Proposed Solar Farm
3040 Harmony Way, Faraday

Geotechnical investigation for Energy Forms

Report 20C 1468
January 2021

GTS
GEOTECHNICAL TESTING SERVICES

3040 Harmony Way, Faraday

Geotechnical Investigation
for
Energy Forms

Revision

Revision	Authorised	Date
20C 1468	SEH	22/01/2021

Distribution (this version only)

Recipient	Format	Date
GTS	On file	22/01/2021
Energy Forms Attn: Fiona Cotter	Email PDF fi.cotter@energyforms.com.au	22/01/2021

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APPENDIX

1 INTRODUCTION

Energy Forms commissioned Geotechnical Testing Services (GTS) to undertake a geotechnical investigation for the proposed solar farm development at the 3040 Harmony Way, Faraday.

The purpose of the investigation was to assess general subsurface conditions at the site with a view to providing comments and design parameters for the proposed construction.

It is understood that the proposed development consists of a solar farm and associated infrastructure such as inverter(s) and battery storage.

2 SITE AND GEOLOGY

2.1 SITE LOCATION AND GENERAL CONDITIONS

The site has a medium fall towards Harmony Way and begins to plateau towards the rear boundary. There were three dams spread across the site, which is being utilised for agricultural purposes. There are many small to large sized trees, including well established eucalyptus gums throughout the investigation site. The surface of the site was dry with a good coverage of both natural and seeded grasses. There was visual evidence of surface rock as exposed out-cropping reefs and boulders of granite rock.

2.2 GEOLOGY

The Victorian Government's online "Geovic" map shows the site to be underlain by Devonian aged sedimentary deposits of the Harcourt Granodiorite formation with this generally confirmed by the field data.

3 FIELDWORK

The geotechnical investigation was conducted on the 9th of December 2020 and involved the drilling of 20 boreholes by a Gemco drilling rig to depths of between 0.5 to 3.0 metres. Dynamic Cone Penetrometer (DCP) and Pocket Penetrometer (PP) tests were conducted in the boreholes with the results included on the engineering logs.

The field investigation was conducted by a technician under the direction of a Geotechnical Engineer, who logged the subsurface profile and determined the testing program. The engineering logs are included in the Appendix with their locations shown on the enclosed site plan.

The field investigation indicated that the soil profile is variable across the site, mainly in respect to depth to rock, but also between Clayey Sand and Sandy Clay which is typical of a granitic profile and may be summarised as follows:

TOPSOIL: Sandy SILT, pale brown, brown, low plasticity, traces of fine gravel, stiff
to depth of between 0.1 to 0.6 metres
Overlying
Clayey SAND, fine to coarse, pale brown, low plasticity clay fines, medium dense to dense
to depths of between 0.3 and 0.8 metres
or
Sandy CLAY, low to medium plasticity, pale brown, fine sand, very stiff to hard
to depths of between 0.8 to 2.7 metres
Overlying
Silty CLAY, high plasticity, brown mottled pale brown, pale grey, soft to very stiff
Overlying
GRANITE, extremely weathered, brown, off white, low to medium strength
to termination depth

There are variations to the above such as borehole (BH) 20 having a low strength (firm) Sandy CLAY layer at a depth of 2m above rock, and BH7 having a relatively shallow soil profile consisting of only Sandy SILT before experiencing refusal on weathered Granite rock. Therefore, reference should be made to the appended borehole logs for the full description of the subsurface conditions at each location.

Groundwater inflow was not encountered over the investigated depths.

4 FIELD RESULTS

4.1 IN-SITU RESISTIVITY

In-situ electrical resistivity testing was undertaken at three sites (RE1-3) with tests conducted in the location of the proposed inverter and battery storage area towards the western boundary, and two further tests conducted at regular intervals down centre of the proposed PV panel arrays (running parallel to the northern boundary line - see appended site plan). The testing procedure involved the use of a Fluke 1625-2 earth/ground tester using the Wenner testing method, where four electrodes are inserted approximately 0.25 metres into the ground, positioned in-line and equally spaced at the required test depths (i.e. probe separation is approximately proportional to testing depth).

At each location, the tests were attempted at 1, 2, 4 and 6 metre separation intervals. It is noted that ground moisture conditioning around the probes was undertaken as per the Fluke 1625-2 earth/ground tester handbook due to low surface moisture across the investigation site. The summary of the soil resistivity testing results has been provided in the table below, with the field data attached in the appendix.

Test #: RE1	**Alignment 1 (North-South)**				**Alignment 2 (East-West)**			
Depth a, (m)	1	2	4	6	1	2	4	6
Earth Electrode Resistance, R_E (Ω)	91.9	13.58	2.15	1.49	33.8	6.40	2.25	1.60
Mean Soil Resistivity ρ (Ωm)	577.42	170.65	54.04	56.17	212.37	80.43	56.55	60.32
Test centre location: 55H 258967 E, 5897391 N (see attached site plan)								
Test #: RE2	**Alignment 1 (North-South)**				**Alignment 2 (East-West)**			
Depth a, (m)	1	2	4	6	1	2	4	6
Earth Electrode Resistance, R_E (Ω)	47.60	4.96	3.78	2.90	76.20	4.62	3.57	3.14
Mean Soil Resistivity ρ (Ωm)	299.08	62.33	95.00	109.33	478.78	58.06	89.72	118.38
Test centre location: 55H 259262 E, 5897481 N (see attached site plan)								
Test #: RE3	**Alignment 1 (North-South)**				**Alignment 2 (East-West)**			
Depth a, (m)	1	2	4	6	1	2	4	6
Earth Electrode Resistance, R_E (Ω)	479.00	70.40	4.20	2.00	104.2	8.30	3.30	1.89
Mean Soil Resistivity ρ (Ωm)	3009.6	884.67	105.56	75.40	654.71	104.3	82.94	71.25
Test centre location: 55H 259421 E, 5897590 N (see attached site plan)								

5 ENGINEERING RECOMMENDATIONS

It is understood from the drawing “PV Solar Overall Layout Plan – Faraday” provided by energy forms, that the proposed development consists of arrays of sun-tracking PV panels with associated infrastructure including an inverter and battery storage technology. As such, the footing will likely consist of shallow steel driven piles for the PV arrays and concrete raft slab or pad footings for the for the associated infrastructure.

Based on the results of this investigation, particular conditions at the site dictate that the founding medium and minimum depth below existing surface levels is outlined below.

Suitable founding medium(s) description	Minimum founding depth (mm)	Borehole region
Clayey SAND, fine to coarse, pale brown, low plasticity clay fines, medium dense to dense	100	BH 1, 3, 4, 5, 8, 16, 18, 19
	300	BH 2,
	400	BH 20
Silty CLAY, high plasticity, brown mottled pale brown, pale grey, stiff to very stiff	300	BH 19
	400	BH 6, 11, 13, 14, 16, 17, 18
	500	BH 12
	800	BH 2, 10
Sandy CLAY, low to medium plasticity, pale brown, fine sand, very stiff to hard	300	BH 4
	400	BH 9
GRANITE, extremely weathered, brown, grey, low to medium strength	500	BH 7
	700	BH 8
	800	BH 5, 9, 12
	900	BH 19
	1000	BH 4, 15
	1100	BH 3, 10, 11, 13
	1200	BH 1, 2, 6, 18
	1500	BH 17
	1700	BH 16
	1800	BH 14
	2700	BH 20

For edge and internal beams of a raft slab, strip and pad (stump) footings founded in the Clayey Sand and Sandy/Silty clay material there is an allowable bearing pressure of 100kPa available, which increases to 400 kPa if they are founded into the weathered granite rock.

It is understood that the preferred founding option for the solar panels is driven steel piles at depths generally between 1 and 2 metres. As such, design parameters for driven and bored piles have been provided for above founding materials. For driven or bored piles there is an allowable end bearing pressure of 100 kPa within the natural clayey sand and sandy/silty clay profile below the minimum founding depths as given in the table above. In addition, the sandy/silty clay material below a depth of 0.6 metres will provide an allowable skin friction of 20 kPa and a lateral resistance of 40 kPa.

If the driven or bored piles extend down to the weathered granite rock, there is an allowable end bearing pressure of 600 kPa. Due to the expected installation methods and strength of the granite rock, it is not expected that socketing in the rock will be conducted.

It is noted that the depth to granite rock varied across the site from 0.5 to 2.7 metres. In addition, there are several areas of exposed granite rock at the surface. As such, the depth to granite rock will vary in areas not directly investigated from the near/at surface to depths below 2 metres. Based on past experience and testing with our drill rigs, they can drill through low strength weathered rock and will experience refusal on medium strength (moderately hard to hard) weathered rock or better. It is noted that solid auger refusal was encountered at depths between 0.5 and 1.2 metres at 3 locations (BHs 4, 7 & 19) whilst at the other locations the rig slowly drilled/ground through the extremely weathered rock.

Therefore, it may be difficult for driven piles to be driven or founded at the required depths. Large conventional earthmoving equipment (i.e >10 tonne excavator) with a ripper or pneumatic hammer attachment may be required excavate the foundations to design levels.

In as far as a site classification in accordance with AS2870-2011 is applicable to a construction of this type, the site is classified as **Class M** with an estimated characteristic surface movement (y_s) in the range of 20 to 40mm.

6 IMPORTANT NOTES ABOUT THIS REPORT

The results from this investigation relate to the specified sites labelled throughout this document, and hence the information obtained may need to be extrapolated to the rest of the designated area. While care has been taken throughout this investigation, soil conditions can vary between each individual test site and at depths greater than that drilled during this investigation. Hence, if variations from this report are found during excavations/construction then Geotechnical Testing Services should be notified so it can be assessed and appropriate advice provided.

The soil colours provided in the bore logs attached may vary with soil moisture content and individual interpretation, therefore colour alone should not be used to identify these soils.

Strength characteristics of soils often exhibit a large variation between wet and dry conditions. Soil characteristics of a soil profile are given on the soil conditions at the time of the investigation.

7 DISCLAIMER

This investigation has been carried out in goodwill and under the instructions of Energy Forms. The investigation has been undertaken with the care and skill of competent personnel as defined within

Geotechnical Testing Services quality system. It is not a comprehensive investigation but a guide to the conditions throughout the designated area.

This document has been prepared for Energy Forms, and hence no responsibility or liability is being accepted to any third party, where any part of the report is used in either isolation or without consideration of the whole document. This document is not appropriate where there has been a significant change in the project or either for the specific needs of the reader.

Please, don't hesitate to contact the undersigned, if you require any further information or assistance.

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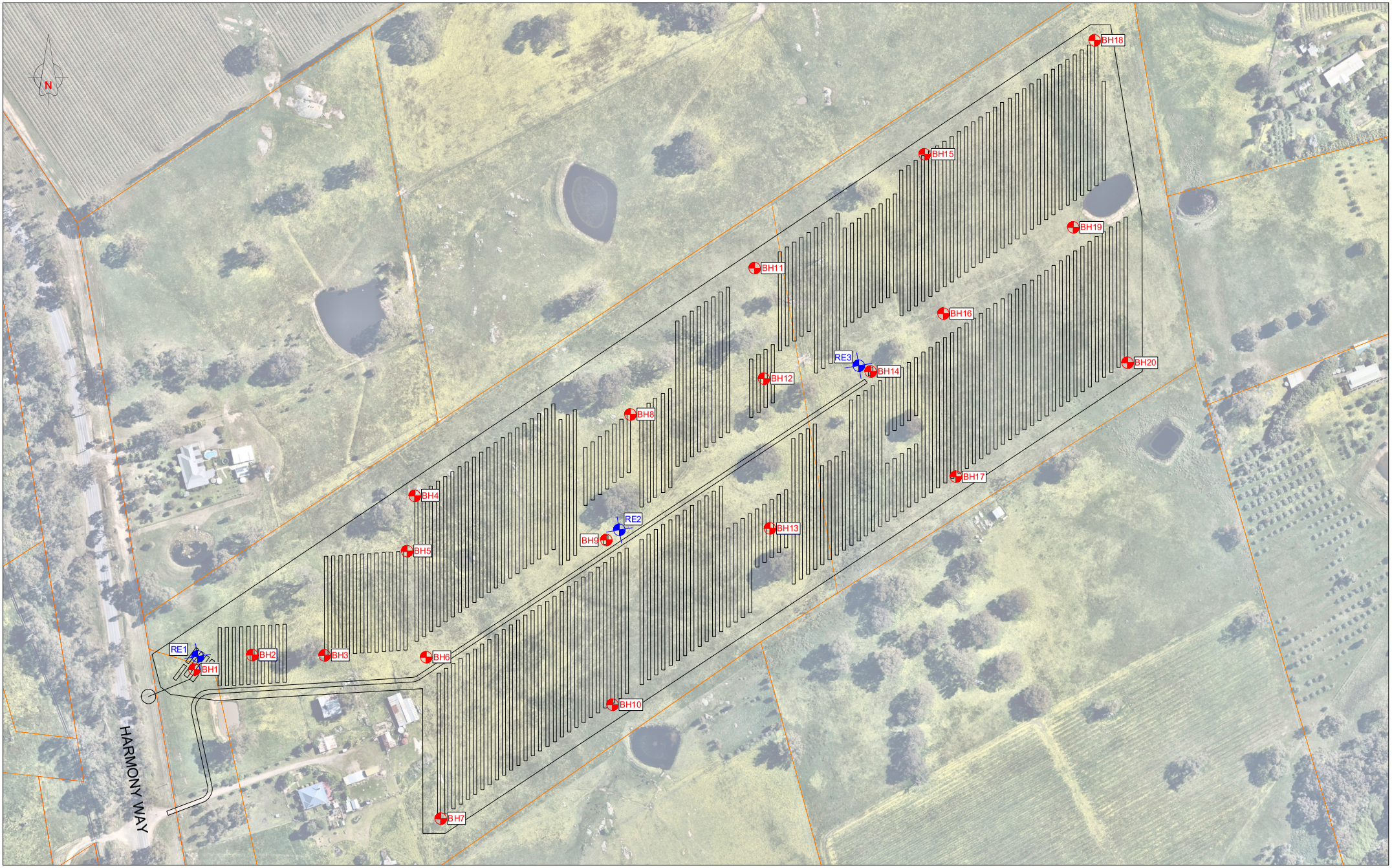
APPENDIX



GTS GEOTECHNICAL TESTING SERVICES

GEOTECHNICAL INVESTIGATION

PROPOSED SOLAR FARM

APPROXIMATE LOCATIONS:
NOT TO SCALE

CLIENT: ENERGY FORMS

LOCATION: 3040 HARMONY WAY, FARADAY

GTS REF: 20C 1468

DATE: 9 DEC. 2020

GTS
GEOTECHNICAL TESTING SERVICES

PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 1
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown 100mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity				D	D				
	0.50								
600mm							DCP=20		
Silty CLAY (CH), high plasticity, brown mottled pale grey/pale brown				M	VSt				
	1.00					PP @ 1.0m = 460 kPa			
1200mm									
GRANITE (XW), extremely weathered, pale brown				M	L	Rock: low strength			
	1.50								
	2.00								
	2.50								
	3.00								
BH1 terminated at 3.0 metres									
	3.50								
	4.00								

ENGINEERING BOREHOLE LOG

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Borehole no. 2
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	St				
300mm									
Clayey SAND (SW), fine to coarse, pale brown, low plasticity	0.50			M	D		DCP=11 DCP=11 DCP=12 DCP=20		
800mm									
Silty CLAY (CH), high plasticity, brown motttled pale grey	1.00			M	VSt-H	PP @ 1.0m = 480 kPa			
1200mm									
GRANITE (XW), extremely weathered	1.50			M	L-M	Rock: low to medium strength			
	2.00								
	2.50								
BH2 terminated at 2.5 metres						**By Refusal**			
	3.00								
	3.50								
	4.00								

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Borehole no. 3
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown, traces of fine gravel 100mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity 400mm	0.50			M	D		DCP=11 DCP=6		
Silty CLAY (CH), high plasticity, brown mottled pale grey				M	St		DCP=4 DCP=4 DCP=3 DCP=4		
1100mm	1.00					PP @ 1.0m = 440 kPa			
GRANITE (XW), extremely weathered, brown	1.50			M	L-M	Rock: low to medium strength			
	2.00								
BH3 terminated at 2.3 metres	2.50					**By Refusal**			
	3.00								
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 4
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Clayey SAND (SW), fine to coarse, brown, low plasticity				D	MD				
300mm									
Sandy CLAY (CI), medium plasticity, brown mottled pale brown				M	VSt		DCP=6		
	0.50						DCP=4		
							DCP=4		
							DCP=5		
						PP @ 0.7m = 380 kPa	DCP=3		
							DCP=8		
1000mm	1.00								
GRANITE (XW), extremely weathered, pale brown 1100mm				M	M	Rock: medium strength			
BH4 terminated at 1.1 metres						**By Refusal**			
	1.50								
	2.00								
	2.50								
	3.00								
	3.50								
	4.00								

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Borehole no. 5
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown, traces of fine gravel 100mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity 400mm				D	D		DCP=10		
Silty CLAY (CH), high plasticity, brown, pale brown	0.50			M	St		DCP=8		
							DCP=2		
							DCP=3		
800mm						PP @ 0.7m = 320 kPa	DCP=6		
GRANITE (XW), extremely weathered, pale brown	1.00			D	L-M	Rock: low to medium strength	DCP=20		
BH5 terminated at 1.4 metres	1.50					**By Refusal**			
	2.00								
	2.50								
	3.00								
	3.50								
	4.00								

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Borehole no. 6
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	St				
400mm							DCP=8		
Silty CLAY (CH), high plasticity, brown mottled pale grey	0.50			M	St		DCP=7 DCP=4 DCP=5 DCP=6 DCP=7		
	1.00								
1200mm									
GRANITE (XW), extremely weathered, pale brown, off white	1.50			M	L-M	Rock: low to medium strength			
	2.00								
BH6 terminated at 2.0 metres						**By Refusal**			
	2.50								
	3.00								
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 7
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	MD				
							DCP=9		
500mm	0.50						DCP=20		
BH7 terminated at 0.5 metres						**By Refusal on weathered granite rock**			
	1.00								
	1.50								
	2.00								
	2.50								
	3.00								
	3.50								
	4.00								

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Borehole no. 8
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), brown 100mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity				D	D				
							DCP=20		
	0.50						DCP=12		
							DCP=15		
700mm							DCP=20		
GRANITE (XW), extremely weathered, pale brown, brown				D	L	Rock: low strength			
	1.00								
	1.50								
	2.00								
	2.50								
	3.00								
BH8 terminated at 3.0 metres									
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 9
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Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown, traces of fine gravel				D	St				
400mm							DCP=11		
Sandy CLAY (CL), low plasticity, pale brown, fine sand	0.50			D	VSt-H		DCP=10 DCP=16 DCP=20		
800mm									
GRANITE (XW), extremely weathered, pale brown	1.00			D	L-M	Rock: low to medium strength			
	1.50								
	2.00								
	2.50								
BH9 terminated at 2.8 metres	3.00					**By Refusal**			
	3.50								
	4.00								

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Borehole no. 10
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown, traces of fine gravel				D	St				
	0.50								
600mm							DCP=7		
Silty CLAY (CH), high plasticity, brown mottled pale brown, pale grey				M	St		DCP=2		
							DCP=2		
							DCP=3		
	1.00						DCP=7		
1100mm							DCP=20		
GRANITE (XW), extremely weathered, pale brown, off white				M	L	Rock: low strength			
	1.50								
	2.00								
	2.50								
	3.00								
BH10 terminated at 3.0 metres									
	3.50								
	4.00								

ENGINEERING BOREHOLE LOG

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Borehole no. 11
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	St				
400mm							DCP=20+		
Silty CLAY (CH), high plasticity, brown mottled pale brown, pale grey	0.50			M	VSt-H	PP @ 0.5m = 450 kPa			
	1.00					PP @ 1.0m = 460 kPa			
1100mm									
GRANITE (XW), extremely weathered, pale brown				D-M	L	Rock: Low strength			
	1.50								
	2.00								
	2.50								
	3.00								
BH11 terminated at 3.0 metres									
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 12
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	St				
500mm	0.50								
Silty CLAY (CH), high plasticity, brown mottled pale brown				M	VSt		DCP=5		
							DCP=8		
800mm							DCP=7		
GRANITE (XW), extremely weathered, pale brown				M	L-M	Rock: low to medium strength	DCP=20+		
	1.00								
	1.50								
BH12 terminated at 1.8 metres						**By Refusal**			
	2.00								
	2.50								
	3.00								
	3.50								
	4.00								

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PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 13
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown, traces of fine gravel				D	St				
400mm							DCP=10		
Silty CLAY (CH), high plasticity, brown mottled pale brown, pale grey	0.50			M	St		DCP=7		
							DCP=5		
							DCP=4		
							DCP=2		
	1.00						DCP=2		
							DCP=3		
1100mm									
GRANITE (XW), extremely weathered, pale brown				D	L-M	Rock: low to medium strength			
	1.50								
	2.00								
BH13 terminated at 2.0 metres						**By Refusal**			
	2.50								
	3.00								
	3.50								
	4.00								

ENGINEERING BOREHOLE LOG

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Borehole no. 14
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), brown				D	St				
400mm							DCP=7		
Silty CLAY (CH), high plasticity, brown mottled pale brown, pale grey, red/brown	0.50			M	F-St		DCP=12		
							DCP=5		
							DCP=3		
						PP @ 0.7m = 200 kPa	DCP=3		
							DCP=2		
	1.00						DCP=5		
	1.50					PP @ 1.5m = 160 kPa			
1800mm									
GRANITE (XW), extremely weathered, pale brown	2.00			D	L-M	Rock: low to medium strength			
	2.50								
	3.00								
BH14 terminated at 3.0 metres									
	3.50								
	4.00								

ENGINEERING BOREHOLE LOG

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Borehole no. 15
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), brown, traces of fine gravel 100mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity clay fines 400mm				D	D		DCP=17		
Silty CLAY (CH), high plasticity, pale brown mottled red/brown	0.50			M	St		DCP=9		
							DCP=3		
					S		DCP=1		
							DCP=2		
							DCP=1		
1000mm	1.00						DCP=20+		
GRANITE (XW), extremely weathered, pale brown				M	L	Rock: low strength			
	1.50								
	2.00								
	2.50								
	3.00								
BH15 terminated at 3.0 metres									
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 16
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown, 100mm traces of fine gravel				D	St				
Clayey SAND (SW), fine to coarse,				D	D				
pale brown, low plasticity clay fines, 400mm traces of fine gravel	0.50						DCP=9		
Silty CLAY (CH), high plasticity,							DCP=7		
brown mottled pale brown, pale				M	St-		DCP=7		
grey					VSt		DCP=7		
	1.00						DCP=5		
							DCP=5		
	1.50					PP @ 1.5m = 440 kPa			
1700mm									
GRANITE (XW), extremely				M	L	Rock: low strength			
weathered, pale brown	2.00								
	2.50								
	3.00								
BH16 terminated at 3.0 metres									
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 17
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	St				
400mm							DCP=12		
Silty CLAY (CH), high plasticity, brown mottled pale brown, red/brown	0.50			M	VSt		DCP=7		
							DCP=7		
					St		DCP=4		
	1.00						DCP=6		
1500mm	1.50					PP @ 1.5m = 290 kPa			
GRANITE (XW), extremely weathered, pale brown				M	L	Rock: low strength			
	2.00								
	2.50								
	3.00								
BH17 terminated at 3.0 metres						**By Refusal**			
	3.50								
	4.00								

ENGINEERING BOREHOLE LOG

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Borehole no. 18
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), brown 50mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity clay fines, traces of fine gravel	0.50			D-M	MD		DCP=11 DCP=9 DCP=7		
Silty CLAY (CH), high plasticity, pale brown mottled pale grey, brown 1200mm	1.00			M	F		DCP=2 DCP=2 DCP=3		
GRANITE (XW), extremely weathered, pale brown	1.50			M	L	Rock: low strength			
	2.00								
	2.50								
	3.00								
BH18 terminated at 3.0 metres	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 19
Sheet no. 1 of 1
Job no. 20C 1468

Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), brown 50mm				D	St				
Clayey SAND (SW), fine to coarse, pale brown, low plasticity clay fines, 300mm				D	D				
traces of fine gravel							DCP=12		
Silty CLAY (CH), high plasticity,	0.50			M	St		DCP=10		
brown mottled pale brown, pale grey							DCP=9		
							DCP=7		
							DCP=5		
900mm							DCP=4		
GRANITE (XW), extremely weathered, pale brown	1.00			M	M	Rock: medium strength			
BH19 terminated at 1.2 metres						**By Refusal**			
	1.50								
	2.00								
	2.50								
	3.00								
	3.50								
	4.00								

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ENGINEERING BOREHOLE LOG

Borehole no. 20
Sheet no. 1 of 1
Job no. 20C 1468

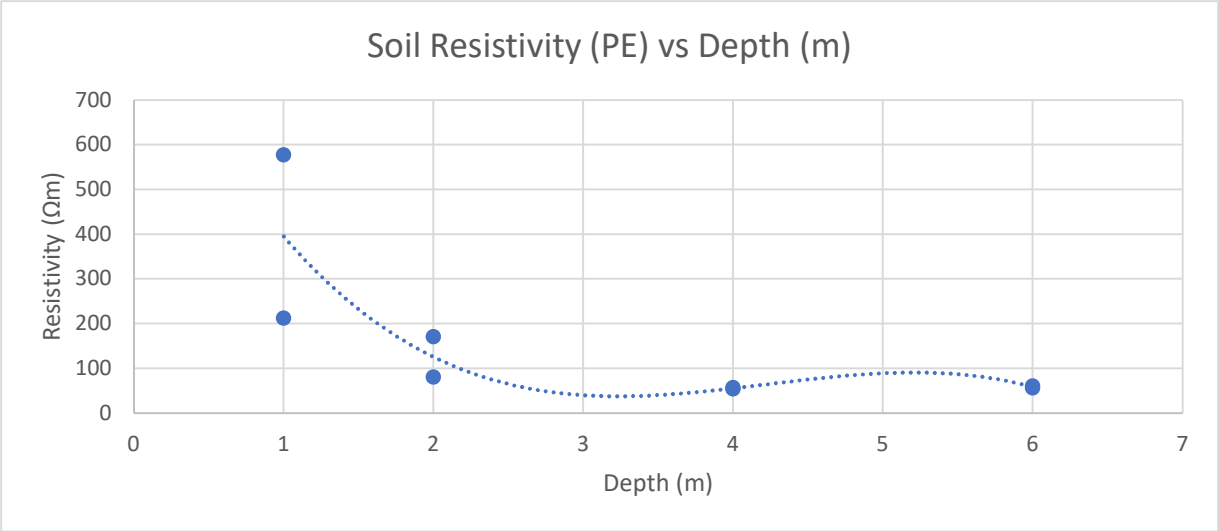
Client :	Energy Forms			Date:	9/12/2020
Project :	Proposed Solar Farm			Logged by:	RC & MM
Location :	3040 Harmony Way, Faraday, Victoria				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), pale brown				D	St				
400mm							DCP=20		
Clayey SAND (SW), fine to coarse, pale brown, low plasticity clay fines 600mm	0.50			D	D				
Silty CLAY (CH), high plasticity, brown mottled pale grey				M	St	PP @ 0.7m = 260 kPa			
	1.00								
	1.50					PP @ 1.5m = 140 kPa			
1800mm									
Sandy CLAY (CI), medium plasticity, brown mottled pale grey, fine sand	2.00			M	F	PP @ 2.0m = 160 kPa			
	2.50								
2700mm									
GRANITE (XW), extremely weathered, grey, green	3.00			M	L	Rock: low strength			
BH20 terminated at 3.0 metres	3.50								
	4.00								

MEASUREMENT OF SOIL RESISTIVITY
WORKSHEET

Project:	Faraday Solar Farm	Our Ref:	20C-1468
Location:	3040 Harmony Way, Faraday	Date:	17/12/2020
Device:	Fluke 1625-2 Earth Ground Tester	Tester:	PB/ED

	Alignment 1				Alignment 2 (90^{O} to first test)			
Test	1	2	3	4	5	6	7	8
Probe Distance (m) = a	1	2	4	6	1	2	4	6
Max Earth Spike Depth (m)	0.3	0.6	1.2	1.8	0.3	0.6	1.2	1.8
Resistance (Ω) = R_E	91.9	13.58	2.15	1.49	33.8	6.4	2.25	1.6
Mean Soil Resistivity (Ωm) = P_E	577.42	170.65	54.035	56.172	212.37	80.425	56.549	60.319



FIELD NOTES:

Allignment 1 - north/south - Centered at 55H258967, 5897391

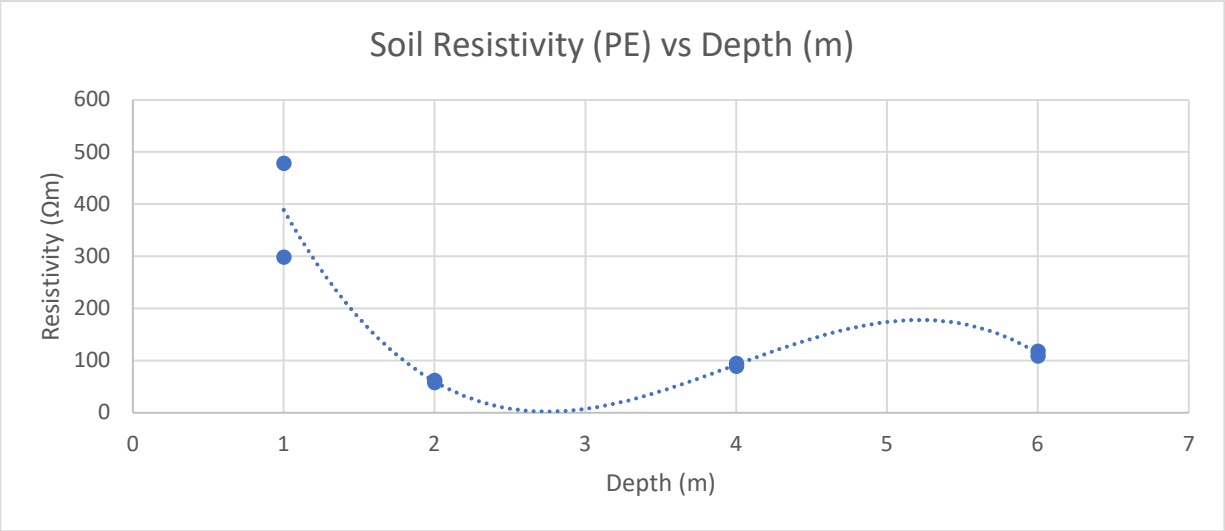
Alignment 2 - east/west

soil moistened

MEASUREMENT OF SOIL RESISTIVITY
WORKSHEET

Project:	Faraday Solar Farm	Our Ref:	20C-1468
Location:	3040 Harmony Way, Faraday	Date:	17/12/2020
Device:	Fluke 1625-2 Earth Ground Tester	Tester:	PB/ED

	Alignment 1				Alignment 2 (90^{O} to first test)			
Test	1	2	3	4	5	6	7	8
Probe Distance (m) = a	1	2	4	6	1	2	4	6
Max Earth Spike Depth (m)	0.3	0.6	1.2	1.8	0.3	0.6	1.2	1.8
Resistance (Ω) = R_E	47.6	4.96	3.78	2.9	76.2	4.62	3.57	3.14
Mean Soil Resistivity (Ωm) = P_E	299.08	62.329	95.002	109.33	478.78	58.057	89.724	118.38



FIELD NOTES:

Allignment 1 - north/south - Centered at 55H259262, 5897481

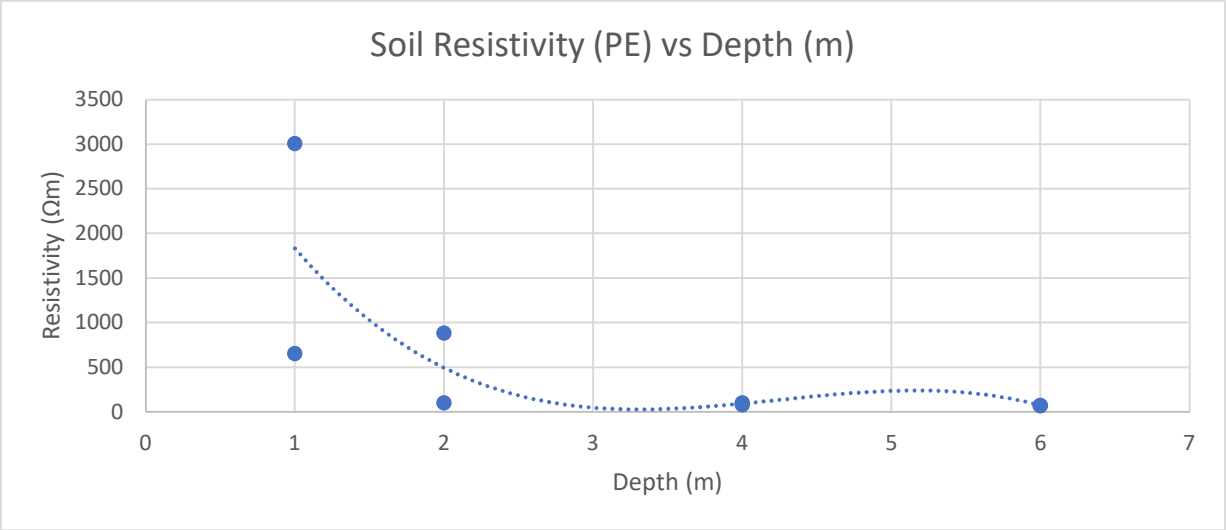
Allignment 2, east/west

moistened soil

MEASUREMENT OF SOIL RESISTIVITY
WORKSHEET

Project:	Faraday Solar Farm	Our Ref:	20C-1468
Location:	3040 Harmony Way, Faraday	Date:	17/12/2020
Device:	Fluke 1625-2 Earth Ground Tester	Tester:	PB/ED

	Alignment 1				Alignment 2 (90^{O} to first test)			
Test	1	2	3	4	5	6	7	8
Probe Distance (m) = a	1	2	4	6	1	2	4	6
Max Earth Spike Depth (m)	0.3	0.6	1.2	1.8	0.3	0.6	1.2	1.8
Resistance (Ω) = R_E	479	70.4	4.2	2	104.2	8.3	3.3	1.89
Mean Soil Resistivity (Ωm) = P_E	3009.6	884.67	105.56	75.398	654.71	104.3	82.938	71.251



FIELD NOTES:

Allignment 1 - north/south -Centered at 55H259421, 5897590

Allignment 2 - east/west

moistened soil

DESCRIPTIVE TERMS
BOREHOLE/EXCAVATION LOG

Classification Symbol & Soil Name

Classification of material and its description is based on the Unified Classification System as referenced in AS1726 – 1993 Geotechnical Site Investigations, Appendix A. A summary of the more common terms is included within.

Particle Size Descriptive Terms

Name	Subdivision	Size
Boulders		>200mm
Cobbles		63 – 200mm
Gravel	Coarse	20 – 63mm
	Medium	6 – 20mm
	Fine	2.36 – 6mm
Sand	Coarse	0.6 – 2.36mm
	Medium	200 – 600 micron
	Fine	75 – 200 micron
Silt		2 – 75 micron
Clay		< 2 micron

Consistency of Cohesive Soils

Term	Undrained shear strength, s_u (kPa)	Field Guide
Very Soft (VS)	<12	A finger can be pushed well into the soil with little effort
Soft (S)	12 – 25	A finger can be pushed into the soil to about 25mm depth
Firm (F)	25 – 50	The soil can be indented about 5mm with the thumb
Stiff (St)	50 – 100	The surface of the soil can be indented with the thumb
Very Stiff (VSt)	100 – 200	The surface of the soil can be indented by thumb nail
Hard (H)	>200	The surface of the soil can be marked only with the thumbnail
Friable (F)	-	Crumbles or powders when scraped by thumbnail

Density of Granular Soils

Term	Density Index (%)
Very Loose (VL)	< 15
Loose (L)	15 – 35
Medium Dense (MD)	35 – 65
Dense (D)	65 – 85
Very Dense (VD)	> 85

Minor Components

Term	Field Guide	Proportion of Minor Component In:
Trace of	Presence just detectable by feel or eye	Coarse grained soils: <5% Fine grained soils: <15%
Some	Presence easily detectable by feel or eye	Coarse grained soils: 5-12% Fine grained soils: 15-30%

Moisture Condition

Dry (D) — Looks & feels dry. Cohesive soils are usually hard, powdery or friable. Granular soils run freely through the hand.

Moist (M) — Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere. Free water does not form.

Wet (W) — As for moist, but with free water forming on hands when remoulded.

Method

S Auger Screwing
D Auger Drilling
R Roller/tricone
W Washboring
N Natural Exposure
E Existing Excavation
B Blade/bucket
C Coring
H Hammer Drill

Support

***** Nil
C Casing
M Mud/polymer

Water

* Not observed
Observed water level (date shown)
Observed water inflow
Observed water outflow
R Refer to report for details

Notes, Samples, Tests

U63 Undisturbed sample, 63mm diameter
D Disturbed sample
N* Standard Penetration Test, (*) Sample Figure = results

Structures, Additional Observations

PP Pocket Penetrometer test (kPa)
DCP Dynamic Cone Penetrometer test (blows/100mm)

Surface

_____ Known boundary
- - - - - - - - - - Probably boundary
-?-?-?-?-?-?- Possible boundary