / Grass root mat cover	0.1	0.2[T]	0.2[T]	0.2[T]	0.1	0.2[T]	0.2[T]	0.1	0.1	0.2[T]	0.2[T]	0.1	0.2[T]	0.2[T]	0.2[T]
CLAY / Sandy CLAY / Silty CLAY; dark to pale grey-brown; occasional bands of sandy silt; typically, stiff to very stiff. **Alluvial Deposits**	5.95*	5.95*	5.95*	5.95*	5.95*	5.95*	5.95*	5.95*	5.5	5.95*	5.95*[,A]	5.95*	3.6[R]	5.95*	5.95*
Clayey SILT / Silty CLAY / Sandy SILT / CLAY; grey mottled brown; typically, hard. **Residual Granitic Deposits**	-	-	-	-	-	-	-	-	5.75[R]	-	-	-	-	-	-

Notes: [*] Target Depth of Borehole, [R] Refusal on inferred granite rock / boulder (HW-MW), [T] Disturbed natural topsoil, [A] Sandy SILT from 0.2 m to 1.0 m

Table 5-3: Summary of laboratory test results

Borehole ID	Depth	Field Moisture Content	Standard Optimum Moisture Content	Field Moisture Variation	Standard Maximum Dry Density	CBR	CBR Swell	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage	Emerson Class No	Particle Size Passing 0.075mm
	(m)	(%)	(%)	(%)	t/m³	(%)	(%)	(%)	(%)	(%)	(%)		(%)
BH01	0.50 - 1.00	11.9	15.5	3.6 Dry	1.81	3.5	3.0	-	-	-	-	2	-
BH03	0.50 - 0.60	23.9	23.5	0.4 Wet	1.57	3.5	1.0	65	22	43	18.0	2	-
BH03	0.50 - 1.0	17.0	-	-	-	-	-	-	-	-	-	2	-
BH04	2.50	21.5	-	-	-	-	-	-	-	-	-	-	-
BH05	0.50 - 1.0	17.0	20.5	3.5 Dry	1.64	1.0	3.5	67	18	49	20.0	-	-
BH08	0.50-1.00	22.1	24.0	1.9 Dry	1.56	1.5	2.0	-	-	-	-	2	-
BH10	0.40-0.60	16.4	-	-	-	-	-	-	-	-	-	3	-
BH10	0.50	-	-	-	-	-	-	78	19	59	22.0	-	-
BH12	0.50	-	-	-	-	-	-	78	21	57	20.0	-	-
BH12	0.50-0.60	24.5	23.0	1.5 Wet	1.57	1.5	2.5	-	-	-	-	2	-
BH12	4.00	24.3	-	-	-	-	-	-	-	-	-	-	-
BH16	0.50	-	-	-	-	-	-	58	19	39	20.0	-	-
BH16	0.50-1.00	22.5	21.0	1.5 Wet	1.62	3.0	2.0	-	-	-	-	2	-
BH16	1.00	21.9	-	-	-	-	-	-	-	-	-	-	-
BH17	0.50	15.7	-	-	-	-	-	-	-	-	-	-	70
BH18	1.00	13.7	-	-	-	-	-	-	-	-	-	-	73
BH18	4.00	18.9	-	-	-	-	-	-	-	-	-	-	-
BH21	0.50-1.00	12.0	16.0	4.0 Dry	1.76	2.5	3.0	-	-	-	-	-	-
BH26	0.50-0.60	7.6	10.5	2.9 Dry	1.97	5.0	1.0	-	-	-	-	5	-
BH26	0.5	10.0	-	-	-	-	-	-	-	-	-	-	58
BH26	1.0	10.7	-	-	-	-	-	-	-	-	-	-	55
BH26	4.0	23.5	-	-	-	-	-	-	-	-	-	-	-
BH28	0.5	10.5	-	-	-	-	-	-	-	-	-	-	48

Table 5-4: Laboratory Test Results (Aggressivity Results Summary)

Borehole ID	Depth	Field Moisture Content	pH	Chloride	Sulphate (So^4)	Electrical Conductivity (EC)	Resistivity
	m	%		mg/kg	mg/kg	µS/cm	Ohm.cm
BH04	1.50	21	5.0	700	210	380	2,631.6
BH06	0.50	12	7.9	380	120	380	2,631.6
BH07	0.10	3.5	7.4	6.9	<30	48	20,833.0
BH16	1.00	17	7.4	590	180	370	2,702.7
BH17	0.10	4.5	6.4	42	<30	190	5,263.2
BH23	2.00	16	4.8	630	120	430	2,325.6
BH27	0.10	3.7	6.3	38	<30	110	9,090.9
BH28	0.50-0.70	15	8.4	330	72	290	3,448.3

Table 5-5: Thermal Resistivity Test Results

Test Location	Depth (m)	Soil Thermal Properties											
		MC (%)	W / m K	m K / W	MC (%)	W / m K	m K / W	MC (%)	W / m K	m K / W	MC (%)	W / m K	m K / W
BH01	1.00-1.50	0.0	0.32	3.13	4.6	0.58	1.72	9.0	1.05	0.95	14.7	1.74	0.57
BH05	1.00-1.50	0.3	0.26	3.85	7.4	0.44	2.27	14.0	0.92	1.09	22.8	1.26	0.79
BH16	1.00-1.50	0.0	0.36	2.78	6.6	0.50	2.0	11.9	0.90	1.11	19.3	1.46	0.68

MC (%): Moisture content; W / m K: Thermal Conductivity; m K / W: Thermal Resistivity

6 Comments

6.1 Geotechnical Units

A geotechnical ground model was developed from the investigations undertaken by SMEC and is summarised in Table 6-1.

Table 6-1: Interpreted Ground Model

Unit No.	Material Description	Depth of Unit (m bgl)
1	**Topsoil** Sandy Clay with grass root mat cover	0.0 to [T]0.2
2a	**Alluvial Soil** CLAY / Sandy CLAY; dark to pale grey-brown; occasional bands of sandy silt; consistency was typically stiff.	[T]0.2 to 2.5
2b	**Alluvial Soil** CLAY / Sandy CLAY; dark to pale grey-brown; occasional bands of sandy silt; consistency was typically very stiff or better.	2.5 to *5.95
3a	**Residual Soil** Clayey SILT / Sandy SILT; pale grey mottled brown; consistency was typically very stiff to hard; only encountered in BH05 and BH08.	2.5 to [R]4.8
3b	**Residual Soil** Silty CLAY / CLAY; red-brown mottled grey and orange; consistency was typically very stiff to hard; only encountered in BH06 and BH24.	2.5 to [R]5.75

* Maximum depth of investigation; [R] Refusal on inferred granite rock / boulder (HW-MW), [T] Disturbed natural topsoil

From the geotechnical investigation it was apparent that the site primarily consisted of topsoil over stiff to very stiff alluvial clays, over residual soils. Five out of thirty boreholes drilled across the site encountered solid flight auger refusal on inferred granitic rock or boulders (HW-MW) between 3.25 m and 5.75 m bgl.

The delineation of topsoil was done based on visual and tactile assessment made onsite; a significant portion of the site had disturbed topsoil extending to 0.2 m below ground level. This disturbed soil was classified as disturbed natural topsoil and not as fill, as there was no evidence of imported fill material onsite. The disturbed natural topsoil was evident in BH10 to BH13, BH15, BH17 to BH19, BH21, BH22, BH25, BH26, and BH28 to BH30. This was further confirmed with the land owner, that there was no imported fill onsite.

Refusal was reached in five of the thirty boreholes (BH05, BH06, BH08, BH24 and BH28), where refusal was inferred as reached on top of granitic rock or boulders (HW-MW). Four of the five boreholes where refusal was reached, had residual soils present. This was derived from visual and tactile assessment onsite. Solid flight auger refusal was encountered towards the north-western and western portions of the site, with refusal not encountered towards the middle and east of the site.

6.2 Site Classification

Although not strictly applicable to the proposed development, classification of the ground conditions in accordance with AS2870-2011 provides a means of estimating the level of soil reactivity and associated movement patterns and magnitude that should be considered in design.

The natural clays encountered in the investigation are considered to have a high potential for volume change with respect to variation in moisture content and are considered to be highly reactive. The site characteristic surface movement will depend on the thickness of natural clays below footings/slabs.

The laboratory Atterberg limit results were used to calculate the shrink-swell index, via the correlation provided by Jayasekera et al (2003). A site characteristic surface movement within the range of 60 mm to 70 mm was calculated. AS2870 notes that the surface movement arises from the possibility of moisture change at depths in excess of 1.8 m due to changing groundwater regimes. Note that the surface movement assumes there is no filling beneath footings/slabs.

It should be noted that the cutting of material, or placement of fill, may change the assessment of the characteristic surface movements for the areas disturbed. As a result, any changes to the existing surface profile will require reassessment based on the cut and fill profiles. It is recommended that any foundation systems be designed to accommodate any anticipated ground surface movements.

6.3 Earthquake Loading

In accordance with Australian Standard AS1170.4 Part 4 “Earthquake Actions in Australia”, the site subsoil classification is considered to correlate to Class Ce for footings on soil. For earthquake design, a hazard factor (z) of 0.08 is recommended for the NSW area as per Figure 3.2(A) in AS 1170.4.

6.4 Geotechnical Design Parameters of Soil for Shallow Footings

The geotechnical design parameters presented in Table 6-2 may be adopted in conceptual design for shallow footings. However, further investigation should be conducted across the site to refine these parameters, if necessary for detailed design. These values have been determined based on the site conditions at the time of the investigation and may change if the soil is subject to prolonged rainfall or soaking during construction.

Table 6-2: Geotechnical Preliminary Design Parameters

Unit	Material	Unit Weight[1]	SPT N-Value	Undrained Shear Strength[1] (S_u)	Poisson's Ratio[1]	Young's Modulus (E')	Shallow Foundation Allowable Bearing Capacity	Effective Cohesion, C'	Effective Friction, Φ'	'At-rest' Pressure Co-eff.	Active Earth Pressure Co-eff.	Passive Earth Pressure Co-eff.
		(kN/m^3)		(kPa)		(MPa)	(kPa)	(kPa)	(°)	Ko	Ka	Kp
1	**Topsoil** Sandy Clay	17	-	-	-	-	-	-	-	-	-	-
2a	**Alluvial Soil** CLAY / Sandy CLAY; stiff.	17	11 to 15	70	0.3	22	145	5	25	0.58	0.41	2.46
2b	**Alluvial Soil** CLAY / Sandy CLAY; very stiff or better.	17	24 to 35	150	0.3	45	300	5	25	0.58	0.41	2.46
3a	**Residual Soil** Clayey SILT / Sandy SILT; very stiff to hard	17	20 to 30	150	0.3	45	300	3	25	0.58	0.41	2.46
3b	**Residual Soil** Silty CLAY / CLAY; very stiff to hard	17	20 to 30	150	0.3	45	300	10	25	0.58	0.41	2.46

Notes: (1) These parameters have been estimated based on SPT values and published data.

6.5 Foundation considerations

All the boreholes undertaken within the site have indicated that the ground conditions are likely to be suitable for shallow foundations (subject to the finished ground levels following development). As the design loads are expected to be greater than a residential type building for substation or similar, typical slab on ground stiffened raft footing design in accordance with AS2870-2011 for residential foundation cannot be utilised and hence undertaking an engineered design is recommended.

6.5.1 Shallow Foundations for Structures

Given the highly reactive nature of the site, it is recommended that a stiffened raft footing system equivalent to Class H2 be designed for the structures. The footing must be founded on natural subgrade. All foundations must extend through any uncontrolled fill or weak soils to be founded on competent subgrade (subject to design for potential shrink-swell movements).

Please note that the minimum footing embedment depth should also take consideration of the overturning bending moment and/or uplift forces. The allowable bearing capacities set out in Table 6-2 may be adopted for the design.

It is recommended that all allowable bearing capacities be confirmed by an experienced geotechnical professional familiar with this report at the time of construction, prior to placement of blinding concrete and/or reinforcing steel.

6.5.2 Settlement

The soil profile is typically stiff to very stiff clays up to about 5.95 m depth. The estimated total settlement of an individual footing proportioned on the basis of the recommended bearing pressures is expected to be in the order of 0.5%B, where B is the footing width. Differential movement is expected to be about 50% of the maximum pad settlement. Such settlements will occur immediately upon loading and will be built into the structure without impacting structural design. The ground water table is assumed not to be above the base of the footing.

6.5.3 Axially Loaded Piles

Bored, screw (non-displacement) or driven (displacement) piles may be required to endure the uplift forces caused by wind actions as well as highly reactive nature of the ground condition. Differential upward movements between posts are considered minimal if uniform ground conditions are encountered in the adjacent post supporting the structure. The subsurface profile encountered during pile excavation should be observed by a geotechnical engineer to confirm the design assumptions.

Advice from an experienced piling contractor must be sought if piling requires pre-drilling into rock. Given that current scope of works did not involve coring into rock, further investigation may be required to identify weathering grade, strength and discontinuity of rock.

It is recommended that all piles be designed in accordance with the requirements of AS2159 – 2009. Using methods described in Woodward & Boitono (1961), the geotechnical parameters recommended for the pile design are shown in Table 6-3.

Table 6-3: Pile Design Parameters

Unit	Material Type	[1]Average Ultimate Skin Friction f_s (kPa)	[2]Average Ultimate End Bearing at Strata Base f_b(kPa)
2a	**Alluvial Soil** CLAY / Sandy CLAY; stiff.	45	600
2b	**Alluvial Soil** CLAY / Sandy CLAY; very stiff or better.	50	1350
3a	**Residual Soil** Clayey SILT / Sandy SILT; very stiff to hard	50	1350
3b	**Residual Soil** Silty CLAY / CLAY; very stiff to hard	50	1350

Note: 1 Only applicable if L/D≥4

2 Based on SPT blow count (N)

In order to assess pile capacity, a geotechnical strength reduction factor (Φ_g) should be applied to the above ultimate unit stresses in accordance with Table 4.3.2 of AS2159-2009. Selection of the geotechnical strength reduction factor (Φ_g) in accordance with AS 2159-2009 Table 3.2(A) is based upon a series of individual risk ratings with the final value of Φ_g dependant on the following factors:

a) Site: the type, quantity and quality of testing;
b) Design: design methods and parameter selection;
c) Installation: construction control and monitoring;
d) Pile testing regime: testing benefit factor based on percentage of piles tested and the type of testing. If some testing is carried out, an increase in the value of Φ_g may be possible depending on the type and extent of the testing. It is noted that Table 8.2.4(B) of AS 2159-2009 requires that 5% to 15% of piles should be subject to integrity testing if the value of Φ_g adopted by the structural designer exceeds 0.4;
e) Redundancy: whether other piles can take up load if a given pile settles or fails.

Of the above factors, SMEC can only comment directly upon the site factors under a). The designer must determine the remaining individual risk factors b) through e), inclusive, with knowledge of the pile construction specification that will be applied to the construction contract.

Table 6-4 presents the assessed individual AS2159-2009 risk factors assigned by SMEC to site conditions only.

It should be noted that unit stress design values will vary for different pile diameters and founding depths, and different values may be applied depending on the type of pile adopted, founding depth, installation method, level of supervision, static load and pull-out testing (depending on the design philosophy i.e. pile spacing and whether uplift is the critical load). Pile design should be checked for lateral loading that may potentially occur.

Table 6-4: Individual Assigned Risk Factors - Site Conditions

Risk Factor	Typical Description of Risk Circumstances for Individual Risk Rating			Assigned Risk Factor
	1 (Very Low Risk)	3 (Moderate Risk)	5 (Very High Risk)	
Geological complexity of site	Horizontal strata, well defined soil and rock characteristics	Some variability over site, but without abrupt changes in stratigraphy	Highly variable profile or features or steeply dipping rock levels or faults present on site, or combinations of these	3
Extent of ground investigation	Extensive drilling investigation covering whole site to an adequate depth	Some boreholes extending at least five pile diameters below the proposed foundation level	Very limited investigation with few shallow boreholes	3
Amount and quality of geotechnical data	Detailed information on strength and compressibility of the main strata	Boreholes confirming rock quality at proposed founding level for piles	Limited amount of simple in-situ testing or index tests only	3

Note: 1 – Refer to Table 4.3.2(A) in AS2159-2009 for details on risk factors.

6.5.4 Lateral Pile Capacity

It must be noted that no specific loading data has been provided for the magnitude, direction or frequency of expected loading conditions.

The preliminary determination of lateral capacity would utilise the conventional closed-form solutions developed by Broms, with further detailed analysis carried out using computer-based numerical methods.

Section 4.4.7 of AS2159-2009 outlines the procedure to determine ultimate geotechnical strength for a laterally loaded pile. The ultimate strength is given as the lesser of two values, depending on whether piles conform to “short-pile” or “long-pile” behaviour.

In short-pile behaviour, the ultimate lateral resistance of the soil surrounding the pile is fully mobilised along the entire length of the pile. In long-pile behaviour, the structural strength of the pile itself is fully mobilised before the ultimate soil resistance is achieved.

For piles constructed of grade 350 MPa steel, short-pile behaviour is expected – the ultimate lateral resistance of the soil surrounding the pile will likely be fully mobilised along the entire embedded length before the structural strength of the pile is fully mobilised.

For pile groups, the standard shows that design ultimate geotechnical strength is also taken as the lesser of two values:

i) The sum of the design ultimate geotechnical strength of the individual piles in the group;

ii) The design ultimate geotechnical strength of a block containing the piles and the soil between them.

Consideration should be given to the possibility for loss of lateral load capacity in the near surface soil. Environmental effects may also reduce lateral resistance. Additionally, separation between the pile and the surrounding ground (near-surface) may occur for piles subjected to cyclic lateral loading.

In addition to the ultimate geotechnical capacity of the pile, the pile must also be designed such that lateral deflections under serviceability loads are within allowable limits.

Given that specific loading data has not been provided for the magnitude, direction or frequency of expected loading conditions lateral deflection under serviceability loads must be checked once the specific structure loadings are available.

6.5.5 Uplift Forces

The uplift resistance may be calculated using the shaft resistance parameters, but with a reduction factor applied.

If tension piles are required to resist the uplift forces, an average ultimate skin friction of 35 kPa for stiff clays, 40 kPa for very stiff (or better) clays and 40 kPa for residual silt and clay soils can be adopted. Again, geotechnical reduction factors should be adopted to modify these values. A further geotechnical reduction factor of 0.4 is recommended for the calculation of uplift resistance of the piles.

6.6 Site Trafficability

The site was trafficable for a four-wheel drive vehicle during the investigation.

Problems may arise from disturbance of the upper level soil fabric resulting from the removal of the existing vegetation. This may limit trafficability for light weight construction vehicles and create difficulties for earthworks operations during wet season. It is recommended that vegetation be trimmed (mowed) and shrubs be cut to the ground level, which will preserve the crust and improve trafficability. Whereas clearing and grubbing would present issues if the crust is breached, and this would be more pronounced after rainfall events.

Should the upper soils become saturated during construction, the removal of the topsoil layer and placement of a temporary working platform (consisting of a geotextile placed under rock fill) may be required to allow access for light weight construction plant and road vehicles.

It is recommended that the following steps be taken to improve trafficability:

- The exposed surface in the construction area is proof rolled to provide a seal and assist in identifying weak or soft areas for treatment;
- Dedicated construction tracks are used to control site traffic and limit trafficability issues; and
- Provision and maintenance of adequate drainage conditions at this site is essential. It should be ensured that runoff is diverted away from the construction and access tracks to prevent ponding of water.

To assist in maintaining a workable construction site, the placement of a working platform as a final layer across structure/building platforms is recommended. The potential trafficability problems with this site should not be underestimated. This site will very quickly become untrafficable if appropriate drainage control measures, along with construction practices appropriate for the site conditions, are not maintained.

The contractor performing the works should fully inform themselves of the ground conditions at the site prior to commencement of earthworks. This requirement should be explicit in any earthworks specifications or

contract. Allowance should be made for the design, construction, and maintenance of a suitable working platform to support construction plant and heavy equipment such as piling rigs. Further advice can be provided by SMEC once details pertaining to design levels and construction plant are available.

6.7 Earthworks and Subgrade preparation

It is understood that minor cut and filling may will be required to create a level platform for construction. Earthworks procedures must be carried out in accordance with AS3798-2007 'Guidelines on Earthworks for Commercial and Residential Developments'.

The standard compaction test results indicated the near surface soils are dry of optimum moisture ranging from 1.9% to 4.0% in five of the sample and 0.4% and 1.5% wet of optimum moisture in three of the samples. Onsite surface clayey material will cause problems with trafficability and workability should this material be wet prior to or during construction.

Onsite surface clayey material will cause problems with trafficability and workability should this material be wet prior to or during construction. Options for earthworks at the site include:

1. Low performance fill platform allowing construction of solar arrays and access tracks constructed from general fill; and
2. Normal performance fill platform to suit construction of pavements and structures constructed from structural fill.

Construction of Option 1 would adopt the following procedure:

- Prepare the areas beneath the proposed works by trimming any vegetation to the ground level. It is recommended that long grass be trimmed (mowed) and shrubs be cut to the ground level, which will preserve the crust and improve trafficability.
  - Any settlement caused by decomposition of organic material within the topsoil is expected to have a small effect on the proposed construction.
- Place general fill in layers no thicker than 300 mm loose and compact uniformly with moisture conditioned to Standard optimum moisture content (OMC) ± 2%, and to the required minimum dry density ratio as given in Table 6-5.
- If the ground is moist, it is possible that the first layer of fill will not achieve the specified degree of compaction. In this case, the layer can be considered as a bridging layer allowing subsequent placement and compaction of general fill. If the ground is wet, then a thicker bridging layer may be required or granular fill may be considered.

Construction of Option 2 would adopt the following procedure:

- Prepare the areas beneath the proposed works by trimming any vegetation to the ground level. It is recommended that long grass be trimmed (mowed) and shrubs be cut to the ground level, which will preserve the crust and improve trafficability.
  - Any settlement caused by decomposition of organic material within the topsoil is expected to have a small effect on the proposed construction.
- Proof roll exposed subgrade using fully loaded water cart or similar to detect whether any soft spots exist. Zones that undergo excessive deflection or are unstable would require further treatment, the extent of which is best assessed at the time of construction. The treatment may involve excavation, and replacement with select fill, the use of a bridging layer potentially with geogrid and geotextiles. An experienced engineer should witness the proof rolling.
- Any imported select fill should comprise a well graded sand, crushed rock equivalent to VicRoads Class 4 crushed rock, ripped sedimentary rock, or suitable site derived filling. The maximum particle size after compaction should be 50 mm.

- The filling required to raise the subgrade should be placed in horizontal layers not greater than 250 mm loose thickness, uniformly compacted throughout, moisture conditioned to Standard optimum moisture content (OMC) ± 2%, and to the required minimum dry density ratio as given in Table 6-5.

The use of low reactive granular fill material is usually preferred as a structural fill. If it is elected to import low or non-reactive filling for structural filling the material specification will depend on the sensitivity of the structure to movement and the requirements of the designers. In the absence of specific design requirements, the following material limits are suggested as a guide:

- Maximum liquid limit: 50%
- Maximum plasticity index: 25%
- PI x %< 0.425 mm < 1200
- Potential swell in 4 day soaked CBR test < 0.5% (4.5 kg surcharge)
- Less than 20% retained on the 37.5 mm sieve (this will allow the implementation of conventional compaction control testing).

The required compaction specification will depend on the nature of the material being worked and its location. Suggested requirements are given in Table 6-5.

Table 6-5: Fill Compaction Requirements

Location	Material Type	Minimum Dry Density Ratio %	Moisture Range
General Fill	Clays	95% Standard	±2% of Standard OMC*
	Granular (non-reactive)	95% Standard	N/A
Structural Fill	Clays	95% Standard	±2% of Standard OMC
	Granular (non-reactive)	95% Standard	N/A

* OMC - Optimum Moisture Content

In the absence of specific design requirements for general fill, the material specifications and limits as suggested for Type-B fill in VicRoads Section 204 – Earthworks, can be used as a guide. It is understood that general fill will not be used in or around structures.

To ensure that desired construction standards are achieved it is suggested that any filling be tested at the minimum test frequency suggested in Table 8.1 of AS 3798-2007. "Earthworks for Commercial and Residential Developments", for the appropriate scale of the earthworks being carried out.

6.8 Material Suitability for Reuse

All site won material will require laboratory testing to confirm contamination status for reusability.

The site primarily consisted of topsoil over stiff to very stiff Clays of high plasticity. The use of high plasticity onsite clays should consider the potential reactivity of these materials which are susceptible to shrink-swell movements with changes in moisture content (i.e. shrinkage on drying and swelling on wetting). For this reason, these clays are usually considered unsuitable for use as structural fill (i.e. behind retaining walls and beneath structures).

The site won material may be used as general filling for access track construction subject to adequate compaction and selective rejection of any unsuitably over-wet material.

6.9 Excavation of Material and Ground Support

The soil materials encountered in the investigation can generally be excavated with conventional earth moving equipment such as excavators, backhoes, dozers, etc.

The excavatability of the rock mass (i.e. Granite) in unconfined situations is a function of several variables including rock strength, fracture spacing and size and orientation of the excavation. Depending on excavation depths, heavy ripping conditions should be expected which would require the use of larger plant (i.e. D9 or larger) together with rock breaking equipment to facilitate excavation and removal. It is recommended that a trial excavation be carried out to assess the general rippability of the rock and establish rates of production.

For dry batters cut into the typical stiff to very stiff clay, the slope angles in Table 6-6 are recommended for short and long-term conditions. The batter angles presented assume surcharge loads are kept clear of batter crests and surface water is diverted away from batters.

Table 6-6: Recommended Batter Angles

Material Type	Batter Height (m)	Temporary Condition (H:V)	Long Term Condition (H:V)
Alluvial CLAY stiff to very stiff	< 2	1 : 1	1.5 : 1
	2 – 3	1.5 : 1	*2 : 1

**Flatter if vegetation and maintenance is required; i.e. 3 : 1*

Batter angles of excavations must be witnessed, verified and best assessed by an experienced geotechnical engineer during works. Flatter batter angles may be required if adverse ground conditions are encountered.

6.10 Groundwater Control

Groundwater was not encountered during the site investigation. Localised flows associated with perched water layers are a possibility. If groundwater is encountered onsite it is anticipated that any flow emanating from these materials can be managed using sump pumping. This will require further assessment at the time of construction.

6.11 Erosion and Drainage

Eight Emerson class (EC) laboratory tests were carried out. Based on AS1289.3.8.1-2017, the results of the EC testing indicate that the soil samples have the following classifications:

- EC = 2 (moderately dispersive), for BH01, BH03, BH08, BH12 and BH16;
- EC = 3 (slightly dispersive), for BH10; and
- EC = 5 (non-dispersive), for BH26.

It is recommended to treat the site soil as moderately dispersive. Such soils are prone to erosion. To protect against erosion and dispersion exposed soils should be vegetated or covered. Proper site drainage will be required to divert surface water from sensitive areas in a controlled manner and prevent pooling water. It is recommended that where site construction drainage involves high concentration of flows, the drains be appropriately lined with geotextile or plastic to control erosion on the site.

Adequate site drainage will be required to remove runoff from site in a controlled manner and prevent pooling water. It is important that the site is well drained. The ground around all structures should slope away at a gradient of 1:50 for a minimum of 3 m, then fall into a stormwater collection system or overland flow paths to prevent water from ponding adjacent to structures.

6.12 Subgrade Evaluation and Preliminary Pavement Assessment

Laboratory testing indicates CBR values of 1.0% to 5.0% for the subgrade materials in the upper profile over the site. Swell percentages in the range 1.0% to 3.0% were measured.

SMEC recommends an initial design CBR value of 2.0% for clay subgrade soils based on the laboratory results. Site specific CBR testing to confirm the assumed design values is recommended for any critical or highly trafficked sections of pavement. Consideration could be given for subgrade treatments for the clay subgrade materials to allow more economical pavement design. Site clays must be treated as expansive.

It should be noted that there may be fill placement over areas of the development. In the areas of fill, the CBR values will be dependent on the source, quality, and compaction of the fill material.

6.13 Thermal Resistivity

The thermal resistivity of soil varies with soil type, density, structure and moisture content. Laboratory testing of three bulk samples was undertaken using the Dry Out Curve procedure which provided thermal resistivity and moisture content results that are plotted on Figure 3.

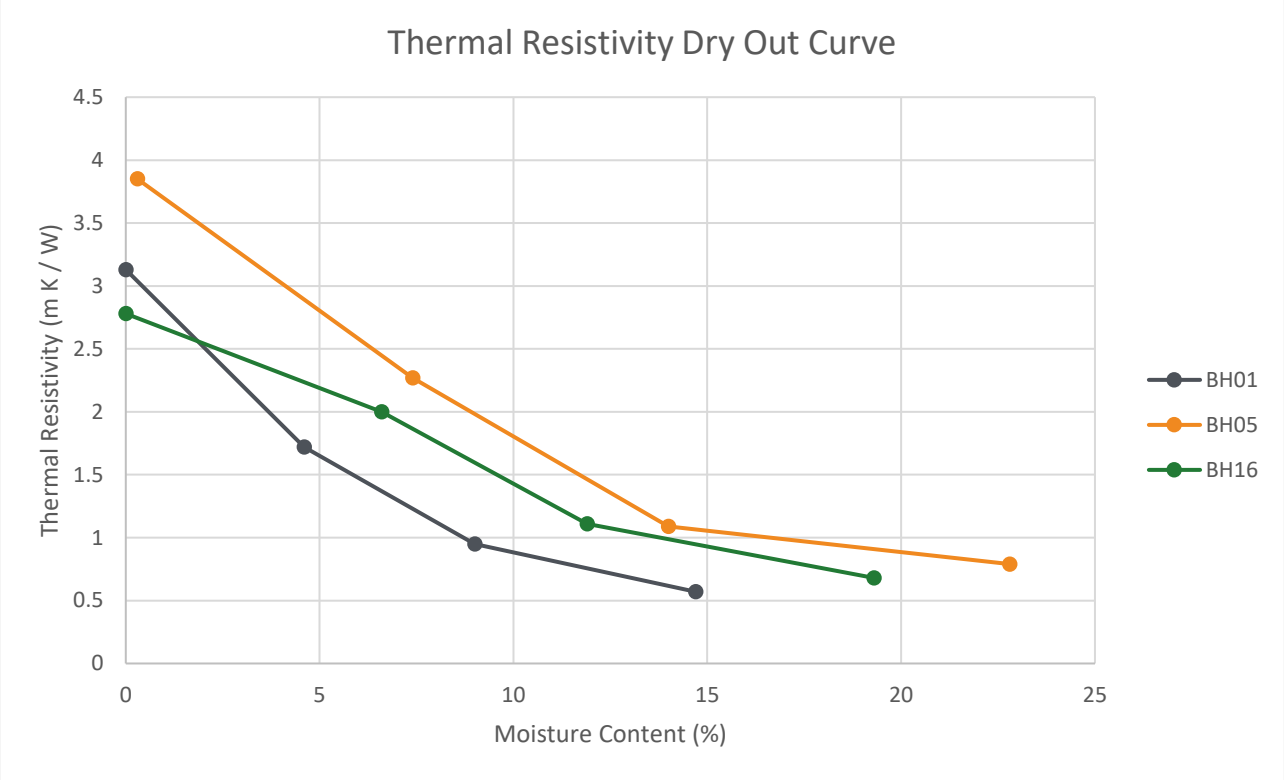


Figure 3: Thermal Resistivity Findings

Observations from the laboratory test results include:

- At field moisture content (FMC), thermal resistivity varies from 0.57 to 0.79 m K/W;
- Remoulded moisture contents (RMC) varied from 14.7% to 22.8%;
- Decreasing moisture content to 0.3% resulted in an increase in thermal resistivity of up to 3.85 m K/W; and
- Remoulded, compacted samples achieved approximately 95% density ratios of standard compaction.

Remoulding soil changes its structure and thermal resistivity and it is expected that soils used as fill or trench backfill may have a different thermal resistivity to that of the natural material onsite. Field measurements may be required if thermal resistivity's of natural materials are required.

6.14 Earth Resistivity Testing (Wenner Method)

The earth resistivity testing (ERT) of soil varies with soil type, density, structure and moisture content. Soil resistivity ground models were developed from the electrical resistivity testing undertaken at the substation and the rest of the site, and are summarised in Table 6-7 and Table 6-8.

Table 6-7: Substation Measurements - Soil Model Thermal Resistivity

Layer	Depth	Resistivity
	(m)	(Ω-m)
1	0 – 0.431	28.91
2	0.431 to infinite	6.86

Table 6-8: Field Measurements - Soil Model Thermal Resistivity

Layer	Depth	Resistivity
	(m)	(Ω-m)
1	0 – 0.276	68.35
2	0.276 to infinite	5.34

These results have been further assessed as part of the durability assessment in Section 6.15.

6.15 Durability Assessment

Based on our experience, soils of low permeability, which are not in the presence of groundwater would have a low probability of being aggressive; groundwater was not encountered at depths of the proposed maximum investigation.

Using the aggressivity results provided in Table 5-5, exposure classifications for concrete piles founded in soil have been determined in accordance with AS2159-2009. Results indicate that for durability of concrete piles, the ground conditions have an exposure classification of non-aggressive to mild; soil type B considered – low permeability soils (e.g. silts and clays) or all soils above groundwater, as per AS2159-2009.

- The samples tested between 0 to 1.0 m bgl were classified as non-aggressive.
- The samples tested between 1.5 to 2.0 m bgl were classified as mild.
- Assuming piled foundations would extend to 1.5 m or deeper, a mild classification is considered here for the durability of concrete onsite.
- For mild rating conditions, minimum concrete strength of 50 MPa with a minimum of 30 mm cover for precast and prestressed piles and a minimum concrete strength of 32 MPa with a minimum of 75 mm cover for cast in place piles for a design life of 100 years.

Using the aggressivity results provided in Table 5-5 and the ERT results provided in Tables 6-7 and 6-8, exposure classifications for steel piles founded in soil have been determined in accordance with AS2159-2009. Results indicate that for durability of steel piles, the ground conditions have an exposure classification of non-aggressive to moderate; soil type B considered – low permeability soils (e.g. silts and clays) or all soils above groundwater, as per AS2159-2009.

- The samples tested between 0 to 0.431 m bgl were classified as non-aggressive.
- The samples tested between 0.431 m to infinite were classified as moderate.
- Assuming piled foundations would extend to 1.5 m or deeper, a moderate classification is considered here for the durability of steel onsite.
- For moderate rating conditions, the durability of steel piles requires a uniform corrosion allowance of 0.02 to 0.04 mm/year. It is recommended that steel posts be galvanised to achieve design lives.

6.16 Anticipated Construction Difficulties

Large trees and other vegetation were also identified onsite during the site walkover. Removal of these trees and their associated roots will be required as their roots can be deleterious to foundations. Care should be taken when removing the tree roots, as incomplete removal could lead to under-draining and ground settlement when the roots decompose. Conversely, the removal of the trees can alter the moisture condition of the surrounding soils and consequently alter their engineering properties to varying degrees depending on the soil type, effects due to moisture change can be such as settlement and cracking of the ground due to shrink-swell.

6.17 Construction Inspections

It is recommended that construction inspection of the footings / pile excavations be undertaken by a SMEC geotechnical engineer to confirm that the ground conditions are consistent with those anticipated.

7 Conclusion

From the findings of the site investigations, factual information and recommended geotechnical design parameters are provided in this report.

Depending on the final development plans for the site, should any design changes occur during the construction phase then further targeted investigations may be required to confirm ground conditions across the site.

Additional geotechnical investigation may be required after preliminary design stage of the development to delineate lateral extent of shallow rock encountered if effected for pile foundation.

8 Limitation

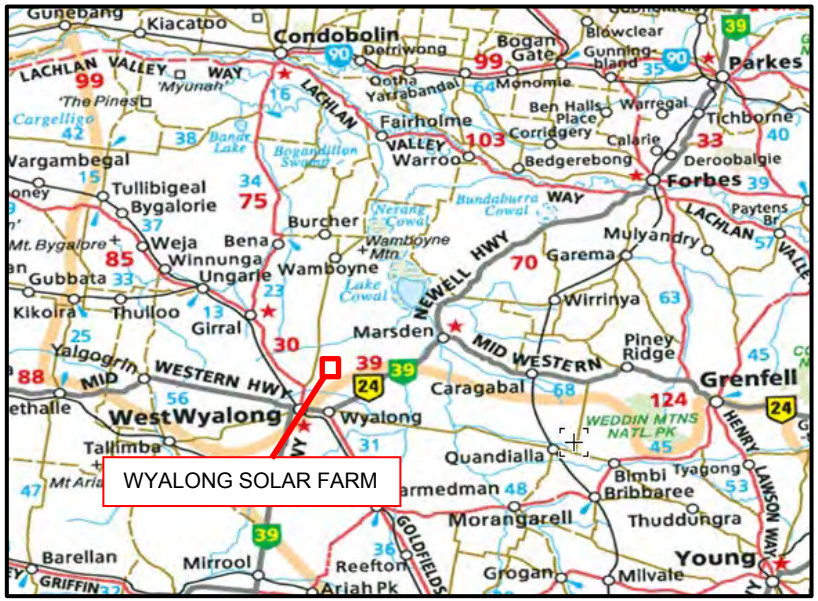
This report has been prepared by SMEC, on behalf of Lightsource BP for the West Wyalong Solar Farm development project. This report has been prepared in accordance with the Services Contract between SMEC and Lightsource BP. This report is prepared exclusively for Lightsource BP for this project only. This report should not be used for other purposes and by any third party.

This report has been prepared based on data available to SMEC at the time of preparing this report. The sub-surface conditions provided in this report are indicative only and are based on available sub-surface testing records (i.e. borehole, standard penetration tests). The sub-surface testings were undertaken at the specific location on specific time and only to the depths investigated. The accuracy of advice and sub-surface conditions provided in this report may be different from the actual sub-surface conditions due to the variable geological processes and undetected sub-surface conditions between the test points.

This report should be used as an entirety and the sections of this report should not be used separately. SMEC cannot be held responsible for any interpretations, decisions and conclusions made by others based on the contents provided in this report. SMEC endeavoured to identify the risks associated with the design and construction. SMEC cannot be held responsible for any risks associated with design and constructions. There may be risks associated with the design and constructions that are not documented or discussed in this report due to the unforeseen site conditions, variation of sub-surface conditions or beyond the knowledge of SMEC designers. However, should there be any risks arise during the design and/or construction SMEC would be endeavoured to carry out a risk assessment of the potential hazards, if requested.

Appendix A Test Site Location Plan

TEST SITE LOCATION PLAN



LOCALITY PLAN

LEGEND:

BHXX – BOREHOLE

ELECTRICAL RESISTIVITY (ERT) TRAVERSE

NOTES:

BOREHOLE AND ERT SYMBOLS ARE NOT TO SCALE

SMEC
Member of the Surbana Jurong Group

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Wyalong Solar Farm Geotechnical Investigation	**PROJECT NO.:**	3004768
Test Site Location Plan	**FIGURE:**	1
Client: Lightsource BP	**DATE:**	7/01/2019

BOREHOLE INVESTIGATION SCHEDULE		
LOCATION ID	EASTING (M)	NORTHING (M)
BH01	529681	6257971
BH02	530382	6259587
BH03	530110	6259399
BH04	529857	6259210
BH05	529576	6259028
BH06	529338	6258835
BH07	529594	6258646
BH08	529587	6258456
BH09	529855	6258460
BH10	530106	6258265
BH11	530379	6258448
BH12	530634	6258645
BH13	530622	6258828
BH14	530630	6259004
BH15	530884	6259067
BH16	530626	6259201
BH17	530382	6259394
BH18	530109	6259203
BH19	529856	6259010

BOREHOLE INVESTIGATION SCHEDULE		
LOCATION ID	EASTING (M)	NORTHING (M)
BH20	529857	6258832
BH21	529854	6258646
BH22	530108	6258641
BH23	530365	6258645
BH24	529614	6259383
BH25	530380	6259021
BH26	530111	6258981
BH27	530108	6258829
BH28	529721	6258271
BH29	530883	6258830
BH30	529338	6258643

NOTES:

1. EASTING AND NORTHING ARE IN UTM ZONE 55H
2. COORDINATES WERE MEASURED WITH A HANDHELD GPS DEVICE WITH AN ACCURACY OF ± 5 M
3. NO SURVEY HAS BEEN UNDERTAKEN TO CONFIRM THE ACCURACY OF THE TEST SITE LOCATIONS AND THEIR REDUCED LEVELS

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Wyalong Solar Farm Geotechnical Investigation	**PROJECT NO.:**	3004768
Test Site Coordinates	**FIGURE:**	2
Client: Lightsource BP	**DATE:**	27/08/2018

Appendix B Site Photographs

Photo 1: Shallow pit excavated at BH03 for sample collection

Photo 2: Terrain near BH05

SMEC Member of the Surbana Jurong Group	**Wyalong Solar Farm**	PROJECT NO. : 30041768
	SITE PHOTOGRAPHS	PLATE No: 1
	CLIENT: Lightsource BP	DATE: 27/08/2018

Photo 3: View of the relatively flat terrain near BH09

Photo 4 : Shallow pit excavated at BH10 for sample collection

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	SITE PHOTOGRAPHS	PLATE No: 2
	CLIENT: Lightsource BP	DATE: 27/08/2018

Photo 5: Slightly undulating terrain at BH10

Photo 6 : Shallow pit excavated at BH12 for sample collection

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	SITE PHOTOGRAPHS	PLATE No: 3
	CLIENT: Lightsource BP	DATE: 27/08/2018

Photo 7: View of the site from BH14, showing near surface disturbance from ploughing

Photo 8 : Drill rig setup at BH19

SMEC Member of the Surbana Jurong Group	**Wyalong Solar Farm**	PROJECT NO. : 30041768
	SITE PHOTOGRAPHS	PLATE No: 4
	CLIENT: Lightsource BP	DATE: 27/08/2018

Photo 9: Looking North-East from BH20 towards the group of trees in the centre of the site

Photo 10: Group of trees in the centre of the site near BH26

SMEC Member of the Surbana Jurong Group	**Wyalong Solar Farm**	PROJECT NO. : 30041768
	SITE PHOTOGRAPHS	PLATE No: 5
	CLIENT: Lightsource BP	DATE: 27/08/2018

Photo 11: Abandoned structure near BH26

Photo 12: View of the farm dam in the centre of the site, north-east of BH21

SMEC Member of the Surbana Jurong Group	**Wyalong Solar Farm**	PROJECT NO.: 30041768
	SITE PHOTOGRAPHS	PLATE No: 6
	CLIENT: Lightsource BP	DATE: 27/08/2018

Appendix C Borehole Logs and Explanatory Notes

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Explanatory Notes of Abbreviations and Terms

Used on Borehole and Excavation Logs

General

Information obtained from site investigations is recorded on log sheets. The “Engineering Log – Borehole or Non Cored Borehole” presents data from drilling operations where a core barrel has not been used to recover material, and information is based on a combination of regular sampling and in-situ testing. The material penetrated in non-core drilling is commonly soil but may include rock. The “Engineering Log – Cored Borehole” presents data from drilling operations where a core barrel has been used to recover material – commonly rock. The “Engineering Log - Excavation” presents data obtained on the subsurface profile from observations of excavations, either natural or man-made. It may contain a scaled, graphical presentation of the typical excavation profile. Refusal of the excavation plant is noted should it occur.

As far as is practicable, the data contained on the log sheets is factual. Some interpretation is inevitable in the assessment of material boundaries in areas of partial sampling, the location of areas of core loss, description and classification of material, estimation of strength and identification of drilling induced fractures. Material description and classification is generally based on AS1726-2017.

Drilling Method

Code	Description
ADT	Auger drilling with TC-bit
ADV	Auger drilling V-bit
AS	Auger screwing
AT	Air track
CA	Casing advancer
CC	Concrete core
CTR	Cable tool rig
DB	Wash bore drag bit
HA	Hand auger
HAND	Hand methods
HF	Hollow flight auger
HMLC	Diamond core 62mm diameter
HQ	Wire line core barrel 64mm diameter
HQ3	Wire line core barrel 62mm diameter
NDD	Non destructive drilling
NMLC	Diamond core 52mm diameter
NQ	Wire line core barrel 47mm diameter
NQ3	Wire line core barrel 45mm diameter
PT	Continuous push tube
PQ	Wire line core barrel 85mm diameter
RAB	Rotary air blast
RC	Reverse circulation
RD	Rotary blade or drag bit
RR	Rock roller
RT	Rotary tricone bit
SD	Sonic drilling
TBX	Tube-X
VC	Vibro-core drilling
WB	Wash bore drilling

Drilling Penetration

Ease of penetration in non-core drilling

VE	Very easy
E	Easy
F	Firm
H	Hard
VH	Very hard

Support and Casing

Code	Description	Code	Description
C	Casing	Hw	114.3 mm
M	Mud	NW	88.9 mm
W	Water	PVC	150 mm

Core Run

Core lifts are identified by a line and depth with core loss per run as a percentage. Core loss is shown in the core run unless otherwise indicated.

Defect Spacing

The average distance between defects is measured parallel to the core axis in mm and may be expressed as a range or average.

Angle / Orientation

Angle from horizontal and orientation to magnetic north.

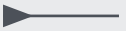
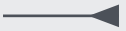
For inclined cored boreholes the Alpha and Beta angles are presented for orientated core. Alpha (α) is measured relative to the core axis, whilst Beta (β) is measured clockwise from the reference line looking down the core axis in the direction of drilling.

Excavation Method

N	Natural exposure
X	Existing excavation
BB	Tractor mounted backhoe bucket
EX	Hydraulic excavator
EH	Hydraulic excavator with hammer
B	Bulldozer blade
R	Ripper

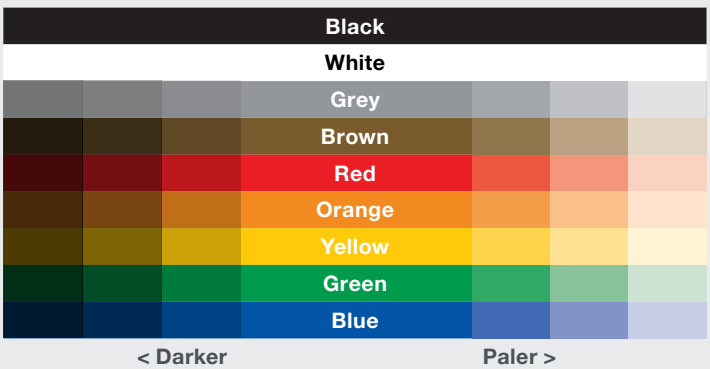
Water / Drilling Fluid

The drilling fluid used is identified and loss of return to the surface is estimated as a percentage, generally of each core lift.

Symbol	Description
	Water inflow
	Water outflow
	Water level: during drilling or immediately after completion of drilling
	Groundwater level with date observed prior to introduction of fluids or after standpipe construction
Not observed	The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole / test pit.
Not encountered	The borehole / test pit was dry soon after excavation, however groundwater could be present in less permeable strata. Inflow may have been observed had the borehole / test pit been left open for a longer period.

Colour

The colour of a soil or rock is described in a moist/wet condition using simple terms, such as black, white, grey, red, brown, orange, yellow green or blue. These are modified as necessary by 'pale', 'dark' or 'mottled'. Borderline colours are described as a combination of these colours (e.g. orange-brown). Where a soil or rock consists of a primary colour with a secondary mottling it is described as (primary colour) mottled (first colour) and (secondary colour).



Description of Soil

i. Soil name (BLOCK LETTERS)

ii. Plasticity or particle size of soil

iii. Colour

iv. Secondary soil components names & estimated proportions, including their plasticity / particle characteristics, colour

v. Minor soil components name, estimated proportions, including their plasticity / particle characteristics, colour

vi. Other minor soil components

vii. Moisture condition

viii. Consistency / density

ix. Structure of soil, geological origin

x. Additional observations

Particle Size

Term		Grain Size
Clay		< 2 µm
Silt		2 – 75 µm
Sand	Fine	0.075 – 0.21 mm
	Medium	0.21 – 0.6 mm
	Coarse	0.6 – 2.36 mm
Gravel	Fine	2.36 – 6.7 mm
	Medium	6.7 – 19 mm
	Coarse	19 – 63 mm
Cobbles		63 – 200 mm
Boulders		> 200 mm

Fine Grained and Coarse Grained Soils

Term	Description
Fine Grained Soil (cohesive)	More than 35% of the material less than 63 mm is smaller than 0.075 mm (silts and clays)
Coarse Grained Soil	More than 65% of the material less than 63 mm is larger than 0.075 mm (sands, gravels and cobbles)

Descriptive Terms for Secondary and Minor Components

Designation of Components	In coarse grained soils				In fine grained soils	
	% Fines	Terminology	% Accessory coarse fraction	Terminology	% Sand / Gravel	Terminology
Minor	≤5	trace	≤15	trace	≤15	trace
	>5, ≤12	with	>15, ≤30	with	>15, ≤30	with
Secondary	>12	prefix	>30	prefix	>30	prefix

Plasticity – Fine Grained Soils

Liquid Limit (LL) %	Description
≤ 35	Low plasticity (L)
>35 to ≤ 50	Medium plasticity (I)
> 50	High plasticity (H)

Plasticity Chart– Fine Grained Soils

Consistency Terms – Fine Grained Soils

Term	Undrained shear strength (kPa)	Indicative SPT (N) Blow Count	Field Guide to Consistency
Very Soft (VS)	<12	0 – 2	Easily penetrated several centimetres by fist, exudes between fingers when squeezed in fist
Soft (S)	12 – 25	2 – 4	Easily penetrated several centimetres by thumb, easily moulded by light finger pressure
Firm (F)	25 – 50	4 – 8	Can be penetrated several centimetres by thumb with moderate effort, and moulded between the fingers by strong pressure
Stiff (St)	50 – 100	8 – 15	Readily indented by thumb but penetrated only with difficultly. Cannot be moulded by fingers
Very Stiff (VSt)	100 – 200	15 –30	Readily indented by thumb nail, still very tough
Hard (H)	>200	>30	Indented with difficulty by thumb nail, brittle
Friable (Fr)	-		Can be easily crumbled or broken into small pieces

Density Terms – Coarse Grained Soils

Term	Density Index (%)	SPT (N) Blow Count
Very Loose (VL)	< 15	0 – 4
Loose (L)	15 – 35	4 – 10
Medium Dense (MD)	35 – 65	10 – 30
Dense (D)	65 – 85	30 – 50
Very Dense (VD)	> 85	>50

Particle Characteristics – Coarse Grained Soils

Term	Description
Well Graded	Having good representation of all particle sizes
Poorly graded	With one or more intermediate size poorly represented
Gap graded	With one or more intermediate sizes absent
Uniform	Essentially of one size

Angularity – Coarse Grained Soils

	Rounded
	Sub-rounded
	Angular
	Sub-angular

Origin of Soil

Fill	Formed by humans
Aeolian	Formed by wind
Alluvial	Formed by streams and rivers
Colluvial	Formed on slopes (talus)
Estuarine	Formed in marine environments
Lacustrine	Formed in lakes
Residual	Formed by weathering insitu

Soil Moisture

	Term	Code	Description
Coarse Grained	Dry	D	Looks and feels dry and free running
	Moist	M	Soil feels cool, darkened in colour, soils tend to stick together, soil grains do not run freely through fingers and no visible free water
	Wet	W	Soil feels cool, darkened in colour, soils tend to stick together, free water on remoulding
Fine Grained	Moist, Less than Plastic Limit	W < PL	Hard and friable or powdery, moisture content well below Plastic Limit
	Moist, Near Plastic Limit	W ≈ PL	Soil feels cool, darkened in colour, can be moulded, near Plastic Limit
	Moist, Wet of Plastic Limit	W > PL	Soil feels cool, dark, usually weakened, free water, moisture content well above Plastic Limit
	Wet, Near Liquid Limit	W ≈ LL	Soil exudes easily
	Wet, Wet of Liquid Limit	W > LL	Soil behaves as a liquid

Boundary Classifications

Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well graded gravel-sand mixture with clay binder.

Graphic Symbols

	Asphalt		MH
	CH		ML
	CI		OH
	CL		OL
	Concrete		PT
	Fill		SC
	GC		SM
	GM		SP
	GP		SW
	GW		

Soil Classification

Soils are described in general accordance with AS1726-2017 as shown below.

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)						GROUP SYMBOL	PRIMARY NAME
COARSE GRAINED SOILS More than 65% of the material is less than 63 mm and is larger than 0.075 mm	A particle size of 0.075 is about the smallest size distinguishable to the naked eye	**GRAVELS** More than half of coarse fraction is larger than 2.36 mm	**CLEAN GRAVELS** (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		GP	GRAVEL
			GRAVELS w/ FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, none to medium dry strength; ≥ 12% silty fines		GM	SILTY GRAVEL
				'Dirty' materials with excess of plastic fines, medium to high dry strength; ≥ 12% clayey fines		GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	**CLEAN SANDS** (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		SW	SAND
				Predominantly one size or a range of sizes with more intermediate sizes missing, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		SP	SAND
			SANDS w/ FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, none to medium dry strength; ≥ 12% silty fines		SM	SILTY SAND
				'Dirty' materials with excess of plastic fines, medium to high dry strength; ≥ 12% clayey fines		SC	CLAYEY SAND
FINE GRAINED SOILS More than 35% of the material less than 63 mm is less than 0.075 mm		**IDENTIFICATION PROCEDURES ON FRACTIONS** < 0.075 mm					
		SILTS AND CLAYS Liquid Limit < 50%	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**	**GROUP SYMBOL**	**PRIMARY NAME**
			None to low	Slow to rapid	Low	ML	SILT
			Medium to high	≥ 12% clayey fines	Medium	CL, CI	CLAY
			Low to medium	Slow	Low	OL	ORGANIC SILT
		SILTS AND CLAYS Liquid Limit > 50%	Low to medium	None to slow	Low to medium	MH	SILT
			High to very high	None	High	CH	CLAY
			Medium to high	None to very slow	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS: readily identified by colour, odour, spongy feel and frequently fibrous texture						PT	PEAT

Description of Rock

i. Rock name (BLOCK LETTERS)

ii. Grain size and mineralogy

iii. Colour

iv. Fabric and texture

v. Features, inclusions, minor components, moisture content and durability

vi. Strength

vii. Weathering and/or alteration

viii. Rock mass properties – discontinuities and structure of rock

ix. Interpreted stratigraphic unit

x. Additional observations including geological structure

Simple rock names are used to provide a reasonable engineering description, rather than a precise geological classification. The rock name is chosen by considering the nature and shape of the grains or crystals, the texture and fabric of the rock material, the geological structure and setting, and information from the geological map of the area. Further guidance on the naming of rocks can be found in AS1726-2017, Tables 15, 16, 17 and 18. Typical rock types are described below, though subject to site specific variations.

Rock Type	Description	Example of Rock Name
Sedimentary	Formed by deposited beds of sediments, have grains that are cemented together and often rounded. Significant porosity	COMMON: Conglomerate, Breccia, Sandstone, Mudstone, Siltstone, Claystone ≥90% CARBONATE: Limestone, Dolomite, Calcirudite, Calcarenite, Calcisiltite, Calcilutite PYROCLASTIC: Agglomerate, Volcanic Breccia, Tuff
Igneous	Formed from molten rock and have a crystalline texture. Typically massive and low porosity. Rock types are from coarse to fine grained.	HIGH QUARTZ CONTENT: Granite, Microgranite, Rhyolite MODERATE QUARTZ CONTENT: Diorite, Microdiorite, Andesite LOW QUARTZ CONTENT: Gabbro, Dolerite, Basalt
Metamorphic	Formed when rocks are subject to heat and/or pressure and have typically have directional fabric. Typically have low porosity and crystalline structure. Rock types are from coarse to fine grained	FOLIATED: Gneiss, Schist, Phyllite, Slate NON-FOLIATED: Marble, Quartzite, Serpentinite, Hornfels
Duricrust	Formed as part of a weathering profile and show evidence of being cemented in situ. Cementation is typically irregular and exhibits replacement textures.	Ferricrete (Iron oxides and hydroxides) Silicrete (Silica) Calcrete (Calcium carbonate) Gypcrete (Gypsum)

Note: ( ) denotes dominant cementing mineralogy

Grain Size

Terms describing dominate grain size in sedimentary rocks.

Term	Grain size
Coarse	Mainly 0.6 mm to 2 mm
Medium	Mainly 0.2 mm to 0.6 mm
Fine	Mainly 0.06mm (just visible) to 0.2 mm

Terms describing dominate grain size in igneous and metamorphic rocks

Term	Grain size
Coarse	Mainly greater than 2 mm
Medium	0.06 mm to 2 mm
Fine	Mainly less than 0.06 mm (just visible) to 0.2mm

Texture and Fabric

Sedimentary rocks

Thickness	Bedding Term
< 6 mm	Thinly laminated
6 – 20 mm	Laminated
20 – 60 mm	Very thinly bedded
60 – 200 mm	Thinly bedded
0.2 – 0.6 m	Medium bedding
0.6 – 2 m	Thickly bedded
> 2 m	Very thickly bedded

Igneous rocks

Term	Definition
Amorphous	Indicates that the rock has no obvious crystalline structure
Crystalline	A regular molecular structure, showing crystal structure and symmetry.
Cryptocrystalline	The texture comprises crystals that are too small to recognise under an ordinary microscope. Indistinctly crystalline.
Porphyritic	Indicates the presence of phenocrysts (relatively large crystals in a fine grained ground mass) in igneous rocks.
Flow banded	Indicates visible flow lines in volcanic rocks and some intrusive rocks
Glassy	Entirely glass like. No crystalline units and without crystalline structure.
Vesicular	A texture of volcanic rocks that indicates the presence of vesicles (small gas bubbles). Where the vesicles are filled with a mineral substance they are termed Amygdales and the texture is Amygdaloidal.

Metamorphic

Term	Definition
Foliation	The parallel arrangement of minerals due to metamorphic process, which shall be defined by the terms in weak, moderate and strongly foliated.
Porphyroblastic	A texture indicating the presence of porphyroblasts (larger crystals formed by recrystallization during metamorphism, such as garnet or staurolite in a mica schist).
Cleavage	A type of foliation developed in fine grained metamorphic rocks such as slates.

Bedding and Fabric Development

Type	Definition
Massive	No obvious development of bedding – rock appears homogeneous
Poorly Developed	Bedding is barely obvious as faint mineralogical layering or grain size banding, but bedding planes are poorly defined.
Well Developed	Bedding is apparent in outcrops or drill core as distinct layers or lines marked by mineralogical or grain size layering.
Very Well Developed	Bedding is often marked by a distinct colour banding as well as by mineralogical or grain size layering.
Indistinct fabric	There is little effect on strength properties
Distinct Fabric	The rock may break more easily parallel to the fabric

Rock Strength

Term (Code)	UCS (MPa)	$Is_{(50)}$ (MPa)	Field Guide to Strength
Very Low (VL)	0.6 – 2	> 0.03 to ≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low (L)	2 - 6	> 0.1 to ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blow of the pick point; has dull sound under hammer. A piece of core 150 mm long 50 mm in diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium (M)	6 - 20	> 0.3 to ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm in diameter can be broken by hand with difficulty.
High (H)	20 - 60	> 1 to ≤ 3	A piece of core 150 mm long by 50 mm in diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High (VH)	60 -200	> 3 to ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High (EH)	>200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Rock strength is assessed by laboratory Uniaxial Compressive Strength (UCS) testing and/or Point Load Strength Index (PLT) testing to obtain the $Is_{(50)}$ the strength table implies a 20 times correlation between $Is_{(50)}$ and UCS used for classification. Note however, multiplier may range from 4 (e.g. some carbonated and low strength rocks) to 40 (e.g. some igneous rocks and/or some high strength rocks). A site specific correlation based on testing, previous investigation or literature may be used where available. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considered weaker due to the effect of rock defects.

Visual Log

A diagrammatic plot of defects showing type, spacing and orientation in relation to the core axis.

- Defects open in situ or clay sealed
- Defects closed in-situ
- Drill induced fractures or handling breaks
- Infilled seam

Rock Weathering and or Alteration Classification

Term (Code)		Definition	
Residual soil (RS)		Soil developed on extremely weathered rock. The rock mass structure and substance fabric are no longer evident but the soil has not been significantly transported.	
Extremely weathered (EW) Extremely altered (XA)		Rock is weathered to such an extent that it has 'soil' properties, i.e, it either disintegrates or can be remoulded in water, but the texture of original rock is still evident.	
Highly weathered (HW) Highly Altered (HA)	Distinctly weathered (DW)*	Whole rock material is discoloured usually by extent that iron staining or bleaching and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original rock substance is no longer recognisable	*Where is it not practical to distinguish between 'HW' and MW'. Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores
Moderately weathered (MW) Moderately Altered (MA)	Distinctly Altered (DA)	Whole rock material is discoloured usually by staining that original colour of the fresh rock is no longer recognisable	
Slightly weathered (SW) Slightly altered (SA)		Rock is slightly discoloured but shows little or no change of strength from fresh rock	
Fresh rock (F)		Rock shows no sign of decomposition or staining.	

Rock Core Recovery

TCR = Total Core Recovery (%)

$$\frac{\text{Length of Core Recovered}}{\text{Length of Core run}} \times 100$$

SCR = Solid Core Recovery (%)

$$\frac{\text{Sum Length of Cylindrical Core Recovered}}{\text{Length of Core run}} \times 100$$

RQD = Rock Quality Designation (%)

$$\frac{\text{Sum Length of Sound Core Pieces > 100mm in length}}{\text{Length of Core run}} \times 100$$

Types of Discontinuities

Term	Code	Description
Parting	Pt	A defect parallel or sub-parallel to a layered arrangement of mineral grains or micro-fractures, which has caused planar anisotropy in the rock substance.
Joint	Jt	A defect across which the rock substance has little tensile strength, but that is not related to textural or depositional features within the rock substance.
Sheared Zone	SZ	A zone with roughly parallel planar boundaries of rock substance consisting of closely spaced joints with smooth slickensided surfaces often curved. The joints divide the rock mass into unit blocks usually of lenticular or wedge shape.
Crushed Zone	CZ	A zone or seam with roughly parallel planar boundaries of rock substance composed of disoriented, usually angular, fragments of the host rock substance
Seam	Se	A zone or seam with roughly parallel boundaries, infilled by soil (IS) or decomposed rock (DS)
Fault	F	A fracture (defect) in rock along which there has been an observable amount of displacement.
Vein	Ve	A zone of minerals intruded into a joint or fissures.

Type of Structures

Term	Code	Description
Bedding	Bg	A layered arrangement of minerals parallel to the surface of deposition which has caused planar anisotropy in the rock substance.
Cleavage	C	An alignment of fine grained minerals caused by deformation.
Schistosity	SH	A layered arrangement of minerals to each other
Foliation	Fo	A planar alignment of minerals caused by deformation.
Void	Vo	A completely empty space
Dyke	DK	Sheet-like bodies of igneous rock that cut across sedimentary bedding or foliations in rocks. They may be single or multiple in nature
Sill	SI	A sill is an intrusion of magma that spreads underground between the layers of another kind of rock
Contact	Cn	A contact between intrusive and stratigraphic units.
Boundary	Bd	A distinct boundary between two stratigraphic units

Note: Drill breaks (DB) and handling breaks (HB) are not included as natural discontinuity.

Discontinuity Spacing

Spacing (mm)	Description
>6000	Extremely Widely Spaced
2000 - 6000	Very Widely Spaced
600 - 2000	Widely Spaced
200 - 600	Medium Spaced
60 - 200	Closely Spaced
20 - 60	Very Closely Spaced
<20	Extremely Closely Spaced

Discontinuity Planarity

Code	Description
Cu	Curved – A defect with a gradual change in orientation
Ir	Irregular – A defect with many sharp changes in orientation
Pl	Planar – Defect forms a continuous plane without variation in orientation
St	Stepped – A defect with distinct sharp steps or step
Un	Undulose – A defect with undulations
Vu	Vuggy – An open void with crystallisation
Wv	Wavy – A wavy defect surface

Discontinuity Roughness

Abbreviation	Description
Ro	Rough – Many small surface irregularities generally related to the grain size of the parent rock
Sm	Smooth – Few or no surface irregularities related to the grain size of the parent rock
Po	Polished – Planes have a distinct sheen or a smoothness
Sl	Slickensided – Planes have a polished, grooved or striated surface consistent with differential movement of the parent rocs along the plane
VR	Very rough – many large surface irregularities, amplitude generally more than 1mm

Infill Material

Code	Name	Code	Name
Ca	Calcite	Gp	Gypsum
Ch	Chlorite	Mn	Manganese
Cl	Clay	MS	Secondary mineral
Co	Coal	Py	Pyrite
Fe	Limonite / Ironstone	Um	Unidentified mineral
Fe Cl	Iron oxide clay	Qz	Quartz
Fl	Feldspar	X	Carbonaceous

Discontinuity Observation

Term	Code	Description
Clean	CN	No visible coating or infill
Stain	SN	No visible coating or infill but surfaces are discoloured by mineral staining
Veneer <1 mm	VNR	A visible coating or soil or mineral substance but usually unable to be measured. If discontinuous over the plane, patchy veneer.
Coating >1 mm to <10 mm	CT	A visible coating or infilling of soil or mineral substance. Describe composition and thickness.
Filling (Filled) >10 mm	FLD	A visible filling of soil or mineral substance. Describe composition and thickness.

Samples and Field Tests

Code	Description
B	Bulk disturbed sample
BLK	Block sample
C	Core sample
DS	Small disturbed sample
ES	Soil sample for environmental testing
EW	Water sample for environmental testing
FP	Pressuremeter
G	Gas sample
H	Hydraulic fracturing
HP	Hand penetrometer test
I	Impression device
$Is_{(50)}$	Point Load Index
K	Permeability
LB	Large bulk disturbed sample
N	Standard penetration test result (N* denotes SPT sample recovery)
O	Core orientation
P	Piston sample
PID	Photoionisation detector reading in ppm
R	Hammer bouncing / refusal
SPT	Standard Penetration Test
U	Undisturbed push in sample
UCS	Uniaxial Compressive Strength
U50	Undisturbed tube sample (50 mm diameter)
U75	Undisturbed tube sample (75 mm diameter)
VS	Vane shear test
● (A)	Axial Test
○ (D)	Diametral Test
□	Irregular Lump test

Laboratory Tests

Code	Description
ACM	Asbestos Containing Material
CD	Consolidated Drained
CU	Consolidated Undrained
LL	Liquid Limit
LS	Linear Shrinkage
MC	Moisture Content
MDD	Maximum Dry Density
OMC	Optimum Moisture Content
PBT	Plate Bearing Test
PI	Plasticity Index
PL	Plastic Limit
PSD	Particle Size Distribution
ρ_b	Bulk Density
ρ_p	Particle Density
ρ_d	Dry Density
UU	Undrained Unconsolidated

Backfill / Standpipe Detail

Symbol	Description	Symbol	Description
	Cement seal		Filter pack: sand filter
	Grout backfill		Filter pack: gravel filter
	Blank pipe		Bentonite seal
	Slotted pipe		Cutting – excavated material backfill
	Surface Completion: Monument Above Ground		Surface Completion: Gatic Ground Monument

Completion Details

Type	Description
Collapse	Exploratory hole collapsed before reaching planned depth
Equipment Failure	Boring or excavator equipment operational failure
Flooding	Flooding of excavation
Machine Limit	Limit of machine capability reached
Obstruction	Obstruction preventing further advancement
Possible services	Indication of possible services below
Services present	Services encountered during exploratory hole
Squeezing	Hole squeezing boring equipment
Target Depth	Depth reached as planned
Target Depth Instrumentation Installed	Depth reached as planned instrumentation installed
Target Depth Standpipe Installed	Depth reached as planned open standpipe constructed
Material Refusal	Material preventing further advancement

Member of the Surbana Jurong Group

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH01

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 529681.0, N: 6257971.0 (MGA94 Zone 55) SURFACE ELEVATION : 235.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION: VE / F / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		235.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, brown, trace fine to medium grain sand	D to M	F - St	**ALLUVIUM** 0.30: rootlets to 0.5 m
				0.50m SPT 1 8,8,0 N*=8	234.5	0.5			0.50m: becoming mottled grey and orange, trace rootlets to 1m			
				0.95m 1.00m SPT 2 10,12,0 N*=12	234.0	1.0						
				1.45m 1.50m SPT 3 9,11,0 N*=11	233.5	1.5			1.50m: becoming mottled pale orange-brown, trace fine to medium grained sand, trace sub-angular gravel			1.50: recovery of quartz gravel
				1.95m	233.0	2.0		CH		M	St	
				2.50m SPT 4 13,12,0 N*=12	232.5	2.5			2.50m: becoming pale grey-brown mottled red, trace medium to coarse grained sand			
				2.95m	232.0	3.0						
					231.5	3.5						3.50: auger grinding slightly
				4.00m	231.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH01
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529681.0, N: 6257971.0 (MGA94 Zone 55) SURFACE ELEVATION : 235.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 15,14,0 N*=14	235.0 / 4.0			**CLAY**: high plasticity, mottled red and grey, with fine to medium grain sand	M	St	**ALLUVIUM**
				4.45m	230.5 / 4.5						
				5.50m SPT 6 19,16,0 N*=16	230.0 / 5.0 229.5 / 5.5		CH			VSt	
				5.95m	229.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					228.5 / 6.5 228.0 / 7.0 227.5 / 7.5 227.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH02

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530382.0, N: 6259587.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE / F / PENETRATION / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, brown, fine grain sand, with rootlets	D		**TOPSOIL**
								CH	**Sandy CLAY**: high plasticity, dark grey-brown, fine grain sand		F - St	**ALLUVIUM** 0.30: trace rootlets to 0.3m
				0.50m SPT 3,4,6 N=10	230.5	0.5			0.50m **CLAY**: high plasticity, brown, mottled grey		St	
				0.95m 1.00m SPT 4,8,8 N=16	230.0	1.0			1.00m: becoming mottled pale brown, trace fine to medium grained sand			
				1.45m 1.50m SPT 3,7,8 N=15	229.5	1.5						
				1.95m	229.0	2.0		CH		M		
				2.50m SPT 6,9,12 N=21	228.5	2.5			2.50m: becoming grey-brown		VSt	
				2.95m	228.0	3.0						
					227.5	3.5						
				4.00m	227.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH02
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530382.0, N: 6259587.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F H VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 7,16,20 N=36	231.0	4.0			**CLAY**: high plasticity, pale grey, mottled red-brown			**ALLUVIUM** 4.05: with bands of sandy silt to 5.95m
				4.45m	226.5	4.5						
					226.0	5.0		CH		M	H	
				5.50m SPT 11,16,25 N=41	225.5	5.5			5.50m: becoming mottled yellow			
				5.95m	225.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					224.5	6.5						
					224.0	7.0						
					223.5	7.5						
					223.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH03

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530110.0, N: 6259399.0 (MGA94 Zone 55) SURFACE ELEVATION : 234.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING								MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		234.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, grey-brown			**ALLUVIUM**
				0.50m SPT 1 4,5,7 N=12 CBR-1 0.5m-0.6m	233.5	0.5						0.30: trace rootlets to 0.5m
				0.95m 1.00m SPT 2 3,4,5 N=9	233.0	1.0			1.00m: becoming mottled brown		St	
				1.45m 1.50m SPT 3 4,5,5 N=10	232.5	1.5						
				1.95m	232.0	2.0		CH		M		
				2.50m SPT 4 4,7,9 N=16	231.5	2.5			2.50m: becoming pale grey-brown, mottled red-brown			
				2.95m	231.0	3.0					VSt	
					230.5	3.5						
				4.00m	230.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH03
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530110.0, N: 6259399.0 (MGA94 Zone 55) SURFACE ELEVATION : 234.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE F H VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 6,12,13 N=25	234.0 / 0.0			**CLAY**: high plasticity, pale grey-brown, mottled red-brown			**ALLUVIUM**
				4.45m	229.5 / 4.5					VSt	
					229.0 / 5.0		CH		M		
				5.50m SPT 6 13,20,20 N=40	228.5 / 5.5			5.50m: trace medium grained, sub-angular gravel		H	
				5.95m	228.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					227.5 / 6.5						
					227.0 / 7.0						
					226.5 / 7.5						
					226.0 / 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH04

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 529857.0, N: 6259210.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING								MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / H / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, dark grey-brown			**ALLUVIUM**
												0.30: trace rootlets to 0.5m
				0.50m SPT 1 4,5,6 N=11	230.5	0.5			0.5m: becoming brown, mottled grey, trace fine to coarse grain sand	D to M		
				0.95m 1.00m SPT 2 4,6,7 N=13	230.0	1.0					St	
				1.45m 1.50m SPT 3 5,6,7 N=13	229.5	1.5						
				1.95m 2.00m DS-1	229.0	2.0			2.00m: becoming mottled pale brown			
								CH				
				2.50m SPT 4 10,13,15 N=28	228.5	2.5			2.50m: becoming pale brown, mottled red-brown	M		
				2.95m	228.0	3.0					VSt	
					227.5	3.5						
				4.00m	227.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH04
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529857.0, N: 6259210.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	F PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 11,14,17 N=31	231.0	4.0			**CLAY**: high plasticity, pale brown, mottled red-brown, trace fine to coarse grain sand			**ALLUVIUM** 4.05: decreased moisture content
				4.45m	226.5	4.5						
					226.0	5.0		CH		M	H	
				5.50m SPT 6 13,17,19 N=36	225.5	5.5			5.50m: becoming pale grey, mottled red-brown and yellow-brown, trace fine grained sand			
				5.95m	225.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					224.5	6.5						
					224.0	7.0						
					223.5	7.5						
					223.0	8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH05
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 4.8 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529576.0, N: 6259028.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING								MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		233.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets, trace quartz gravel on surface			**TOPSOIL**
								CH	**Sandy CLAY**: high plasticity, dark grey-brown, fine grain sand	D		**ALLUVIUM** 0.30: trace rootlets to 0.5m
				0.50m SPT 1 5,4,6 N=10 B-1 0.5m-1m	232.5	0.5		CH	0.50m **CLAY**: high plasticity, brown, mottled red-brown, trace fine to medum grain sand, trace fine grain, sub-angular gravel		St	
				0.95m 1.00m SPT 2 4,6,8 N=14	232.0	1.0				M		
				1.45m 1.50m SPT 3 4,6,10 N=16	231.5	1.5		CH	1.50m: becoming pale grey-brown, mottled red-brown			
				1.95m 2.10m DS-1	231.0	2.0			2.10m: becoming red-brown	D		2.10: auger grinding noted by driller
				2.50m SPT 4 2,9,10 N=19	230.5	2.5			2.50m **Clayey SILT**: low plasticity, pale grey, mottled red and white	D to M	VSt	**RESIDUAL SOIL**
				2.95m	230.0	3.0		ML				
					229.5	3.5						
				4.00m	229.0	4.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH05
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 4.8 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529576.0, N: 6259028.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 2,12,14 N=26 4.45m 4.80m	233.0 228.5	4.0 4.5		ML	**Clayey SILT** low plasticity, pale grey, mottled red and white *(continued)* 4.00m: becoming orange-brown 4.20m: becoming pale-grey, mottled orange-brown 4.80m	D	VSt	**RESIDUAL SOIL**
				SPT 6 5/140mm HB N=R 4.94m	228.0	5.0			Hole Terminated at 4.80 m Material refusal on inferred granite rock / boulder (HW-MW)			
					227.5	5.5						
					227.0	6.0						
					226.5	6.5						
					226.0	7.0						
					225.5	7.5						
					225.0	8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
Fb - Friable
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH06
PROJECT NUMBER : 30041768
SHEET : 1 OF 1
FINAL DEPTH : 3.7 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529338.0, N: 6258835.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, dark grey-brown, trace fine to medium grain sand			**ALLUVIUM**
												0.30: trace rootlets to 0.5m
				0.50m SPT 1 7,7,7 N=14	230.5	0.5			0.50m: trace fine to coarse grained sand, trace fine grained sub-rounded gravel		St	
				0.95m 1.00m SPT 2 6,8,8 N=16	230.0	1.0			1.00m: becoming brown, mottled orange-brown	M		
				1.45m 1.50m SPT 3 5,6,10 N=16	229.5	1.5		CH	1.50m: becoming pale brown, mottled brown and red-brown		VSt	
				1.95m	229.0	2.0			2.00m: becoming orange and red-brown, with silt	D		
				2.50m SPT 4 4,14,17/130mm HB N=R	228.5	2.5			2.50m **Silty CLAY**: high plasticity, red-brown, mottled grey and orange			**RESIDUAL SOIL**
				2.93m	228.0	3.0		CH		M	H	
				3.60m SPT 5 8/100mm HB N=R 3.70m	227.5	3.5			3.60m: becoming red-brown			
					227.0	4.0			3.70m Hole Terminated at 3.70 m Material refusal on inferred granite rock / boulder (HW-MW)			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH07

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.93 m

POSITION : E: 529594.0, N: 6258646.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	0.50m SPT 1 6,7,8 N=15	231.5	0.5		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets **CLAY**: high plasticity, dark grey-brown	D	St - VSt	**TOPSOIL** **ALLUVIUM** 0.30: trace rootlets to 0.5m
				0.95m 1.00m SPT 2 6,5,5 N=10	231.0	1.0			0.50m: becoming brown, mottled orange and black		VSt	
				1.45m 1.50m SPT 3 4,5,6 N=11	230.5	1.5					St	
				1.95m	230.0	2.0		CH		M		
				2.50m SPT 4 5,10,12 N=22	229.5	2.5			2.50m: becoming pale grey-brown, mottled orange-brown			2.50: veins of orange-brown sandy silt
				2.95m	229.0	3.0					VSt	
					228.5	3.5						
				4.00m	228.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH07
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.93 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529594.0, N: 6258646.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE, F, VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 10,16,22 N=38	232.0	4.0			**CLAY**: high plasticity, dark grey-brown, trace red-brown, medium to coarse grain, sub-angular gravel			**ALLUVIUM**
				4.45m	227.5	4.5						
					227.0	5.0		CH		M	H	
				5.50m SPT 6 8,24,21,13 N=R	226.5	5.5						
				5.93m	226.0	6.0			5.93m Hole Terminated at 5.93 m Target Depth			
					225.5	6.5						
					225.0	7.0						
					224.5	7.5						
					224.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH08

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 1
FINAL DEPTH : 3.25 m

POSITION : E: 529587.0, N: 6258456.0 (MGA94 Zone 55) SURFACE ELEVATION : 235.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		235.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, dark grey-brown			**ALLUVIUM**
												0.30: trace rootlets to 0.5m
				0.50m SPT 4,3,3 N=6 CBR-1 0.5m-1m	234.5	0.5			0.50m: trace black organics		F	
				0.95m 1.00m SPT 4,5,4 N=9	234.0	1.0			1.00m: becoming brown, mottled grey			
				1.45m 1.50m SPT 3,3,5 N=8	233.5	1.5		CH		M	St	
				1.95m	233.0	2.0			1.80m: becoming grey-brown, mottled red-brown			2.00: increased silt content noted off auger
				2.50m SPT 10,10/50mm N=R 2.70m	232.5	2.5			2.85m			
				3.20m SPT 6/50mm N=R 3.25m	232.0	3.0		ML	**Sandy SILT**: low plasticity, pale grey mottled orange-brown, fine grain sand 3.25m	D	H	**RESIDUAL SOIL**
					231.5	3.5			Hole Terminated at 3.25 m Material refusal on inferred granite rock / boulder (HW-MW)			
					231.0	4.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH09

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 529855.0, N: 6258460.0 (MGA94 Zone 55) SURFACE ELEVATION : 234.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		234.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets to 1m	D		**TOPSOIL**
									CLAY: high plasticity, dark grey-brown, trace fine to medium grain sand, trace fine to medium grain, sub-angular gravel		St - VSt	**ALLUVIUM** 0.30: trace rootlets to 0.5m
				0.50m SPT 1 8,9,8 N=17	233.5	0.5					VSt	
				0.95m 1.00m SPT 2 5,6,6 N=12	233.0	1.0			1.00m: becoming brown, mottled orange-brown			1.00: quartz sand recovery to 1.5m
				1.45m 1.50m SPT 3 5,6,7 N=13	232.5	1.5					St	
				1.95m	232.0	2.0		CH		M		
				2.50m SPT 4 7,9,12 N=21	231.5	2.5			2.50m: becoming pale brown, mottled red-brown			2.50: bands of red-brown sandy silt to 5.95m
				2.95m	231.0	3.0					VSt	
					230.5	3.5						
				4.00m	230.0	4.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH09
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529855.0, N: 6258460.0 (MGA94 Zone 55) SURFACE ELEVATION : 234.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 12,16,22 N=38	234.0 4.0			**CLAY**: high plasticity, dark grey-brown, trace fine to medium grain sand, trace fine to medium grain, sub-angular gravel *(continued)* 4.00m: becoming pale grey-brown			**ALLUVIUM**
				4.45m	229.5 4.5						
					229.0 5.0		CH		M	H	
				5.50m SPT 6 11,16,21 N=37	228.5 5.5						
				5.95m	228.0 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					227.5 6.5						
					227.0 7.0						
					226.5 7.5						
					226.0 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH10
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530106.0, N: 6258265.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / H / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	0.40m CBR-1 0.50m SPT 4,4,3 N=7 0.95m 1.00m SPT 3,4,5 N=9 1.45m 1.50m SPT 3,4,6 N=10 1.95m 2.50m SPT 4,8,10 N=18 2.95m 4.00m	232.0 231.5 231.0 230.5 230.0 229.5 229.0 228.5 228.0	0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		CH	**Silty CLAY**: high plasticity, brown, with rootlets 0.20m **CLAY**: high plasticity, brown, trace fine to medium grain sand 4.00m	D D to M M	F St	**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m **ALLUVIUM** 0.30: trace rootlets to 0.5m

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH10
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530106.0, N: 6258265.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : NR

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 6,12,18 N=30	232.0 / 0.0			**CLAY**: high plasticity, brown, trace fine grain gravel, trace fine to coarse grain sand	M	H	**ALLUVIUM** 4.05: bands of red-brown sandy silt
				4.45m	227.5 / 4.5						
				5.50m SPT 12,19,25 N=44	226.5 / 5.5						
				5.95m	226.0 / 6.0		CH	5.95m Hole Terminated at 5.95 m Target Depth			
					225.5 / 6.5						
					225.0 / 7.0						
					224.5 / 7.5						
					224.0 / 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH11
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530379.0, N: 6258448.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / H / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		233.0	0.0		CH	**Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m **CLAY**: high plasticity, dark brown-grey to brown, mottled grey		F - St	**ALLUVIUM** 0.30: trace rootlets to 1.5m
				0.50m SPT 1 5,4,4 N=8	232.5	0.5						
				0.95m 1.00m SPT 2 3,4,5 N=9	232.0	1.0			1.00m: with organics			1.00: slight increase in moisture
				1.45m 1.50m SPT 3 3,3,5 N=8	231.5	1.5						
				1.95m	231.0	2.0		CH		M	St	
				2.50m SPT 4 5,6,7 N=13 DS-1	230.5	2.5			2.50m: becoming pale brown, mottled brown, trace fine to medium grained sand			
				2.95m	230.0	3.0						
					229.5	3.5						
				4.00m	229.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH11
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530379.0, N: 6258448.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE F H VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 7,8,10 N=18	233.0 / 4.0			**CLAY**: high plasticity, pale brown, mottled red-brown and orange-brown, trace fine to medium grain sand			**ALLUVIUM**
				4.45m	228.5 / 4.5					VSt	
					228.0 / 5.0		CH		M		
				5.50m SPT 6 14,12,20 N=32	227.5 / 5.5			5.50m: becoming pale grey		H	5.50: bands of ferruginous sandy silt
				5.95m	227.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					226.5 / 6.5						
					226.0 / 7.0						
					225.5 / 7.5						
					225.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH12

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530634.0, N: 6258645.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	**Silty CLAY**: high plasticity, brown, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m **Silty CLAY**: high plasticity, dark brown to brown, trace fine grain, subrounded gravel	D to M		**ALLUVIUM** 0.30: trace rootlets to 0.5m
				0.50m SPT 2,3,4 N=7 CBR-1 0.5m-0.6m	230.5	0.5					F	
				0.95m 1.00m SPT 3,4,4 N=8	230.0	1.0			1.00m: becoming brown, mottled grey, trace fine grained sand			
				1.45m 1.50m SPT 3,6,7 N=13	229.5	1.5						
				1.95m	229.0	2.0		CH		M		
				2.50m SPT 3,5,7 N=12	228.5	2.5					St	
				2.95m	228.0	3.0						
					227.5	3.5						
				4.00m	227.0	4.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH12
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530634.0, N: 6258645.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 7,8,9 N=17	231.0 / 4.0			**Silty CLAY**: high plasticity, dark brown to brown, trace fine grain, subrounded gravel *(continued)*			**ALLUVIUM**
				4.45m	226.5 / 4.5					VSt	
					226.0 / 5.0		CH		M		
				5.50m SPT 11,17,17 N=34	225.5 / 5.5			5.50m: becoming mottled red-brown		H	5.50: bands of sandy silt to 5.95m
				5.95m	225.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					224.5 / 6.5						
					224.0 / 7.0						
					223.5 / 7.5						
					223.0 / 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH13

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530622.0, N: 6258828.0 (MGA94 Zone 55) SURFACE ELEVATION : 230.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE F VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		230.0	0.0		CH	**Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m **CLAY**: high plasticity, brown, trace fine to coarse grain sand, trace fine grain, sub-angular gravel			**ALLUVIUM** 0.30: trace rootlets to 1.5m
				0.50m SPT 1 5,5,7 N=12	229.5	0.5						
				0.95m 1.00m SPT 2 5,7,7 N=14	229.0	1.0			0.90m: becoming grey-brown, mottled orange-brown		St	
				1.45m 1.50m SPT 3 3,5,7 N=12	228.5	1.5						
				1.95m	228.0	2.0		CH		M		
				2.50m SPT 4 4,7,9 N=16	227.5	2.5			2.50m: becoming grey-brown, mottled red-brown			
				2.95m	227.0	3.0					VSt	
					226.5	3.5						
				4.00m	226.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH13
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530622.0, N: 6258828.0 (MGA94 Zone 55) SURFACE ELEVATION : 230.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 8,9,13 N=22	230.0 / 4.0			**CLAY**: high plasticity, brown, with fine grain sand, trace fine grain, sub-angular gravel			**ALLUVIUM**
				4.45m	225.5 / 4.5					VSt	
					225.0 / 5.0		CH	5.00m: becoming grey	M		
				5.50m SPT 6 9,13,17 N=30	224.5 / 5.5					H	
				5.95m	224.0 / 6.0		5.95m	Hole Terminated at 5.95 m Target Depth			
					223.5 / 6.5						
					223.0 / 7.0						
					222.5 / 7.5						
					222.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH14

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530630.0, N: 6259004.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING | MATERIAL

PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE F H VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components; ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components)	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	0.10m **Silty CLAY**: high plasticity, brown, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, brown, mottled white and black, trace fine to medium grain sand			**ALLUVIUM**
									0.30: trace rootlets to 1.5m			
				0.50m SPT 3,4,5 N=9	230.5	0.5			0.50m: becoming mottled orange-brown and grey, trace fine grained sub-rounded gravel			
				0.95m 1.00m SPT 4,4,7 N=11	230.0	1.0					St	
				1.45m 1.50m SPT 3,5,6 N=11	229.5	1.5						
				1.95m	229.0	2.0		CH		M		
				2.50m SPT 5,6,9 N=15	228.5	2.5					VSt	
				2.95m	228.0	3.0						
					227.5	3.5						
				4.00m	227.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH14
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530630.0, N: 6259004.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 9,15,19 N=34	231.0 / 4.0			**CLAY**: high plasticity, mottled red-brown, trace fine to medium grain sand, trace fine grain, sub-rounded gravel 4.00m: becoming mottled red-brown	M	H	**ALLUVIUM** 4.05: bands of sandy silt to 5.95m
				4.45m	226.5 / 4.5						
				5.50m SPT 12,17,14 N=31	225.5 / 5.5						
				5.95m	225.0 / 6.0		CH	5.95m Hole Terminated at 5.95 m Target Depth			
					224.5 / 6.5						
					224.0 / 7.0						
					223.5 / 7.5						
					223.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH15

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530884.0, N: 6259067.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING | MATERIAL

DRILLING & CASING	DRILLING FLUID	PENETRATION VE F H VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components; ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components)	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	**Silty CLAY**: high plasticity, brown, with rootlets, organics present	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
						0.20m			**CLAY**: high plasticity, brown to brown mottled grey, trace fine to medium grain sand			**ALLUVIUM** 0.30: trace rootlets to 0.5m
				0.50m SPT 3,3,6 N=9	230.5	0.5						
				0.95m 1.00m SPT 3,6,8 N=14	230.0	1.0			1.00m: becoming mottled grey and brown, trace fine to coarse grained sand, trace organics		St	
				1.45m 1.50m SPT 3,5,7 N=12	229.5	1.5						
				1.95m	229.0	2.0		CH		M		
				2.50m SPT 5,7,12 N=19	228.5	2.5			2.50m: becoming pale grey, mottled red-brown and yellow			
				2.95m	228.0	3.0					VSt	
					227.5	3.5						
				4.00m	227.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH15
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530884.0, N: 6259067.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F H VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 10,13,17 N=30	231.0	4.0			**CLAY**: high plasticity, mottled red-brown and pale grey, trace fine to medium grain sand			**ALLUVIUM**
				4.45m	226.5	4.5					VSt	
					226.0	5.0		CH		M		
				5.50m SPT 10,18,21 N=39	225.5	5.5					H	
				5.95m	225.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					224.5	6.5						
					224.0	7.0						
					223.5	7.5						
					223.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH16

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530626.0, N: 6259201.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	0.50m SPT 2,3,4 N=7	232.0 / 0.0		CH	0.10m **CLAY**: high plasticity, grey-brown, with rootlets	D		**TOPSOIL**
					231.5 / 0.5			**CLAY**: high plasticity, dark grey-brown, trace fine to coarse grain quartz sand to 1m 0.50m: trace fine to medium grained sand		F	**ALLUVIUM**
				0.95m 1.00m SPT 3,3,4 N=7	231.0 / 1.0						1.00: increased moisture content
				1.45m 1.50m SPT 3,4,5 N=9	230.5 / 1.5			1.50m: becoming grey-brown			
				1.95m	230.0 / 2.0		CH	2.00m: becoming mottled orange	M		
				2.50m SPT 4,4,6 N=10	229.5 / 2.5			2.50m: becoming mottled red-brown		St	
				2.95m	229.0 / 3.0						
					228.5 / 3.5						
				4.00m	228.0 / 4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH16
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530626.0, N: 6259201.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F H VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 6,9,10 N=19	232.0 / 4.0		CH	**CLAY**: high plasticity, pale grey-brown, mottled red-brown, trace fine to medium grain sand	M	VSt	**ALLUVIUM**
				4.45m	227.5 / 4.5						
				5.50m SPT 10,17,13 N=30	227.0 / 5.0			5.50m: becoming mottled red-brown, trace fine to coarse grained sand, trace fine to medium grained sub-angular gravel		H	
				5.95m	226.5 / 5.5			5.95m			
					226.0 / 6.0			Hole Terminated at 5.95 m Target Depth			
					225.5 / 6.5						
					225.0 / 7.0						
					224.5 / 7.5						
					224.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH17

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530382.0, N: 6259394.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	DS-1	233.0	0.0		CH	**Silty CLAY**: high plasticity, brown, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m **Silty CLAY**: high plasticity, brown to brown mottled grey, trace fine to medium grain sand			**ALLUVIUM** 0.30: trace rootlets to 1m
				0.50m SPT 4,6,6 N=12	232.5	0.5					St	
				0.95m	232.0	1.0						
				1.50m SPT 4,6,9 N=15	231.5	1.5			1.50m: becoming grey-brown, mottled brown, trace medium grained sand			1.50: recovery of quartz sand to 2.5m
				1.95m	231.0	2.0		CH		M		
				2.50m SPT 5,6,12 N=18	230.5	2.5					VSt	
				2.95m	230.0	3.0						
					229.5	3.5						
				4.00m	229.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH17
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530382.0, N: 6259394.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 11,14,19 N=33	233.0 / 4.0			**Silty CLAY**: high plasticity, brown mottled yellow, trace fine grain sand			**ALLUVIUM**
				4.45m	228.5 / 4.5						
					228.0 / 5.0		CH		M	H	
				5.50m SPT 10,14,20 N=34	227.5 / 5.5			5.5m: becoming mottled red-brown, trace fine grained sand			5.50: bands of sandy silt to 5.95m
				5.95m	227.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					226.5 / 6.5						
					226.0 / 7.0						
					225.5 / 7.5						
					225.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH18

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530109.0, N: 6259203.0 (MGA94 Zone 55) SURFACE ELEVATION : 229.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		229.0	0.0		CH	**Silty CLAY**: high plasticity, brown, trace fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m **Silty CLAY**: high plasticity, grey-brown to brown, trace medium grain sand	D to M		**ALLUVIUM** 0.30: trace rootlets to 0.5 m
				0.50m SPT 3,2,3 N=5	228.5	0.5					F	
				0.95m 1.00m SPT 4,5,7 N=12	228.0	1.0			1.00m: becoming mottled grey		St	
				1.45m 1.50m SPT 4,7,9 N=16	227.5	1.5			1.50m: becoming mottled grey and brown			
				1.95m	227.0	2.0		CH		M		
				2.50m SPT 5,9,12 N=21	226.5	2.5			2.50m: trace fine to medium grained sand		VSt	
				2.95m	226.0	3.0						
					225.5	3.5						
				4.00m	225.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH18
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530109.0, N: 6259203.0 (MGA94 Zone 55) SURFACE ELEVATION : 229.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 9,14,17 N=31	229.0 / 4.0			**Silty CLAY**: high plasticity, pale grey, mottled orange-brown, trace fine to medium grain sand			**ALLUVIUM**
				4.45m	224.5 / 4.5						
					224.0 / 5.0		CH		M	H	
				5.50m SPT 8,18,23 N=41	223.5 / 5.5			5.50m: becoming mottled red-brown and grey, trace fine to coarse grained sand, trace fine to medium grained sub-angular gravel			5.50: bands of silty sand to 5.95m
				5.95m	223.0 / 6.0		5.95m	Hole Terminated at 5.95 m Target Depth			
					222.5 / 6.5						
					222.0 / 7.0						
					221.5 / 7.5						
					221.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH19

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 529856.0, N: 6259010.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		233.0	0.0		CH	**Sandy CLAY**: high plasticity, brown, fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m			
									CLAY: high plasticity, dark brown to brown, mottled black and grey, trace coarse grain sand		St - VSt	**ALLUVIUM** 0.30: rootlets to 1 m
				0.50m SPT 1 10,9,8 N=17	232.5	0.5						
				0.95m 1.00m SPT 2 5,7,8 N=15	232.0	1.0			1.00m: becoming mottled black, trace organics	D to M	VSt	
				1.45m 1.50m SPT 3 4,4,6 N=10	231.5	1.5			1.50m: trace coarse grained sand			
				1.95m	231.0	2.0		CH			St	
				2.50m SPT 4 8,12,18 N=30	230.5	2.5			2.50m: becoming pale brown, mottled red-brown	M		
				2.95m	230.0	3.0					VSt	
					229.5	3.5						
				4.00m	229.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH19
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529856.0, N: 6259010.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 14,18,24 N=42	233.0	4.0			**CLAY**: high plasticity, pale grey, mottled yellow-brown, trace coarse grain sand			**ALLUVIUM** 4.05: decreased moisture content
				4.45m	228.5	4.5						
					228.0	5.0		CH		M	H	
				5.50m SPT 6 15,18,24 N=42	227.5	5.5			5.50m: becoming mottled dark-brown			
				5.95m	227.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					226.5	6.5						
					226.0	7.0						
					225.5	7.5						
					225.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH20

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 529857.0, N: 6258832.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	0.50m SPT 1 4,5,5 N=10	232.5	0.5		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets **CLAY**: high plasticity, brown	D		**TOPSOIL** **ALLUVIUM** 0.30: trace rootlets to 1.0 m
				0.95m 1.00m SPT 2 3,6,6 N=12	232.0	1.0			1.00m: trace fine to medium grained sand		St	1.00: Quartz sand recovered to 1.5m
				1.45m 1.50m SPT 3 3,4,5 N=9	231.5	1.5			1.50m: becoming brown			
				1.95m	231.0	2.0		CH		M		
				2.50m SPT 4 7,9,14 N=23	230.5	2.5			2.50m: becoming pale grey-brown, mottled red			
				2.95m	230.0	3.0					VSt	
					229.5	3.5						
				4.00m	229.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH20
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529857.0, N: 6258832.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING				MATERIAL						
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 14,18,19 N=37	233.0	4.0			**CLAY**: high plasticity, pale grey, mottled yellow and red, trace fine to coarse grain sand, trace medium grain, sub-angular gravel			**ALLUVIUM**
				4.45m	228.5	4.5						
					228.0	5.0		CH		M	H	
				5.50m SPT 6 11,18,21 N=39	227.5	5.5			5.50m: trace fine to medium grained sand			5.50: Quartz sand recovered to 5.95m
				5.95m	227.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					226.5	6.5						
					226.0	7.0						
					225.5	7.5						
					225.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH21
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529854.0, N: 6258646.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		232.0	0.0		CH	**Silty CLAY**: high plasticity, grey-brown, with rootlets 0.20m			**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
				0.50m SPT 6,7,6 N=13 CBR-1 0.5m-1m	231.5	0.5			**CLAY**: high plasticity, grey-brown, trace fine grain sand	D D to M	St	**ALLUVIUM** 0.30: trace rootlets to 0.5 m
				0.95m 1.00m SPT 5,6,5 N=11	231.0	1.0						
				1.45m 1.50m SPT 3,7,10 N=17	230.5	1.5			1.50m: becoming mottled red-brown and yellow			
				1.95m	230.0	2.0		CH				
				2.50m SPT 5,9,11 N=20	229.5	2.5				M	VSt	
				2.95m	229.0	3.0						
					228.5	3.5						
				4.00m	228.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH21
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529854.0, N: 6258646.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 9,11,16 N=27	232.0 / 0.0			**CLAY**: high plasticity, mottled red-brown, trace fine grain sand, trace fine grain, sub-rounded gravel			**ALLUVIUM**
				4.45m	227.5 / 4.5						
					227.0 / 5.0		CH		M	VSt	
				5.50m SPT 10,12,15 N=27	226.5 / 5.5			5.50m: becoming pale grey mottled red and yellow			
				5.95m	226.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					225.5 / 6.5						
					225.0 / 7.0						
					224.5 / 7.5						
					224.0 / 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
Fb - Friable
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH22

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530108.0, N: 6258641.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	**Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m			**ALLUVIUM**
				0.50m SPT 1 5,7,6 N=13	230.5	0.5			**CLAY**: high plasticity, dark brown to brown mottled grey, trace medium grain, sub-angular gravel			0.30: trace rootlets to 0.5 m
				0.95m 1.00m SPT 2 5,6,8 N=14	230.0	1.0			1.00m: trace fine to medium grained sand		St	
				1.45m 1.50m SPT 3 3,4,6 N=10	229.5	1.5						
				1.95m	229.0	2.0		CH		M		
				2.50m SPT 4 5,6,11 N=17	228.5	2.5			2.50m: becoming pale brown, mottled red-brown			
				2.95m	228.0	3.0					VSt	
					227.5	3.5						
				4.00m	227.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH22
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530108.0, N: 6258641.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE, F, VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 13,15,21 N=36	231.0	4.0			**CLAY**: brown, mottled red-brown, trace fine to medium grain sand, trace fine to coarse grain, sub-angular ferruginous gravel			**ALLUVIUM** 4.05: Decreased moisture content
				4.45m	226.5	4.5						
					226.0	5.0		CH		M	H	
				5.50m SPT 6 18,22,25 N=47	225.5	5.5						
				5.95m	225.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					224.5	6.5						
					224.0	7.0						
					223.5	7.5						
					223.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH23

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530365.0, N: 6258645.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		233.0	0.0		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, fine gained sand, with rootlets	D		**TOPSOIL**
									CLAY: high plasticity, dark grey, trace medium to coarse grain sand		St	**ALLUVIUM** 0.15: recovery of quartz sand to 0.5m 0.30: trace rootlets to 1.5 m
				0.50m SPT 1 3,6,9 N=15	232.5	0.5			0.50m: becoming grey-brown		VSt	
				0.95m 1.00m SPT 2 5,6,6 N=12	232.0	1.0						
				1.45m 1.50m SPT 3 4,5,6 N=11	231.5	1.5					St	
				1.95m 2.00m DS	231.0	2.0		CH		M		
				2.50m SPT 4 6,9,11 N=20	230.5	2.5			2.50m: becoming mottled red-brown			
				2.95m	230.0	3.0					VSt	
					229.5	3.5						
				4.00m	229.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH23
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530365.0, N: 6258645.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 11,16,20 N=36	233.0 / 4.0			**CLAY**: high plasticity, pale grey, mottled brown and red-brown, trace fine to medium grain sand			**ALLUVIUM** 4.05: bands of sandy silt to 5.95m
				4.45m	228.5 / 4.5						
				5.50m SPT 6 12,18,24 N=42	228.0 / 5.0 227.5 / 5.5		CH		M	H	
				5.95m	227.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					226.5 / 6.5						
					226.0 / 7.0						
					225.5 / 7.5						
					225.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard
- Fb - Friable
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH24

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.75 m

POSITION : E: 529614.0, N: 6259383.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION: VE F VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	0.10m DS-1 0.50m SPT 1 3,3,3 N=6 0.95m 1.00m SPT 2 3,4,6 N=10 1.45m 1.50m SPT 3 6,8,9 N=17 1.95m 2.50m SPT 4 6,6,9 N=15 2.95m 4.00m	232.0 231.5 231.0 230.5 230.0 229.5 229.0 228.5 228.0	0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		CH CH	0.10m **Sandy CLAY**: high plasticity, brown, fine grain sand, with rootlets **CLAY**: high plasticity, brown, mottled dark grey and pale grey 1.50m: becoming red-brown, mottled grey 2.50m: becoming red, mottled grey and white, trace fine to coarse grained, sub-angular gravel 4.00m	D M D to M	F St VSt St	**TOPSOIL** **ALLUVIUM** 0.30: trace rootlets to 1.5 m

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH24
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.75 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529614.0, N: 6259383.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 8,12,16 N=28	232.0	4.0			**CLAY**: high plasticity, pale grey, mottled red, with fine to coarse grain sand, trace medium to coarse grain, sub-angular gravel	D to M	VSt	**ALLUVIUM** 4.05: residual granite recovered as trace gravels to 5.75m
				4.45m	227.5	4.5		CH				
					227.0	5.0						
				5.50m	226.5	5.5			5.50m			
				SPT 6 13,10/100mm HB N=R				CH	**CLAY**: high plasticity, red-brown, mottled grey, trace medium to coarse grain, sub-angular gravel		H	**RESIDUAL SOIL**
				5.75m					5.75m			
					226.0	6.0			Hole Terminated at 5.75 m Material refusal on inferred granite rock / boulder (HW-MW)			
					225.5	6.5						
					225.0	7.0						
					224.5	7.5						
					224.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH25

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530380.0, N: 6259021.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F H VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		232.0	0.0		CH	**Silty CLAY**: high plasticity, brown, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
						0.20m						
				0.50m SPT 3,3,6 N=9	231.5	0.5			**Silty CLAY**: high plasticity, brown, trace fine grain sand	M	St	**ALLUVIUM** 0.30: trace rootlets to 0.5 m
				0.95m 1.00m SPT 4,8,11 N=19	231.0	1.0			1.00m: trace fine to medium grained sand			
				1.45m 1.50m SPT 4,6,9 N=15	230.5	1.5			1.50m: becoming mottled pale brown	M		
				1.95m	230.0	2.0		CH				
				2.50m SPT 5,9,12 N=21	229.5	2.5					VSt	
				2.95m	229.0	3.0				M		
					228.5	3.5						
				4.00m	228.0	4.0			4.00m			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH25
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530380.0, N: 6259021.0 (MGA94 Zone 55) SURFACE ELEVATION : 232.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 13,16,20 N=36	232.0 / 4.0		CH	**CLAY**: high plasticity, pale grey, trace fine to medium grain sand	M	H	**ALLUVIUM** 4.05: decreased moisture content noted
				4.45m	227.5 / 4.5						
					227.0 / 5.0						5.00: bands of sandy silt to 5.95m
				5.50m SPT 10,18,23 N=41	226.5 / 5.5			5.05m: becoming mottled red-brown			
				5.95m	226.0 / 6.0		5.95m	Hole Terminated at 5.95 m Target Depth			
					225.5 / 6.5						
					225.0 / 7.0						
					224.5 / 7.5						
					224.0 / 8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH26

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530111.0, N: 6258981.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING | MATERIAL

PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE F H VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components; ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		233.0	0.0		ML	**Sandy SILT**: low plasticity, pale brown, fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
									0.20m **Sandy SILT**: low plasticity, brown, mottled black, fine to medium grain sand	M	St - VSt	**ALLUVIUM** 0.30: trace rootlets to 0.5 m
				0.50m SPT 1 6,12,9 N=21 CBR-1 0.5m-0.6m	232.5	0.5		ML		D to M		
				0.95m 1.00m SPT 2 11,12,12 N=24	232.0	1.0			1.00m **Sandy CLAY**: high plasticity, grey-brown, fine to medium grain sand			
				1.45m 1.50m SPT 3 11,13,13 N=26	231.5	1.5		CH	1.50m: becoming mottled pale grey, trace fine to medium grained sand			
				1.95m	231.0	2.0					VSt	
				2.50m SPT 4 8,8,10 N=18	230.5	2.5			2.70m **CLAY**: high plasticity, grey-brown mottled red	D		
				2.95m	230.0	3.0		CH				
					229.5	3.5						
				4.00m	229.0	4.0			4.00m			

METHOD

HA	Hand auger
AS	Auger screwing
ADV	Auger drilling with V bit
ADT	Auger drilling with TC bit
HF	Hollow flight auger
WB	Wash-bore drilling
RR	Rock roller
SD	Sonic drilling
NDD	Non destructive drilling
PT	Continuous push tub
HAND	Hand methods

PENETRATION

VE — E — F — H — VH
No Resistance
Very Hard / Refusal

WATER

dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS

B	Bulk Disturbed Sample
D	Disturbed Sample
U	Undisturbed Sample
ES	Environmental Sample
W	Water Sample
HP	Hand Penetrometer (kPa)
SPT	Standard Penetration Test
N	Result of SPT (*=sample taken)
R	Hammer Bouncing / Refusal
U50	Undisturbed Sample (50mm dia)
U75	Undisturbed Sample (75mm dia)
VS	Vane Shear; peak/remouded(kPa)
PT	Push Tube
MC	Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE

D	Dry
M	Moist
W	Wet
PL	Plastic limit
LL	Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH26
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530111.0, N: 6258981.0 (MGA94 Zone 55) SURFACE ELEVATION : 233.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 13,16,16 N=32	233.0 / 4.0			**CLAY**: high plasticity, mottled red-brown, trace fine grain sand			**ALLUVIUM** 4.05: bands of sandy silt to 5.5m
				4.45m	228.5 / 4.5						
					228.0 / 5.0		CH		D	H	
				5.50m SPT 6 14,16,18 N=34	227.5 / 5.5			5.50m: becoming mottled pale grey, trace fine grained sand			
				5.95m	227.0 / 6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					226.5 / 6.5						
					226.0 / 7.0						
					225.5 / 7.5						
					225.0 / 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
Fb - Friable
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH27

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

POSITION : E: 530108.0, N: 6258829.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING								MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE–VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	0.50m SPT 1 4,6,8 N=14	230.5	0.5		CH	0.10m **Sandy CLAY**: high plasticity, grey-brown, with rootlets	D	St	**TOPSOIL** **ALLUVIUM**
				0.95m 1.00m SPT 2 5,6,9 N=15	230.0	1.0		CH	**CLAY**: high plasticity, brown, mottled grey and black, trace medium grain sand 0.30: trace rootlets to 1.5 m		VSt	
				1.45m 1.50m SPT 3 4,5,7 N=12	229.5	1.5					St	
				1.95m	229.0	2.0				M		
				2.50m SPT 4 8,9,14 N=23	228.5	2.5			2.50m **CLAY**: high plasticity, pale brown, mottled red-brown, with fine grain sand, trace fine grain sub-rounded to sub-angular gravel			
				2.95m	228.0	3.0		CH			VSt	
					227.5	3.5						
				4.00m	227.0	4.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH27
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530108.0, N: 6258829.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 24/07/2018 DATE COMPLETED : 24/07/2018 DATE LOGGED : 24/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE, F, VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 11,13,20 N=33	231.0	4.0			**CLAY**: high plasticity, pale brown, mottled red-brown, with fine grain sand, trace fine grain sub-rounded to sub-angular gravel *(continued)*			**ALLUVIUM** 4.05: Decreased moisture content
				4.45m	226.5	4.5						
					226.0	5.0		CH		M	H	
				5.50m SPT 6 13,24,27 N=51	225.5	5.5						
				5.95m	225.0	6.0			5.95m Hole Terminated at 5.95 m Target Depth			
					224.5	6.5						
					224.0	7.0						
					223.5	7.5						
					223.0	8.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH28

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm
PROJECT NUMBER : 30041768
SHEET : 1 OF 1
FINAL DEPTH : 3.6 m

POSITION : E: 526721.0, N: 6258271.0 (MGA94 Zone 55) SURFACE ELEVATION : 235.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 26/07/2018 DATE COMPLETED : 26/07/2018 DATE LOGGED : 26/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE / F / H / VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
					235.0	0.0			**Silty CLAY**: high plasticity, grey-brown, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
								CH	0.20m **Sandy CLAY**: high plasticity, dark brown to brown mottled grey, with fine to medium grain quartz sand	D	St - VSt	**ALLUVIUM** 0.30: trace rootlets to 0.5 m
ADV	No Fluid		Not Encountered	0.50m SPT 7,10,10 N=20 DS-1 0.5m-0.7m	234.5	0.5				D		
				0.95m 1.00m SPT 9,7,8 N=15	234.0	1.0		CH	1.00m: becoming mottled black, trace medium grained sand	D to M	VSt	
				1.45m 1.50m SPT 5,8,5 N=13	233.5	1.5			1.90m			
				1.95m	233.0	2.0			**CLAY**: high plasticity, grey-brown mottled brown, trace fine to medium grain sand		St	
				2.50m SPT 6,8,12 N=20	232.5	2.5		CH	2.50m: becoming pale grey-brown, mottled red-brown, trace fine grained sub-angular gravel	M	VSt	
				2.95m	232.0	3.0						
				3.50m SPT 5/50mm N=R 3.55m	231.5	3.5			3.50m: fine to coarse grain granitic sand, with silt 3.60m	D	D	3.50: auger grinding on inferred residual granite
					231.0	4.0			Hole Terminated at 3.60 m Material refusal on inferred granite rock / boulder (HW-MW)			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH29
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530883.0, N: 6258830.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE F H VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		231.0	0.0		CH	**Silty CLAY**: high plasticity, grey-brown, with rootlets 0.20m	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
				0.50m SPT 2,3,4 N=7	230.5	0.5			**CLAY**: high plasticity, dark grey to grey-brown, trace fine grain sub-rounded gravel 0.30m: trace fine grain sand to 0.5 m		F	**ALLUVIUM** 0.30: trace rootlets to 0.5 m 0.55: trace calcareous content recovered as gravel
				0.95m 1.00m SPT 3,3,5 N=8 DS-1	230.0	1.0			1.00m: becoming mottled pale grey, trace fine grained sand			
				1.45m 1.50m SPT 3,5,6 N=11	229.5	1.5			1.50m: becoming pale brown			
				1.95m	229.0	2.0		CH		M		
				2.50m SPT 4,7,7 N=14	228.5	2.5			2.50m: becoming grey-brown, mottled red-brown		St	
				2.95m	228.0	3.0						
					227.5	3.5						
				4.00m	227.0	4.0						

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH29
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 530883.0, N: 6258830.0 (MGA94 Zone 55) SURFACE ELEVATION : 231.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 27/07/2018 DATE COMPLETED : 27/07/2018 DATE LOGGED : 27/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION VE F H VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5,8,10 N=18	231.0 / 4.0			**CLAY**: high plasticity, dark grey to grey-brown, trace fine grain sub-rounded gravel *(continued)*			**ALLUVIUM**
				4.45m	226.5 / 4.5			4.50m: becoming mottled yellow		VSt	
					226.0 / 5.0		CH		M		
				5.50m SPT 16,19,24 N=43	225.5 / 5.5			5.50m: becoming mottled red-brown, trace fine grained sand		H	5.50: bands of sandy silt recovered to 5.95m
				5.95m	225.0 / 6.0		5.95m	Hole Terminated at 5.95 m Target Depth			
					224.5 / 6.5						
					224.0 / 7.0						
					223.5 / 7.5						
					223.0 / 8.0						

METHOD
HA Hand auger
AS Auger screwing
ADV Auger drilling with V bit
ADT Auger drilling with TC bit
HF Hollow flight auger
WB Wash-bore drilling
RR Rock roller
SD Sonic drilling
NDD Non destructive drilling
PT Continuous push tub
HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
dd/mm/yy Level on Date shown
Drilling water level
water inflow
water outflow

SAMPLES & FIELD TESTS
B Bulk Disturbed Sample
D Disturbed Sample
U Undisturbed Sample
ES Environmental Sample
W Water Sample
HP Hand Penetrometer (kPa)
SPT Standard Penetration Test
N Result of SPT (*=sample taken)
R Hammer Bouncing / Refusal
U50 Undisturbed Sample (50mm dia)
U75 Undisturbed Sample (75mm dia)
VS Vane Shear; peak/remouded(kPa)
PT Push Tube
MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D Dry
M Moist
W Wet
PL Plastic limit
LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH30
PROJECT NUMBER : 30041768
SHEET : 1 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529338.0, N: 6258643.0 (MGA94 Zone 55) SURFACE ELEVATION : 234.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING							MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	PENETRATION (VE, F, VH)	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered		234.0	0.0		CH	**Sandy CLAY**: high plasticity, grey-brown, fine grain sand, with rootlets	D		**TOPSOIL** 0.10: disturbed natural topsoil to 0.2 m
				0.50m SPT 1 5,6,6 N=12	233.5	0.5			0.20m **CLAY**: high plasticity, dark grey-brown to brown, mottled orange	D to M	St	**ALLUVIUM** 0.30: trace rootlets to 1 m
				0.95m 1.00m SPT 2 5,6,7 N=13	233.0	1.0			1.00m: becoming mottled red-brown			
				1.45m 1.50m SPT 3 5,7,8 N=15	232.5	1.5			1.50m: becoming pale grey-brown, mottled red, trace fine grained sand			1.50: bands of sandy silt to 5.95m
				1.95m	232.0	2.0		CH		M		
				2.50m SPT 4 8,13,16 N=29	231.5	2.5					VSt	
				2.95m	231.0	3.0						
					230.5	3.5						
				3.80m SPT 5 16,25,29 N=54	230.0	4.0					H	

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

NON-CORE DRILL HOLE - ENGINEERING LOG

HOLE NO : BH30
PROJECT NUMBER : 30041768
SHEET : 2 OF 2
FINAL DEPTH : 5.95 m

CLIENT : Lightsource BP
LOCATION : Wyalong West
PROJECT: Wyalong Solar Farm

POSITION : E: 529338.0, N: 6258643.0 (MGA94 Zone 55) SURFACE ELEVATION : 234.00 (AHD) INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : HYNDAGH MOUNTING : 4WD CONTRACTOR : APEX DRILLING HOLE DIA : 100 mm

DATE STARTED : 25/07/2018 DATE COMPLETED : 25/07/2018 DATE LOGGED : 25/07/2018 LOGGED BY : AS CHECKED BY : SC

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	VE F PENETRATION VH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL ELEVATION / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
ADV	No Fluid		Not Encountered	SPT 5 16,25,29 N=54 4.25m	234.0 / 0.0 229.5 / 4.5 229.0 / 5.0		CH	**CLAY**: high plasticity, dark grey-brown to brown, mottled orange *(continued)*	M	H	**ALLUVIUM**
				5.50m SPT 6 4,10,19 N=29	228.5 / 5.5					VSt	
				5.95m	228.0 / 6.0 227.5 / 6.5 227.0 / 7.0 226.5 / 7.5 226.0 / 8.0			5.95m Hole Terminated at 5.95 m Target Depth			

METHOD
- HA Hand auger
- AS Auger screwing
- ADV Auger drilling with V bit
- ADT Auger drilling with TC bit
- HF Hollow flight auger
- WB Wash-bore drilling
- RR Rock roller
- SD Sonic drilling
- NDD Non destructive drilling
- PT Continuous push tub
- HAND Hand methods

PENETRATION
VE E F H VH
No Resistance
Very Hard / Refusal

WATER
- dd/mm/yy Level on Date shown
- Drilling water level
- water inflow
- water outflow

SAMPLES & FIELD TESTS
- B Bulk Disturbed Sample
- D Disturbed Sample
- U Undisturbed Sample
- ES Environmental Sample
- W Water Sample
- HP Hand Penetrometer (kPa)
- SPT Standard Penetration Test
- N Result of SPT (*=sample taken)
- R Hammer Bouncing / Refusal
- U50 Undisturbed Sample (50mm dia)
- U75 Undisturbed Sample (75mm dia)
- VS Vane Shear; peak/remouded(kPa)
- PT Push Tube
- MC Moisture Content

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D Dry
- M Moist
- W Wet
- PL Plastic limit
- LL Liquid limit

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fb	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC NON-CORED BOREHOLE 30041768 - WYALONG SOLAR FARM 02082018 - SK_NR.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

Appendix D Laboratory Results

CHADWICK GEOTECHNICS

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Report No: MAT:S18DS-08702/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025 – Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH01, 0.5 - 1.0m
Field Sample ID	1
Date Sampled	26/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08702

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	11.9	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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CHADWICK GEOTECHNICS

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DANDENONG SOUTH, VIC 3175

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Report No: MAT:S18DS-08704/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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(Melbourne Lab Supervisor)
12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH03, 0.5 - 0.6m
Field Sample ID	3
Date Sampled	26/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08704

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	23.9	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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Report No: MAT:S18DS-08705/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Sample Details

Location	West Wyalong
Sample Location	BH05, 0.5 - 1.0m
Field Sample ID	4
Date Sampled	25/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08705

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.0	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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Report No: MAT:S18DS-08707/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Sample Details

Location	West Wyalong
Sample Location	BH08, 0.5 - 1.0m
Field Sample ID	6
Date Sampled	26/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08707

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	22.1	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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Report No: MAT:S18DS-08708/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Sample Details

Location	West Wyalong
Sample Location	BH10, 0.4 - 0.6m
Field Sample ID	7
Date Sampled	26/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08708

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.4	
Emerson Class Number	AS 1289.3.8.1	3	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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Report No: MAT:S18DS-08709/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH12, 0.5 - 0.6m
Field Sample ID	8
Date Sampled	26/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08709

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	24.5	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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CHADWICK GEOTECHNICS

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Report No: MAT:S18DS-08710/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
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12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH16, 0.5 - 1.0m
Field Sample ID	9
Date Sampled	26/07/2018
Source	In-Situ
Material	Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08710

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	22.5	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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CHADWICK GEOTECHNICS

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Report No: MAT:S18DS-08713/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025 – Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: J. Lamont
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12712 Date of Issue: 9/08/2018

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Location	West Wyalong
Sample Location	BH26, 0.5 - 0.6m
Field Sample ID	12
Date Sampled	26/07/2018
Source	In-Situ
Material	Sand
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08713

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	7.6	
Emerson Class Number	AS 1289.3.8.1	5	
Soil Description		Sand	
Type of Water		Distilled	
Temperature of Water (°C)		18.0	

Comments

N/A

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CHADWICK GEOTECHNICS

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Report No: MAT:S18DS-08727/1
Issue No: 2
This report replaces all previous issues of report no 'MAT:S18DS-08727/1'.

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025 – Testing

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
Date of Issue: 9/08/2018

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Sample Details

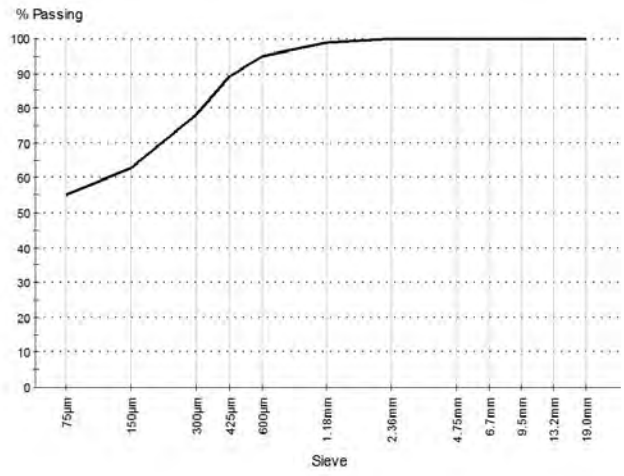
Location	West Wyalong
Sample Location	BH26, 1.0m
Field Sample ID	2
Date Sampled	6/07/2018
Source	In-Situ
Material	Sandy CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08727

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	10.7	

Particle Size Distribution

AS 1289.3.6.1



Drying by: Oven
Date Tested:

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	95	
425µm	89	
300µm	78	
150µm	63	
75µm	55	

Comments

N/A

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CHADWICK GEOTECHNICS

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Report No: MAT:S18DS-08730/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
Date of Issue: 9/08/2018

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Sample Details

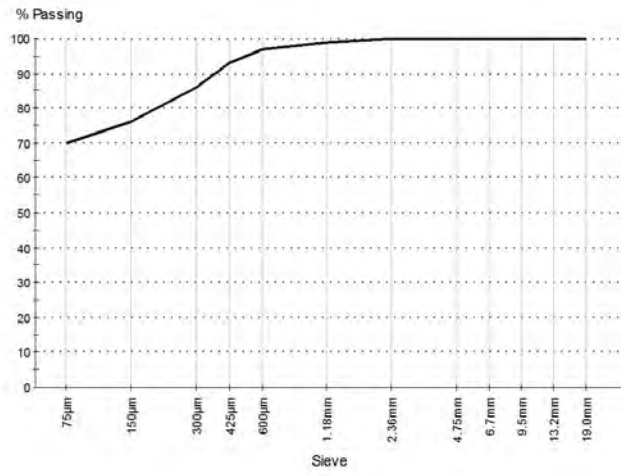
Location	West Wyalong
Sample Location	BH17, 0.5m
Field Sample ID	5
Date Sampled	27/07/2018
Source	In-Situ
Material	Clay with Sand
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08730

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	15.7	

Particle Size Distribution

AS 1289.3.6.1



Drying by: Oven
Date Tested:

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	97	
425µm	93	
300µm	86	
150µm	76	
75µm	70	

Comments

N/A

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Report No: MAT:S18DS-08726/1
Issue No: 2
This report replaces all previous issues of report no 'MAT:S18DS-08726/1'.

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
12712 Date of Issue: 22/08/2018

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Sample Details

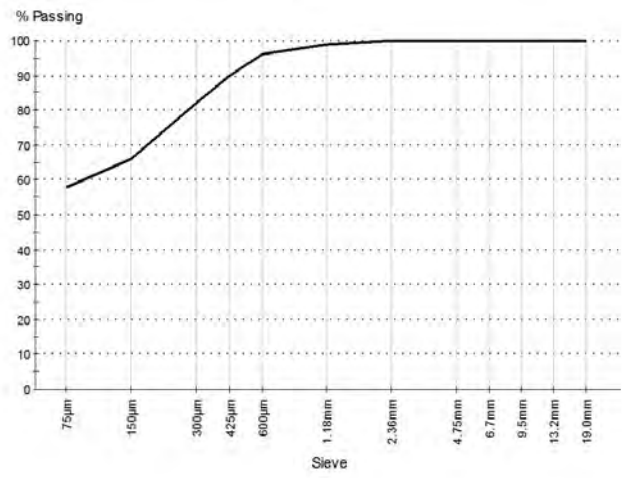
Location	West Wyalong
Sample Location	BH26, 0.5m
Field Sample ID	1
Date Sampled	26/07/2018
Source	In-Situ
Material	Sandy SILT
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08726

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	10.0	

Particle Size Distribution

AS 1289.3.6.1



Drying by: Oven
Date Tested:

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	96	
425µm	90	
300µm	82	
150µm	66	
75µm	58	

Comments

N/A

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Report No: MAT:S18DS-08728/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
Date of Issue: 22/08/2018

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Sample Details

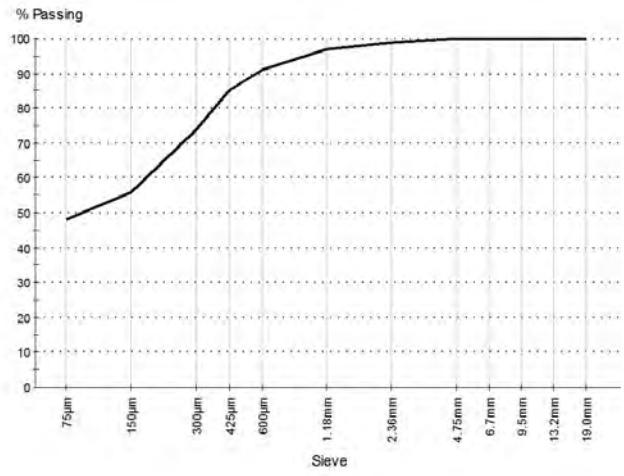
Location	West Wyalong
Sample Location	BH28, 0.5m
Field Sample ID	3
Date Sampled	26/07/2018
Source	In-Situ
Material	Sandy CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08728

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	10.5	

Particle Size Distribution

AS 1289.3.6.1



Drying by: Oven
Date Tested:

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	99	
1.18mm	97	
600µm	91	
425µm	85	
300µm	74	
150µm	56	
75µm	48	

Comments

N/A

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Report No: MAT:S18DS-08729/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
Date of Issue: 22/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH18, 1.0m
Field Sample ID	4
Date Sampled	27/07/2018
Source	In-Situ
Material	Silty Clay
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08729

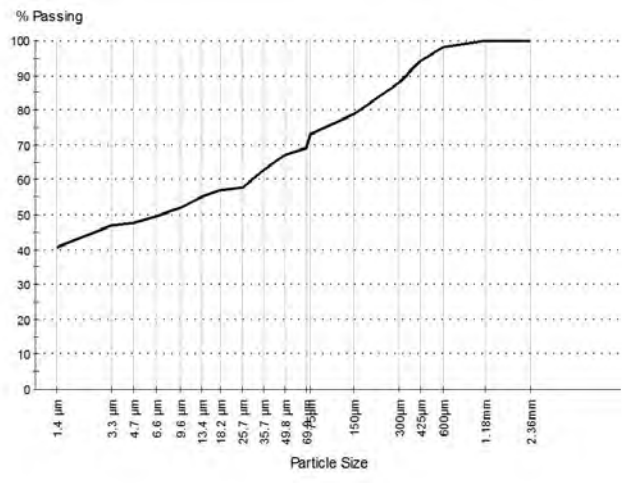
Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	13.7	
Hydrometer Type	AS 1289.3.6.3	g/L	
Dispersion Method		Mechanical stirrer	

Particle Size Distribution

AS 1289.3.6.3

Drying by: Oven
Date Tested:



Particle Size	% Passing	Limits
2.36mm	100	
1.18mm	100	
600µm	98	
425µm	94	
300µm	88	
150µm	79	
75µm	73	
69.9 µm	69	
49.8 µm	67	
35.7 µm	63	
25.7 µm	58	
18.2 µm	57	
13.4 µm	55	
9.6 µm	52	
6.6 µm	50	
4.7 µm	48	
3.3 µm	47	
1.4 µm	41	

Comments

N/A

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Report No: MAT:S18DS-08736/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH03, 0.5m
Field Sample ID	11
Date Sampled	26/07/2018
Source	In-Situ
Material	CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08736

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	18.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	65	
Plastic Limit (%)	AS 1289.3.2.1	22	
Plasticity Index (%)	AS 1289.3.3.1	43	

Comments

N/A

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Report No: MAT:S18DS-08737/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH05, 0.5m
Field Sample ID	12
Date Sampled	25/07/2018
Source	In-Situ
Material	CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08737

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	20.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	67	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	49	

Comments

N/A

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Report No: MAT:S18DS-08738/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH10, 0.5m
Field Sample ID	13
Date Sampled	26/07/2018
Source	In-Situ
Material	CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08738

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	22.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	78	
Plastic Limit (%)	AS 1289.3.2.1	19	
Plasticity Index (%)	AS 1289.3.3.1	59	

Comments

N/A

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Report No: MAT:S18DS-08739/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH12, 0.5m
Field Sample ID	14
Date Sampled	26/07/2018
Source	In-Situ
Material	CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08739

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	20.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	78	
Plastic Limit (%)	AS 1289.3.2.1	21	
Plasticity Index (%)	AS 1289.3.3.1	57	

Comments

N/A

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Report No: MAT:S18DS-08740/1
Issue No: 1

Material Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: J. Lamont
(Melbourne Lab Supervisor)
12712 Date of Issue: 9/08/2018

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Sample Details

Location	West Wyalong
Sample Location	BH16, 0.5m
Field Sample ID	15
Date Sampled	26/07/2018
Source	In-Situ
Material	CLAY
Specification	AS Grading
Sampling Method	Submitted by client
Sample ID	S18DS-08740

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	20.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	58	
Plastic Limit (%)	AS 1289.3.2.1	19	
Plasticity Index (%)	AS 1289.3.3.1	39	

Comments

N/A

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MOISTURE CONTENT REPORT

Customer: SMEC
Customer Address: Level 10, 71 Queens Road, MELBOURNE, VIC
Project: Wyalong Solar Farm
Location: West Wyalong
Customer Order No.: 30041768

Report Number: **W18DS02263**
Report Date: 09/08/18
CG Job No: 1007949
Test Method: AS 1289 2.1.1
Page: 1 of 1

Testing performed and reported at our Dandenong South Laboratory 12712

Sample No.:	S18DS-08731	S18DS-08732	S18DS-08733	S18DS-08734	S18DS-08735					
ID No.:	1	2	3	4	5					
Lot No.:	-	-	-	-	-					
Date Sampled:	28/07/2018	28/07/2018	28/07/2018	28/07/2018	28/07/2018					
Time Sampled:	am/pm	am/pm	am/pm	am/pm	am/pm					
Date Tested:	2/08/2018	2/08/2018	2/08/2018	2/08/2018	2/08/2018					
Material Source:	In-situ	In-situ	In-situ	In-situ	In-situ					
Material Description:	CLAY	CLAY	CLAY	CLAY	CLAY					
To Be Used As:	Material Analysis	Material Analysis	Material Analysis	Material Analysis	Material Analysis					
Sample Location :	BH16 1.0m	BH26 4.0m	BH18 4.0m	BH04 2.5m	BH12 4.0m					
Layer Depth (mm):	-	-	-	-	-					
Test Depth (mm):	-	-	-	-	-					
Sampling Procedure:	Client Sampled	Client Sampled	Client Sampled	Client Sampled	Client Sampled					
Moisture Content (%):	**21.9**	**23.5**	**18.9**	**21.5**	**24.3**					

Remarks:

ilac-MRA NATA Accreditation No. 12719

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APPROVED SIGNATORY

J Lamont

Form No.: **CG.319.003**

Issue Date: 16/06/2018

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DANDENONG SOUTH, VIC 3175

Ph: + 61 3 8796 7900
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Report No: CBR:S18DS-08702
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
12712 Date of Issue: 21/08/2018

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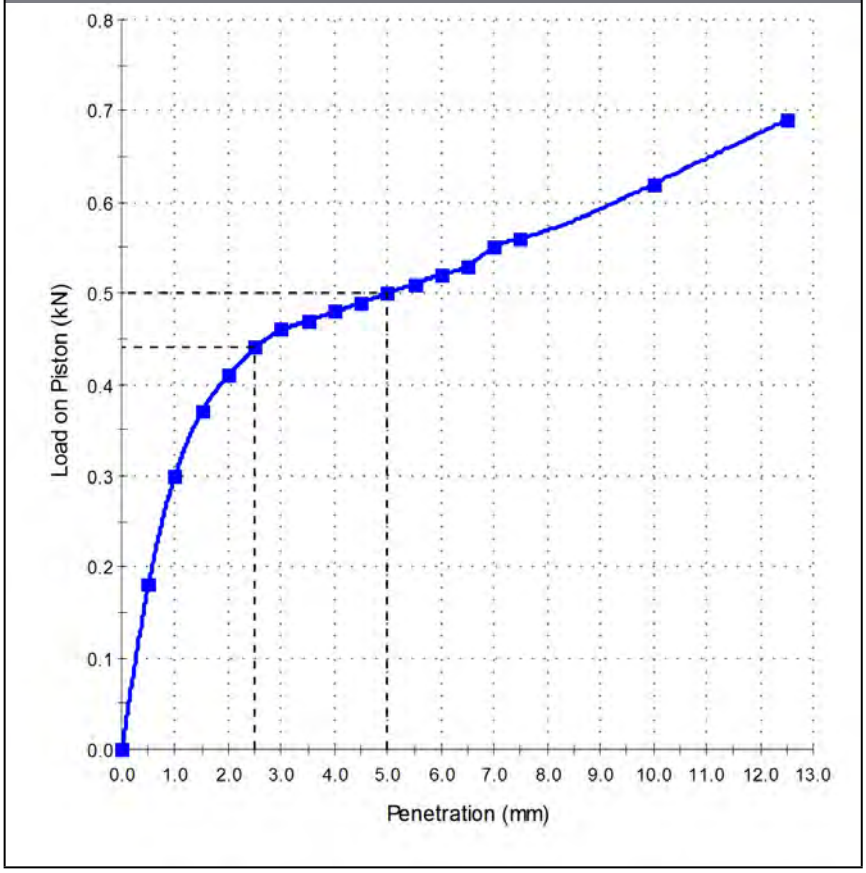
Sample Details

Sample ID: S18DS-08702
Sampled By: Client
Location: BH01, 0.5 - 1.0m
Date Tested: 14/08/2018
Date Sampled: 26/07/2018
Material: Clay
Tested By: C. Ranaraja

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**3.5**
Maximum Dry Density (t/m³):	1.81
Optimum Moisture Content (%):	15.5
Dry Density before Soaking (t/m³):	1.76
Density Ratio before Soaking (%):	97.5
Moisture Content before Soaking (%):	15.5
Moisture Ratio before Soaking (%):	100.5
Dry Density after Soaking (t/m³):	1.71
Density Ratio after Soaking (%):	94.5
Swell (%):	3.0
Moisture Content of Top 30mm (%):	22.4
Compactive Effort:	Standard AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	07/ 08/ 2018 00:00
Date/Time Cure End:	10/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08704
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
Date of Issue: 21/08/2018

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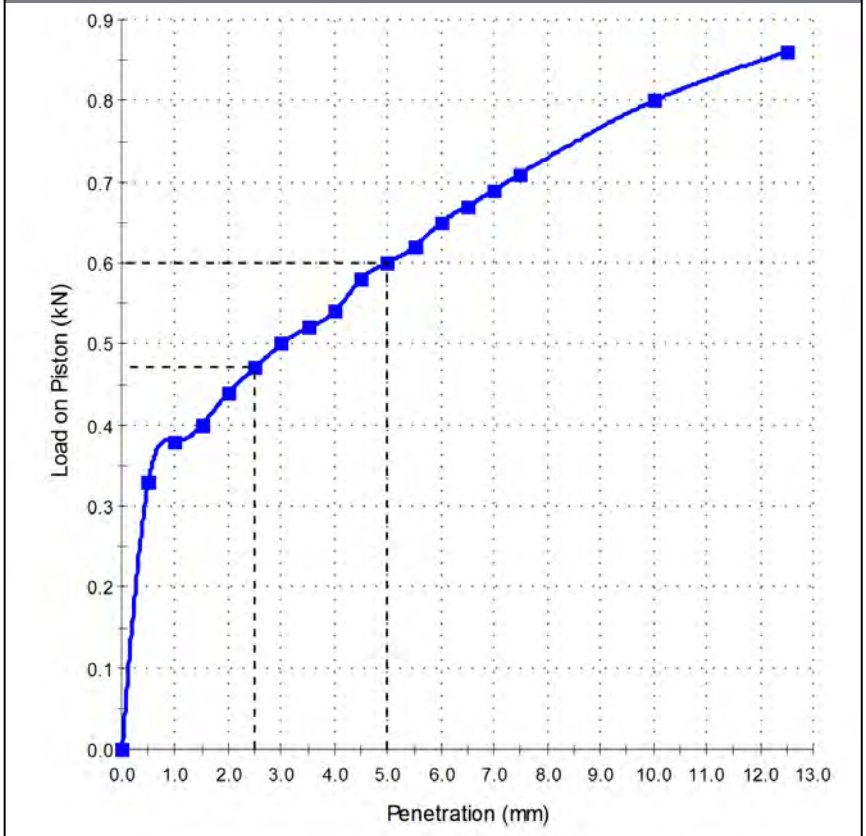
Sample Details

Sample ID: S18DS-08704
Sampled By: Client
Location: BH03, 0.5 - 0.6m
Date Tested: 21/08/2018
Date Sampled: 26/07/2018
Material: Clay
Tested By: C. Veal

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**3.5**
Maximum Dry Density (t/m³):	1.57
Optimum Moisture Content (%):	23.5
Dry Density before Soaking (t/m³):	1.53
Density Ratio before Soaking (%):	97.0
Moisture Content before Soaking (%):	23.7
Moisture Ratio before Soaking (%):	100.0
Dry Density after Soaking (t/m³):	1.51
Density Ratio after Soaking (%):	96.0
Swell (%):	1.0
Moisture Content of Top 30mm (%):	25.8
Compactive Effort:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	13/ 08/ 2018 00:00
Date/Time Cure End:	16/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08705
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025 – Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

12712

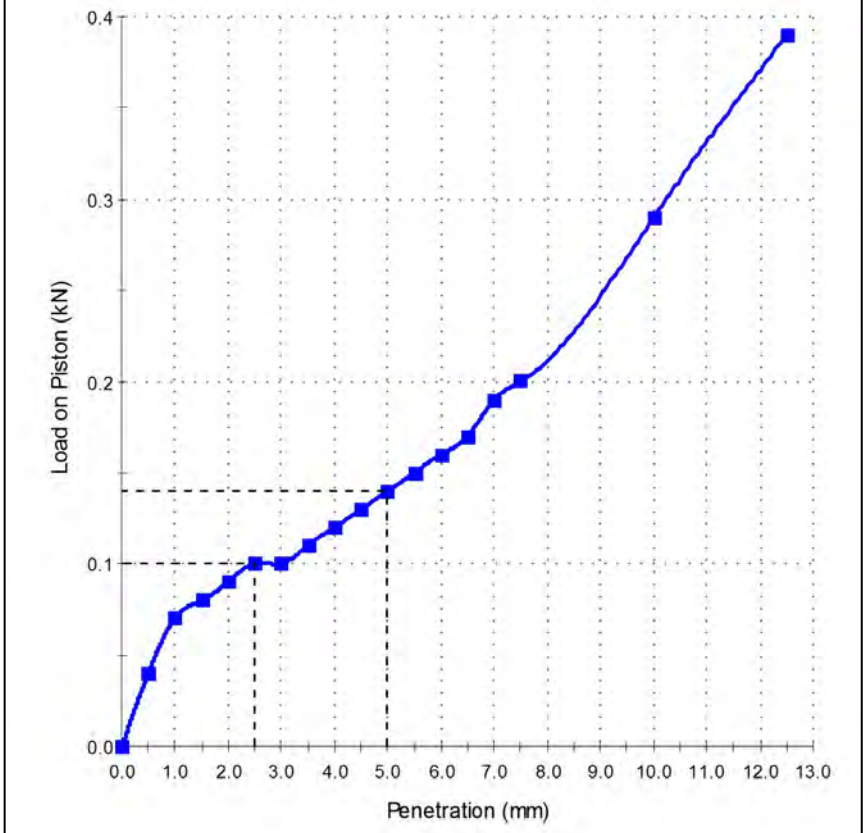
Approved Signatory: M. Robinson
(Senior Technician)
Date of Issue: 21/08/2018

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: S18DS-08705
Sampled By: Client
Location: BH05, 0.5 - 1.0m
Date Tested: 13/08/2018
Date Sampled: 25/07/2018
Material: Clay
Tested By: C. Ranaraja

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**1.0**
Maximum Dry Density (t/m³):	1.64
Optimum Moisture Content (%):	20.5
Dry Density before Soaking (t/m³):	1.61
Density Ratio before Soaking (%):	98.5
Moisture Content before Soaking (%):	20.0
Moisture Ratio before Soaking (%):	98.5
Dry Density after Soaking (t/m³):	1.55
Density Ratio after Soaking (%):	95.0
Swell (%):	3.5
Moisture Content of Top 30mm (%):	27.4
Compactive Effort:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	06/ 08/ 2018 00:00
Date/Time Cure End:	09/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08707
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
Date of Issue: 21/08/2018

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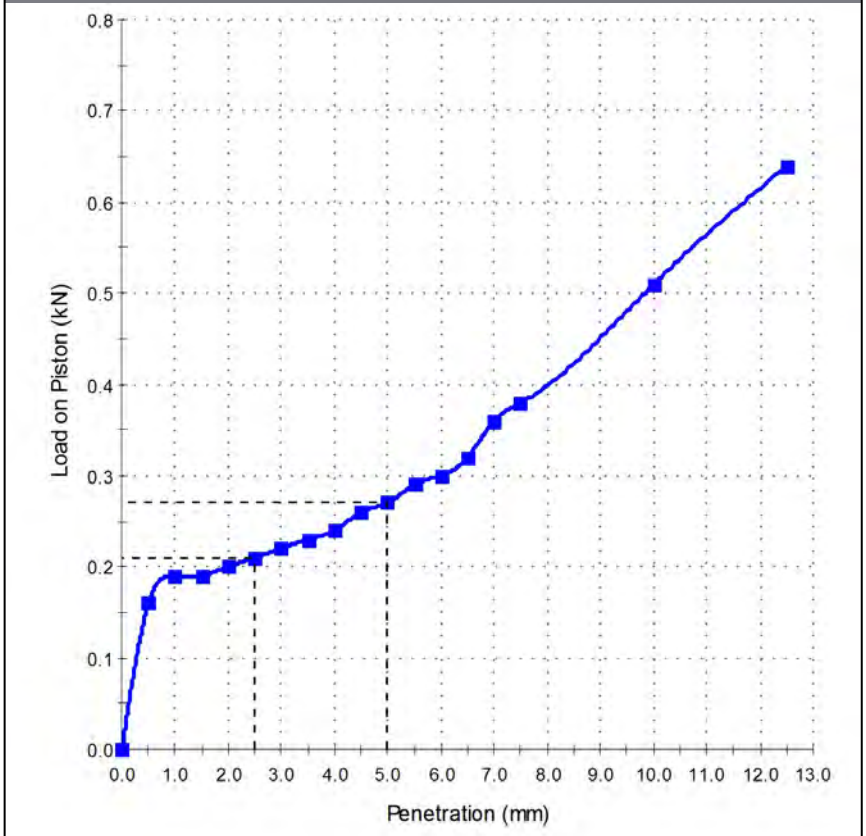
Sample Details

Sample ID: S18DS-08707
Sampled By: Client
Location: BH08, 0.5 - 1.0m
Date Tested: 20/08/2018
Date Sampled: 26/07/2018
Material: Clay
Tested By: C. Veal

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**1.5**
Maximum Dry Density (t/m³):	1.56
Optimum Moisture Content (%):	24.0
Dry Density before Soaking (t/m³):	1.53
Density Ratio before Soaking (%):	97.5
Moisture Content before Soaking (%):	24.1
Moisture Ratio before Soaking (%):	100.0
Dry Density after Soaking (t/m³):	1.50
Density Ratio after Soaking (%):	96.0
Swell (%):	2.0
Moisture Content of Top 30mm (%):	28.7
Compactive Effort:	Standard AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	13/ 08/ 2018 00:00
Date/Time Cure End:	16/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08709
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
Date of Issue: 21/08/2018

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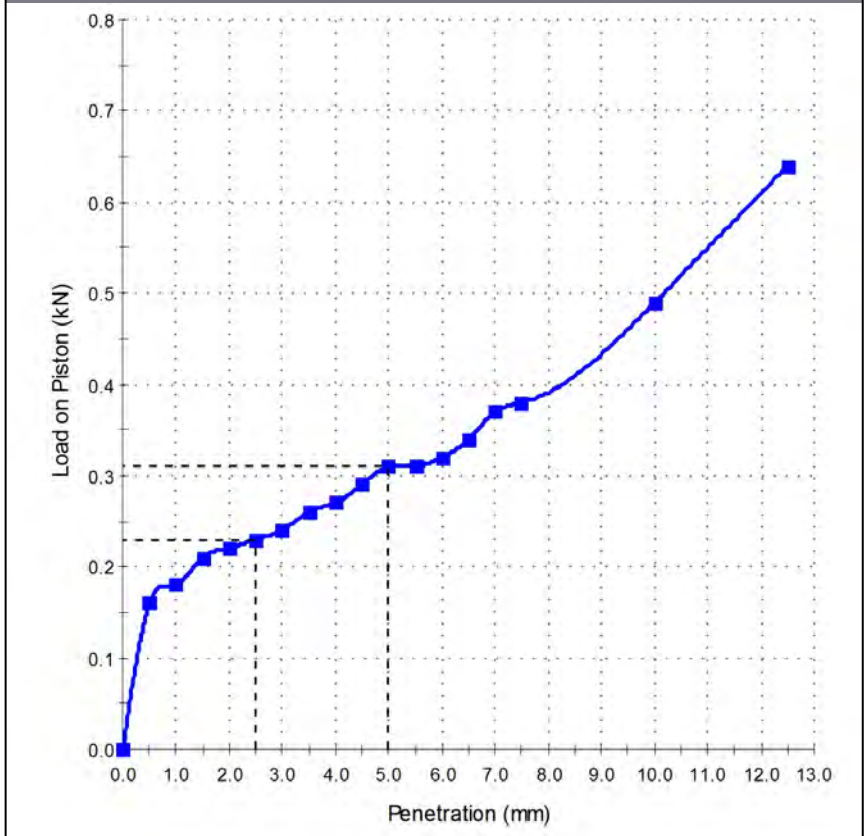
Sample Details

Sample ID: S18DS-08709
Sampled By: Client
Location: BH12, 0.5 - 0.6m
Date Tested: 20/08/2018
Date Sampled: 26/07/2018
Material: Clay
Tested By: C. Veal

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**1.5**
Maximum Dry Density (t/m³):	1.57
Optimum Moisture Content (%):	23.0
Dry Density before Soaking (t/m³):	1.53
Density Ratio before Soaking (%):	97.5
Moisture Content before Soaking (%):	23.3
Moisture Ratio before Soaking (%):	101.5
Dry Density after Soaking (t/m³):	1.50
Density Ratio after Soaking (%):	95.5
Swell (%):	2.5
Moisture Content of Top 30mm (%):	27.5
Compactive Effort:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	13/ 08/ 2018 00:00
Date/Time Cure End:	16/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08710
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
Date of Issue: 21/08/2018

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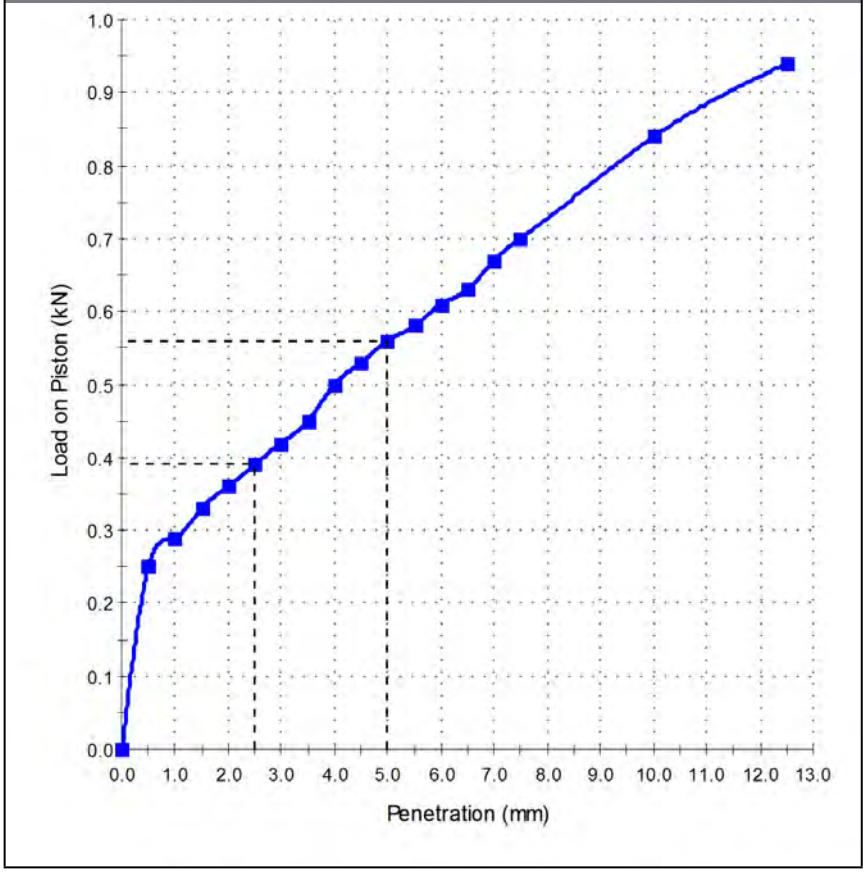
Sample Details

Sample ID: S18DS-08710
Sampled By: Client
Location: BH16, 0.5 - 1.0m
Date Tested: 13/08/2018
Date Sampled: 26/07/2018
Material: Clay
Tested By: C. Ranaraja

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**3.0**
Maximum Dry Density (t/m³):	1.62
Optimum Moisture Content (%):	21.0
Dry Density before Soaking (t/m³):	1.60
Density Ratio before Soaking (%):	99.0
Moisture Content before Soaking (%):	20.2
Moisture Ratio before Soaking (%):	96.0
Dry Density after Soaking (t/m³):	1.57
Density Ratio after Soaking (%):	97.0
Swell (%):	2.0
Moisture Content of Top 30mm (%):	24.7
Compactive Effort:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	07/ 08/ 2018 00:00
Date/Time Cure End:	09/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08712
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
12712 Date of Issue: 21/08/2018

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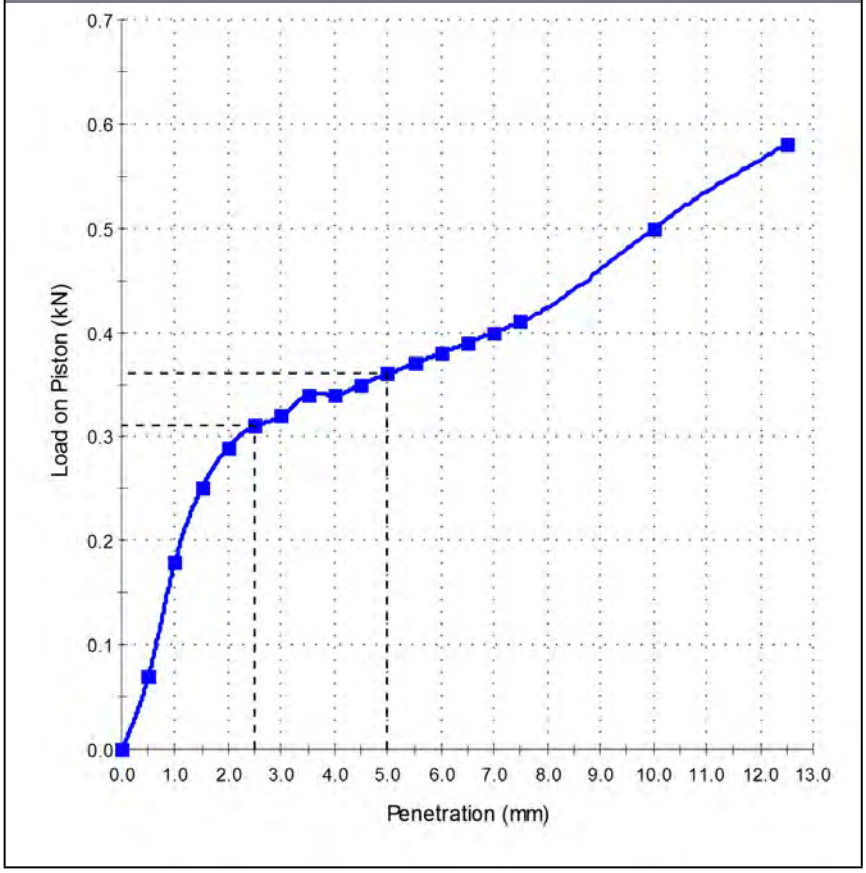
Sample Details

Sample ID: S18DS-08712
Sampled By: Client
Location: BH21, 0.5 - 1.0m
Date Tested: 13/08/2018
Date Sampled: 26/07/2018
Material: Clay
Tested By: C. Ranaraja

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**2.5**
Maximum Dry Density (t/m³):	1.76
Optimum Moisture Content (%):	16.0
Dry Density before Soaking (t/m³):	1.74
Density Ratio before Soaking (%):	98.5
Moisture Content before Soaking (%):	15.8
Moisture Ratio before Soaking (%):	99.5
Dry Density after Soaking (t/m³):	1.69
Density Ratio after Soaking (%):	95.5
Swell (%):	3.0
Moisture Content of Top 30mm (%):	21.5
Compactive Effort:	Standard AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	07/ 08/ 2018 00:00
Date/Time Cure End:	09/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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Report No: CBR:S18DS-08713
Issue No: 1

California Bearing Ratio Test Report

Client: SMEC
Address: Level 10, 71 Queens Road
MELBOURNE VIC 3004
Project: Wyalong Solar Farm
Project No.: 1007949
Order No.: **CG Request No.:**
TRN: **Lot No.:**

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Approved Signatory: M. Robinson
(Senior Technician)
12712 Date of Issue: 21/08/2018

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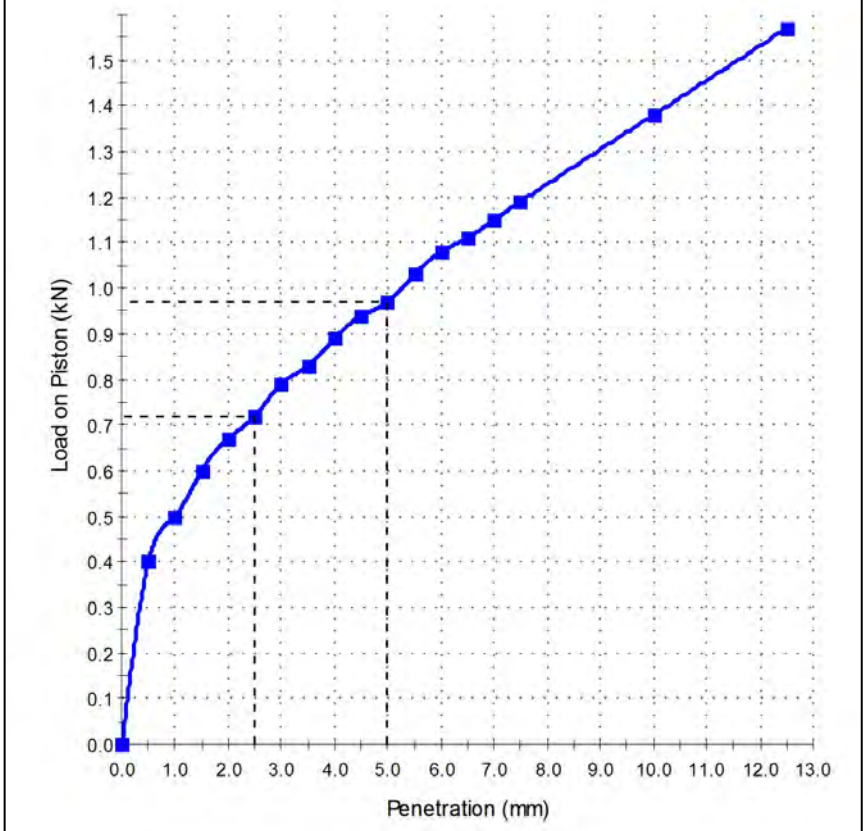
Sample Details

Sample ID: S18DS-08713
Sampled By: Client
Location: BH26, 0.5 - 0.6m
Date Tested: 13/08/2018
Date Sampled: 26/07/2018
Material: Sand
Tested By: C. Ranaraja

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2014

CBR At 2.5mm (%):	**5**
Maximum Dry Density (t/m³):	1.97
Optimum Moisture Content (%):	10.5
Dry Density before Soaking (t/m³):	1.93
Density Ratio before Soaking (%):	98.0
Moisture Content before Soaking (%):	10.3
Moisture Ratio before Soaking (%):	98.5
Dry Density after Soaking (t/m³):	1.91
Density Ratio after Soaking (%):	97.0
Swell (%):	1.0
Moisture Content of Top 30mm (%):	15.0
Compactive Effort:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Date/Time Cure Start:	08/ 08/ 2018 00:00
Date/Time Cure End:	09/ 08/ 2018 00:00

Comments

The Liquid Limit used for determining the curing period, AS1289.6.1.1 Clause 5.2d (iii): estimated base on a competent experienced soil technician's visual/tactile assessment of the material

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CHADWICK GEOTECHNICS

Thermal Resistivity Dryout Curve Report

Customer: SMEC
Customer Address: Level 10, 71 Queens Rd Melbourne VIC 3004
Project: Wyalong Solar Farm
Project Location: Wyalong
Customer Request No.: 30041768

Report No: W18DS02259
CG Project No: **1007949**
Report Date: 21/08/18
Test Method: TR LAB.2013 (In-House)
Page: 1 of 3

Testing performed and reported at our Dandenong South Laboratory

Sample No: S18DS-08703 **Date Moulded:** 13/08/2018

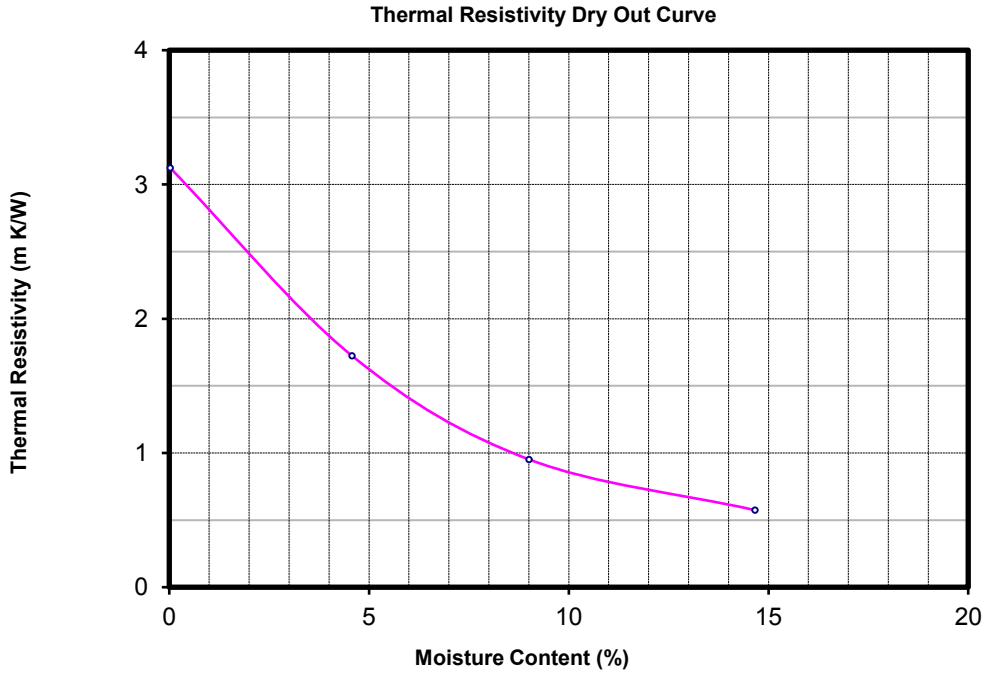
Client Sample ID: 2
Sample Location: BH01 @ 1.0-1.5m
Date Sampled: 26/07/2018

Sampling Procedure: As Received
Sample Description: CLAY
Sample History: Remoulded

Maximum Dry Density (t/m^3): 1.81
Optimum Moisture Content(%): 14.8
Moulded Moisture Content (%): 14.7

Achieved Density Ratio (%): 95.5
Achieved Moisture Ratio (%): 99.0

Moisture Content (%)	Compacted Dry Density t/m^3	Thermal Conductivity (W / m K)	Thermal Resistivity (m K / W)
0.0	---	0.32	3.13
4.6	---	0.58	1.72
9.0	---	1.05	0.95
14.7	**1.72**	1.74	0.57



Resistivity Meter: **TC1396** Needle ID.: **0239** Needle Resistance: **82.93 Ohm/m**

Remarks:

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APPROVED SIGNATORY

J Lamont

Head Office:
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Ph: +61 8796 7900

CHADWICK GEOTECHNICS

Thermal Resistivity Dryout Curve Report

Customer: SMEC
Customer Address: Level 10, 71 Queens Rd Melbourne VIC 3004
Project: Wyalong Solar Farm
Project Location: Wyalong
Customer Request No.: 30041768

Report No: W18DS02259
CG Project No: **1007949**
Report Date: 21/08/18
Test Method: TR LAB.2013 (In-House)

Testing performed and reported at our Dandenong South Laboratory

Sample No: S18DS-08706 **Date Moulded:** 14/08/2018

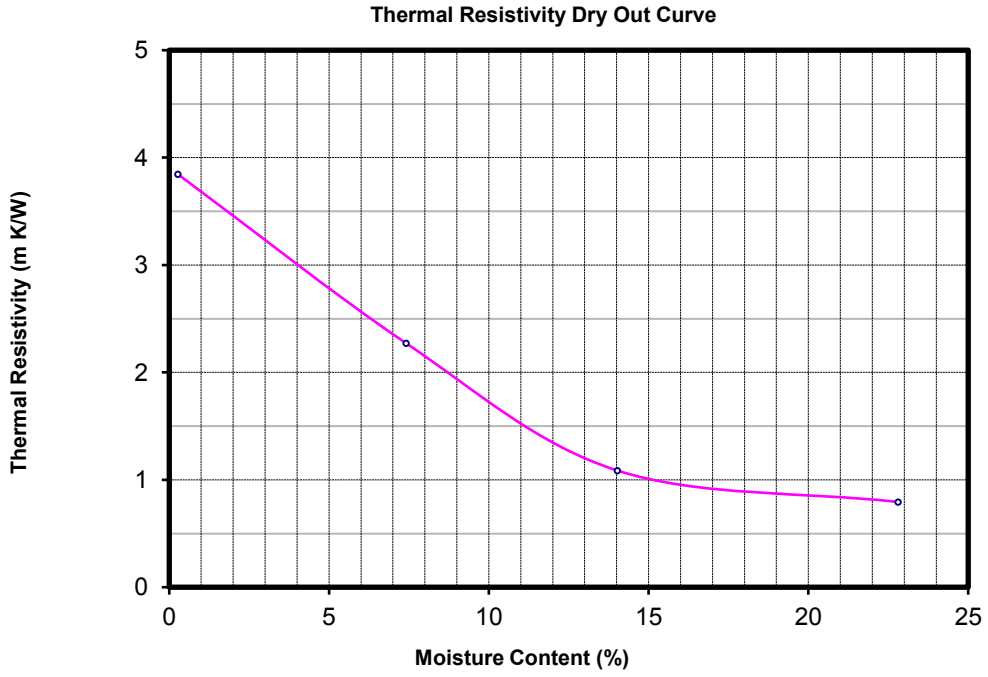
Client Sample ID: 5
Sample Location: BH05 @ 1.0-1.5m
Date Sampled: 25/07/2018

Sampling Procedure: As Received
Sample Description: CLAY
Sample History: Remoulded

Maximum Dry Density (t/m^3): 1.58
Optimum Moisture Content(%): 23.1
Moulded Moisture Content (%): 22.8

Achieved Density Ratio (%): 95.5
Achieved Moisture Ratio (%): 98.5

Moisture Content (%)	Compacted Dry Density t/m^3	Thermal Conductivity (W / m K)	Thermal Resistivity (m K / W)
0.3	---	0.26	3.85
7.4	---	0.44	2.27
14.0	---	0.92	1.09
22.8	**1.51**	1.26	0.79



Resistivity Meter: **TC1396** Needle ID.: **0239** Needle Resistance: **82.93 Ohm/m**

Remarks:

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CHADWICK GEOTECHNICS

Thermal Resistivity Dryout Curve Report

Customer: SMEC
Customer Address: Level 10, 71 Queens Rd Melbourne VIC 3004
Project: Wyalong Solar Farm
Project Location: Wyalong
Customer Request No.: 30041768

Report No: W18DS02259
CG Project No: **1007949**
Report Date: 21/08/18
Test Method: TR LAB.2013 (In-House)
Page: 3 of 3

Testing performed and reported at our Dandenong South Laboratory

Sample No: S18DS-08711 **Date Moulded:** 8/08/2018

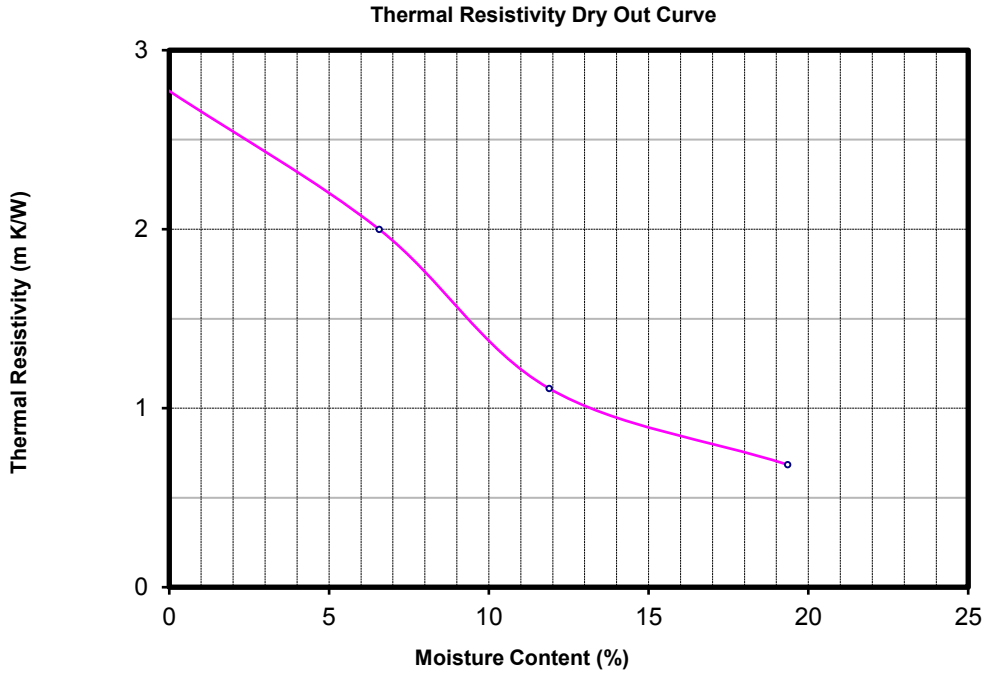
Client Sample ID: 10
Sample Location: BH16 @ 1.0-1.5m
Date Sampled: 26/07/2018

Sampling Procedure: As Received
Sample Description: CLAY
Sample History: Remoulded

Maximum Dry Density (t/m^3): 1.70
Optimum Moisture Content(%): 19.7
Moulded Moisture Content (%): 19.3

Achieved Density Ratio (%): 95.5
Achieved Moisture Ratio (%): 98.0

Moisture Content (%)	Compacted Dry Density t/m^3	Thermal Conductivity (W / m K)	Thermal Resistivity (m K / W)
0.0	---	0.36	2.78
6.6	---	0.50	2.00
11.9	---	0.90	1.11
19.3	**1.63**	1.46	0.68



Resistivity Meter: **TC1396** Needle ID.: **0239** Needle Resistance: **82.93 Ohm/m**

Remarks:

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Celebrating 30 years Testing and Protecting Human Health

Certificate of Analysis

SMEC Australia Pty Ltd
Level 10, 71 Queens Road
Melbourne
VIC 3004

NATA Accredited
Accreditation Number 1261
Site Number 1254

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Attention: **Nihad Rajabdeen**

Report **610075-S**
Project name WYALONG WEST SOLAR FARM
Project ID 30041768
Received Date Jul 31, 2018

Client Sample ID			**BH04**	**BH06**	**BH07**	**BH16**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-JI35695**	**M18-JI35696**	**M18-JI35697**	**M18-JI35698**
Date Sampled			**Jul 24, 2018**	**Jul 25, 2018**	**Jul 25, 2018**	**Jul 26, 2018**
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	700	380	6.9	590
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	380	380	48	370
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.0	7.9	7.4	7.4
Sulphate (as SO4)	30	mg/kg	210	120	< 30	180
% Moisture	1	%	21	12	3.5	17

Client Sample ID			**BH17**	**BH23**	**BH27**	**BH28**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-JI35699**	**M18-JI35700**	**M18-JI35701**	**M18-JI35702**
Date Sampled			**Jul 27, 2018**	**Jul 25, 2018**	**Jul 24, 2018**	**Jul 26, 2018**
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	42	630	38	330
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	190	430	110	290
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	6.4	4.8	6.3	8.4
Sulphate (as SO4)	30	mg/kg	< 30	120	< 30	72
% Moisture	1	%	4.5	16	3.7	15

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chloride	Melbourne	Aug 01, 2018	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Aug 01, 2018	7 Day
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Aug 01, 2018	7 Day
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Melbourne	Aug 01, 2018	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
% Moisture	Melbourne	Jul 31, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

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Address: Level 10, 71 Queens Road
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Project Name: WYALONG WEST SOLAR FARM
Project ID: 30041768

Order No.:
Report #: 610075
Phone: 03 9514 1500
Fax: 03 9514 1502

Received: Jul 31, 2018 1:15 PM
Due: Aug 7, 2018
Priority: 5 Day
Contact Name: Nihad Rajabdeen

Eurofins | mgt Analytical Services Manager : Cindi Guo

Sample Detail						Chloride	Conductivity (1:5 aqueous extract at 25°C as rec.)	pH (1:5 Aqueous extract at 25°C as rec.)	Sulphate (as SO4)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	BH04	Jul 24, 2018		Soil	M18-Jl35695	X	X	X	X	X
2	BH06	Jul 25, 2018		Soil	M18-Jl35696	X	X	X	X	X
3	BH07	Jul 25, 2018		Soil	M18-Jl35697	X	X	X	X	X
4	BH16	Jul 26, 2018		Soil	M18-Jl35698	X	X	X	X	X
5	BH17	Jul 27, 2018		Soil	M18-Jl35699	X	X	X	X	X
6	BH23	Jul 25, 2018		Soil	M18-Jl35700	X	X	X	X	X
7	BH27	Jul 24, 2018		Soil	M18-Jl35701	X	X	X	X	X
8	BH28	Jul 26, 2018		Soil	M18-Jl35702	X	X	X	X	X
Test Counts						8	8	8	8	8

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chloride	mg/kg	< 5			5	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Sulphate (as SO4)	mg/kg	< 30			30	Pass	
LCS - % Recovery							
Chloride	%	111			70-130	Pass	
Sulphate (as SO4)	%	103			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Sulphate (as SO4)	M18-Jl35646	NCP	%	93			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chloride	M18-Jl35698	CP	%	80			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25°C as rec.)	M18-Jl35658	NCP	pH Units	5.9	6.0	pass	30%	Pass	
Sulphate (as SO4)	M18-Au00058	NCP	mg/kg	< 30	< 30	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-Jl35699	CP	%	4.5	4.0	12	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Cindi Guo	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Michael Brancati	Senior Analyst-Inorganic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Appendix E Electrical Resistivity Testing Results

Wyalong Solar Farm

Soil Resistivity Report

Client	Lightsource BP
Site Location:	Wyalong Solar Farm
Document Number:	SMEC-WYG-REP-002

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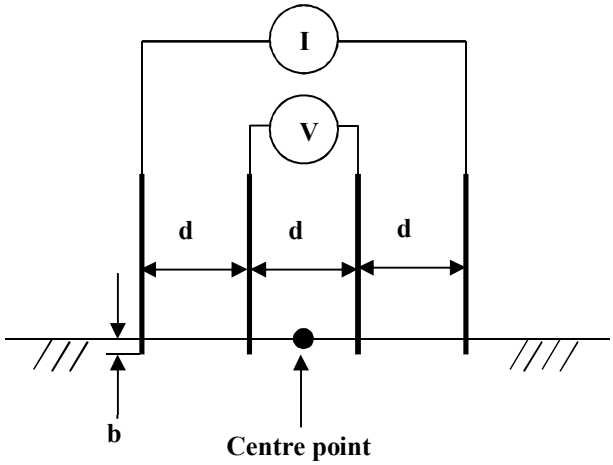
Test Methodology: 4 Pole Wenner Method

The Wenner Method was used to perform the soil resistivity tests, with the probe spacing and configuration indicated below:



The following steps are required for the Wenner method:

1. A centre point needs to be selected on the middle of the ground, which shall be marked, as this will be the reference point.
2. Four equally spaced earth electrodes to be inserted into the ground.
3. Ensure that the test electrodes are in a straight line and the inserted depth is no more than 1/20th of the electrode spacing. (b = d / 20)
4. Using appropriate testing equipment, current is injected into the earth via the two outer rods and the voltage between the two inner rods is measured.
5. The apparent soil resistivity shall be calculated. **($\rho = R_{mes} \times 2\pi \times d$)** and recorded in the tables provided in section.

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Soil Resistivity Test Results

Client: Lightsource BP

Location of Test:

Wyalong Solar Farm

Date of Tests:

21/08/18 & 22/08/18

Test Conditions

Weather: Cold and drizzle of rain. Constant soil moisture content at all different site locations.

All traverses completed in dry wheat fields.

Test Procedure: Four Pole Wenner Method

Equipment Used During Testing:	Serial Number:	Next Calibration Date:
AEMC 6472	193373QKDV	30 November 2018

Summary of Results:

- Substation measurements: Traverses 1 & 2 were completed (locations indicated Page 4) and using algorithm converted into a two (2) layer soil model as below:

Layer	Depth	Resistivity
1	0 – 0.431 m	28.91
2	0.431 m to infinite	6.86

- Field measurements: Traverses 3,4 & 5 were completed (locations indicated Page 4) using algorithm converted into a two (2) layer soil model as below:

Layer	Depth	Resistivity
1	0 – 0.276 m	68.35
2	0.276 m to infinite	5.34

Test Sheet Acceptance Sign Off:

SMEC Report Written by:		SMEC Report Approved by:	
Name:	Jess Ramakrishnan / David Townley	Name:	Malcolm Davies
Signature:		Signature:	
Date:	24/08/2018	Date:	24/08/2018

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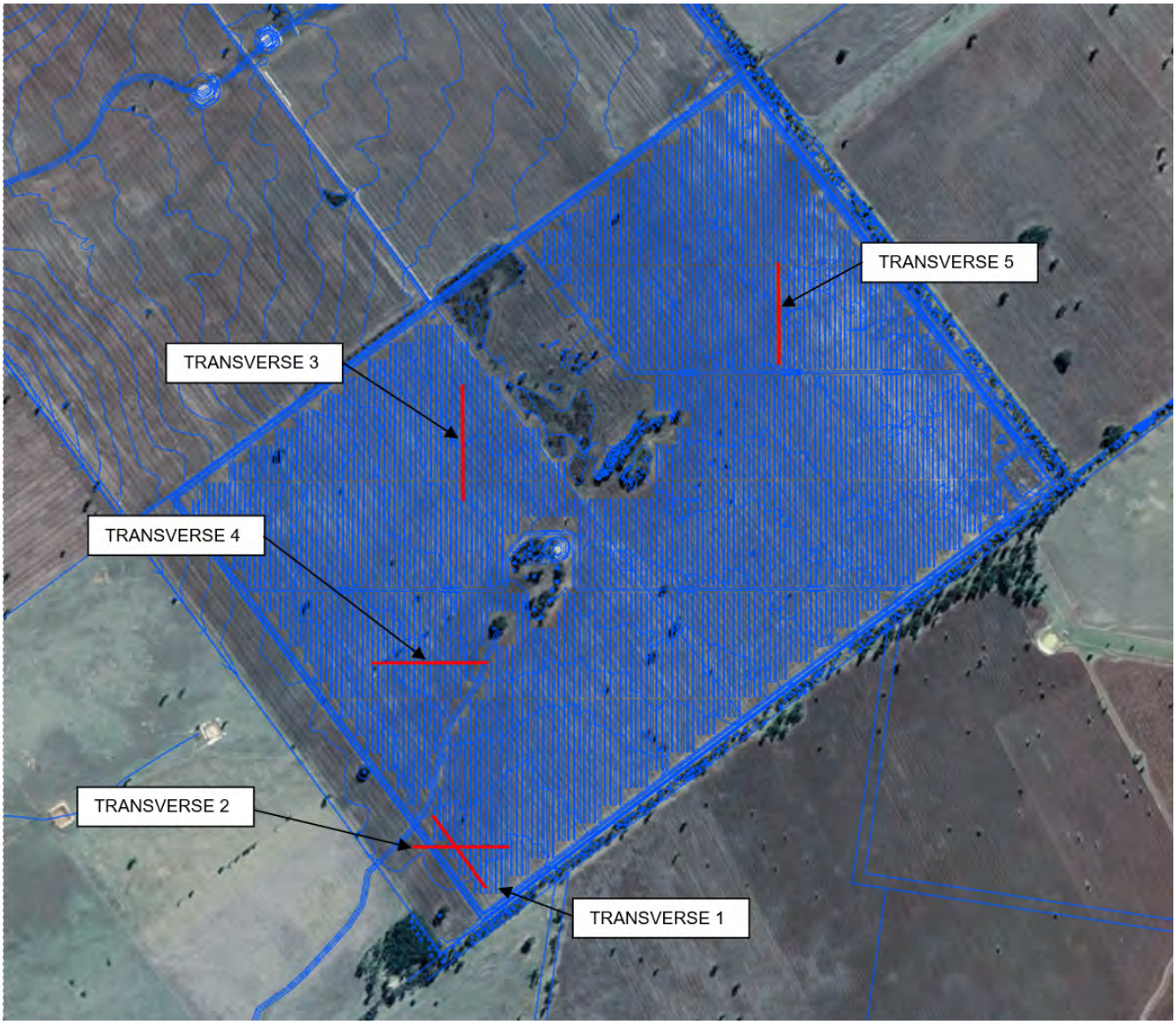
Test Location



Wyalong Solar Farm

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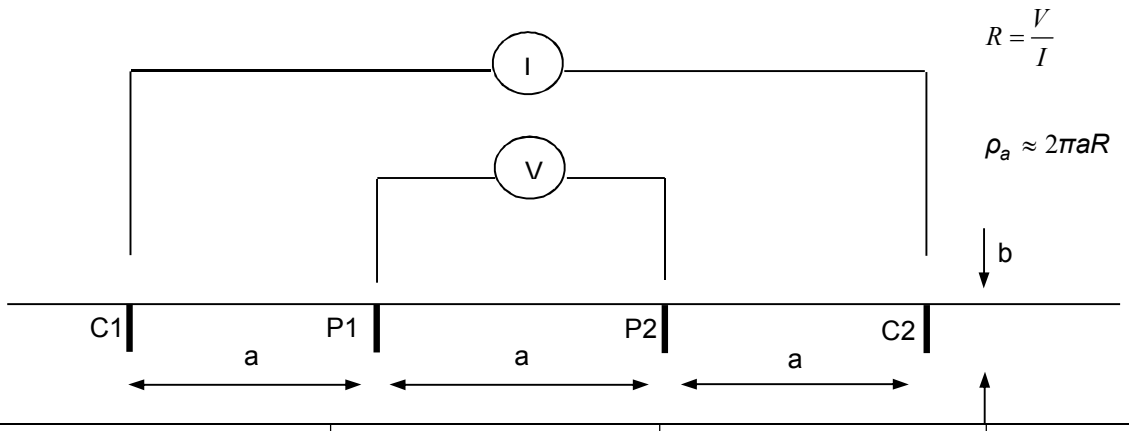
Test Sheet (Traverse #1)

Test Details	
Location:	Substation Centrepoint: WGS 84 529681E 6257971N N/W Corner End Point 1: WGS 84 529604E 6258059N N/W Corner End Point 2: WGS 84 529749E 6257876N
Traverse / Direction No:	Traverse 1, (at substation location)
Date:	21/08/17
Time (start):	1430H
Time (finish):	1630H
Test Conditions:	Dry wheat fields
Method:	Four Pole Wenner Method
Test Setup	
Instrument:	AEMC 6472
Calibration Data (last test, next test):	New machine – next calibration due : 28 October 2018
Max. voltage:	42V Peak
Max. current:	10mA
Frequency:	128Hz square wave
Measured Data	



a [m]	b [m]	Ω	ρ_a [Ω.m]
0.5	0.1	9.42	29.59
1	0.1	2.24	14.07
2	0.1	0.63	7.92
4	0.1	0.23	5.78
8	0.1	0.13	6.53
16	0.1	0.06	6.03
32	0.1	0.05	10.05
50	0.1	0.08	25.13
80	0.1	0.10	50.27

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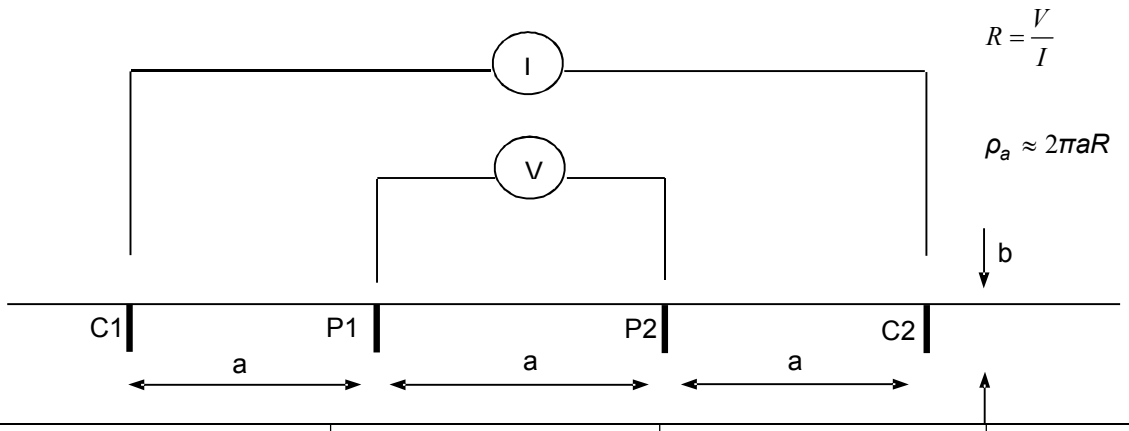
Test Sheet (Traverse #2)

Test Details	
Location:	Substation Centrepoint - WGS 84 529681E 6257971N N/E Corner End Point 1: WGS 84 529561E 6257968N N/E Corner End Point 2: WGS 84 529797E 6257963N
Traverse / Direction No:	Traverse 2 (at substation location)
Date:	21/08/18
Time (start):	1630H
Time (finish):	1730H
Test Conditions:	Dry wheat fields
Method:	Four Pole Wenner Method
Test Setup	
Instrument:	AEMC 6472
Calibration Data (last test, next test):	New machine – next calibration due : 28 October 2018
Max. voltage:	42V Peak
Max. current:	10mA
Frequency:	128Hz square wave
Measured Data	



$$R = \frac{V}{I}$$

$$\rho_a \approx 2\pi aR$$

a [m]	b [m]	Ω	ρ_a [Ω.m]
0.5	0.1	5.49	17.25
1	0.1	1.72	10.81
2	0.1	0.57	7.16
4	0.1	0.23	5.78
8	0.1	0.13	6.53
16	0.1	0.06	6.03
32	0.1	0.05	10.05
50	0.1	0.05	15.71
80	0.1	0.07	35.19

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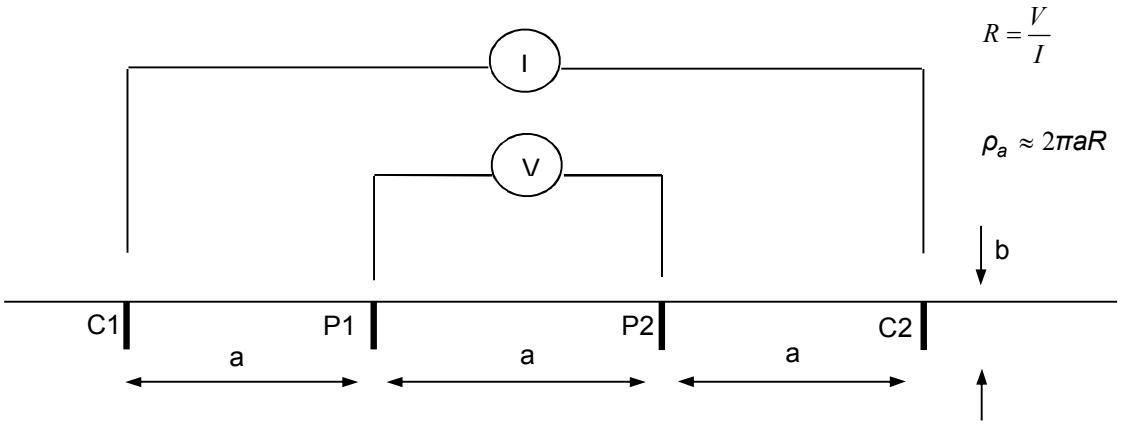
Test Sheet (Traverse #3)

Test Details	
Location:	Centrepoint: WGS 84 529651E 6259018N N-S Direction
Traverse / Direction No:	Traverse 3
Date:	22/08/18
Time (start):	0800H
Time (finish):	1000H
Test Conditions:	Dry wheat fields
Method:	Four Pole Wenner Method
Test Setup	
Instrument:	AEMC 6472
Calibration Data (last test, next test):	New machine – next calibration due : 28 October 2018
Max. voltage:	42V Peak
Max. current:	10mA
Frequency:	128Hz square wave
Measured Data	



$$R = \frac{V}{I}$$

$$\rho_a \approx 2\pi aR$$

a [m]	b [m]	Ω	ρ_a [Ω.m]
0.5	0.1	7.89	24.79
1	0.1	1.79	11.25
2	0.1	0.44	5.53
4	0.1	0.18	4.52
8	0.1	0.10	5.03
16	0.1	0.04	4.02
32	0.1	0.03	6.03
50	0.1	0.02	6.28
80	0.1	0.02	10.05

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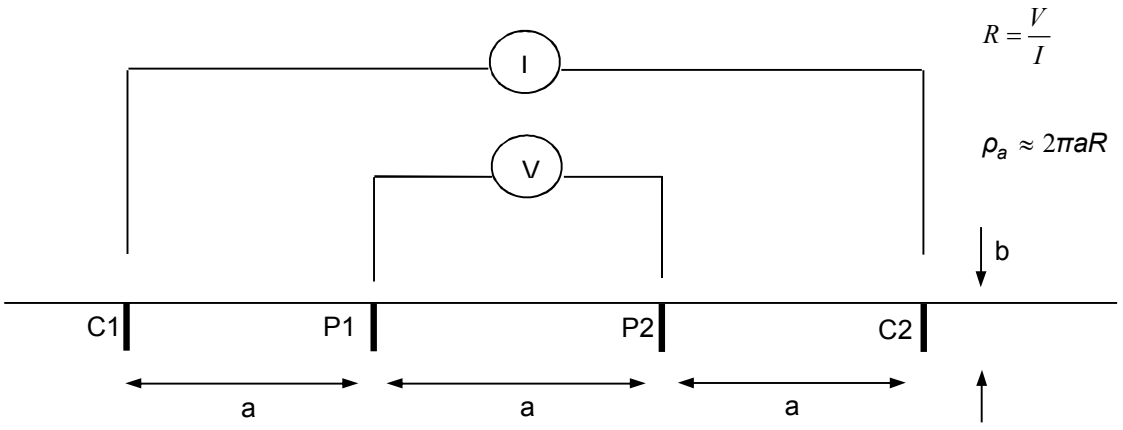
Test Sheet (Traverse #4)

Test Details	
Location:	Centrepoint: WGS 84 529586E 6258460N E-W Direction
Traverse / Direction No:	Traverse 4
Date:	22/08/18
Time (start):	1200H
Time (finish):	1330H
Test Conditions:	Dry wheat fields
Method:	Four Pole Wenner Method
Test Setup	
Instrument:	AEMC 6472
Calibration Data (last test, next test):	New machine – next calibration due : 28 October 2018
Max. voltage:	42V Peak
Max. current:	10mA
Frequency:	128Hz square wave
Measured Data	



a [m]	b [m]	Ω	ρ_a [Ω.m]
0.5	0.1	1.39	4.37
1	0.1	0.72	4.52
2	0.1	0.3	3.77
4	0.1	0.18	4.52
8	0.1	0.08	4.02
16	0.1	0.05	5.03
32	0.1	0.06	12.06
50	0.1	0.02	6.28
80	0.1	0.03	15.08

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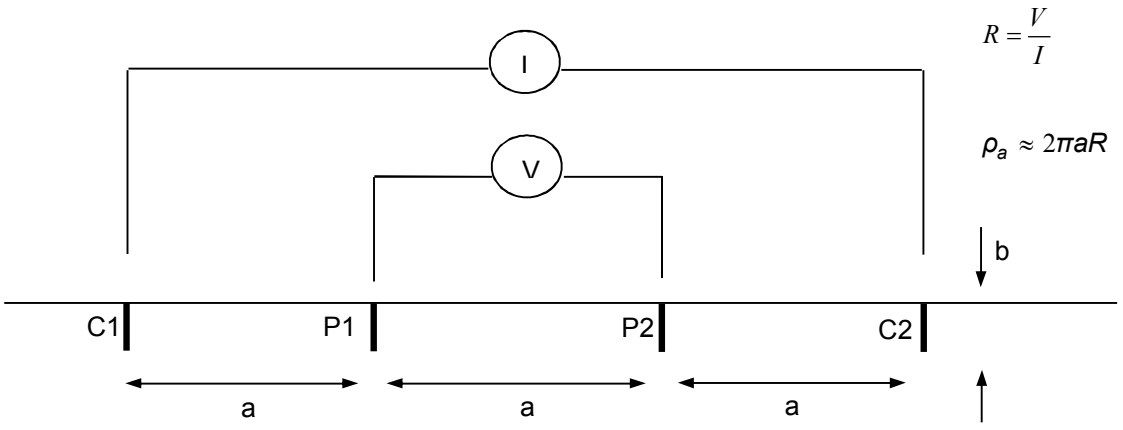
Test Sheet (Traverse #5)

Test Details	
Location:	Centrepoint: WGS 84 530467E 6259335N N-S Direction
Traverse / Direction No:	Traverse 5
Date:	22/08/18
Time (start):	1330H
Time (finish):	1530H
Test Conditions:	Dry wheat fields
Method:	Four Pole Wenner Method
Test Setup	
Instrument:	AEMC 6472
Calibration Data (last test, next test):	New machine – next calibration due : 28 October 2018
Max. voltage:	42V Peak
Max. current:	10mA
Frequency:	128Hz square wave
Measured Data	



a [m]	b [m]	Ω	ρ_a [Ω.m]
0.5	0.1	8.13	25.54
1	0.1	1.60	10.05
2	0.1	0.58	7.29
4	0.1	0.20	5.03
8	0.1	0.08	4.02
16	0.1	0.05	5.03
32	0.1	0.03	6.03
50	0.1	0.02	6.28
80	0.1	0.02	10.05

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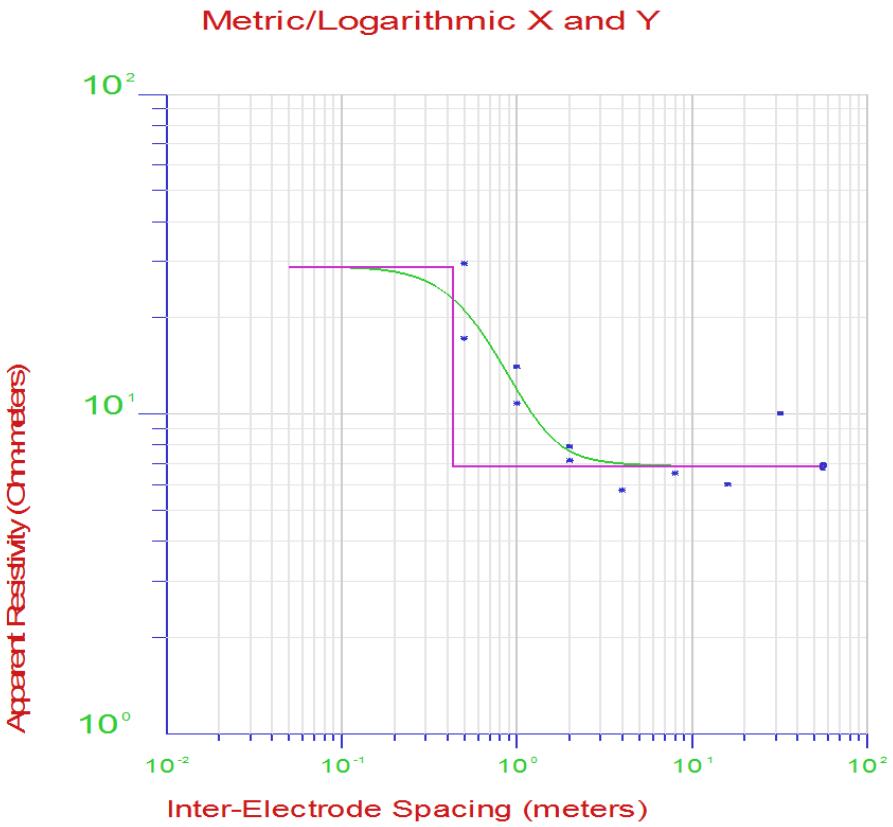
Soil Model

The following model was calculated using CDEGS software:

Figure 1:Wyalong Solar Farm – 2 Layer Soil Model for Substation Traverses



Measurement Method..: Wenner
RMS error.....: 19.04%

Layer Number	Resistivity (Ohm-m)	Thickness (Meters)
Air	Infinite	Infinite
2	28.91051	0.4314606
3	6.853844	Infinite

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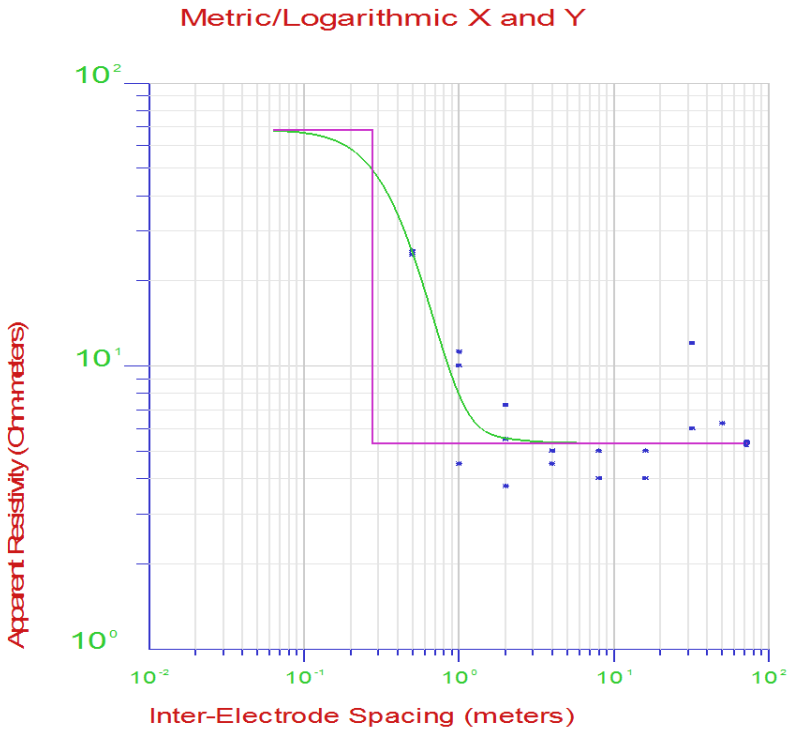
Figure 2 : Wyalong Solar Farm – 2 Layer Soil Model for Field Traverses



Measurement Method..: Wenner
RMS error.....: 27.95%

Layer Number	Resistivity (Ohm-m)	Thickness (Meters)
Air	Infinite	Infinite
2	68.34624	0.2756365
3	5.337744	Infinite

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Appendix B: Testing Process

Figure 3: Testing process- AEMC 6472 Ground Tester

Figure 4: Testing process - indicating probe layout and using AEMC 6472 Ground Tester

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