



Tier 2 Geotechnical and Geoenvironmental Assessment

Site: Newport Solar Farm

Prepared For: Newport City Council

Issue Date: June 2026

Job No: TF-26-137-CA

REPORT TITLE : **Geoenvironmental and Geotechnical Report:
Proposed Commercial Development, Solar
Farm in Newport**

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	Name	Signature
Prepared	Rocio Albertos-Vazquez BSc (Hons), MSc, FGS Engineering Geologist	
Checked	Tomas Marquez Clemente MSc, FGS Senior Engineering Geologist	
Approved	Gwyn Lake BSc (Hons), PhD, CGeol, FGS Director	



Executive Summary

Site Location and Proposed Development	Newport City Council is proposing the construction of a new commercial development at Docks Way, Newport. The proposed development will consist of a solar farm in the northern part of the council landfill site. The Solar Farm comprises the installation of solar photovoltaic panels and associated infrastructure, including a switch room and fencing.			
Site History	Historically, the area formed part of a meander of the River Ebbw before the river channel was modified between 1945 and 1979 near its mouth, resulting in the present-day landfill site. The area was then used as a municipal landfill which according to on line data is over 40years old. In recent years the site was closed and capped with inert materials, the exact thickness of which is unknown.			
Geology	Made ground: unknown depth comprising domestic and commercial refuse is anticipated at the site. Following completion of the landfill the site was capped with a varying thickness of inert material. Tidal flat deposits: Mud flat and sand flat deposits, form extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. Mercia Mudstone Group: Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas.			
Ground Conditions	Depth (m)		Thickness (m)	Stratum
	0.00-	- 0.40/1.00	0.40 - 1.00	Made Ground: Firm brown slightly gravelly sandy CLAY (Capping)
	0.45/1.00	- 0.60/1.40	0.05 - 0.70	Made Ground: Very dense light brown sandy GRAVEL/ reddish brown slightly gravelly SAND (Capping)
	0.40/1.40	- > 4.25 Base not proven	1.00- >3.60 Base not proven	Made Ground (Waste related to the infilled land): (Very dense to refuse) frequent plastics, bags, bricks and very strong waste odour with a content of black slightly sandy silty clay
Contamination of Concern	All substances tested were present at concentrations below their respective human health threshold levels. When gas monitoring results are compared with Table 8.5 of CIRIA report C665, the site is classified as 'gas characteristic situation 1' (CS1). However, as the peak methane/ carbon dioxide has periodically/regularly risen above the 1%/5% screening threshold level, it is recommended that consideration be given to elevating the gas characteristic situation to CS2.			
Ground Gas Risk Assessment	As the development is a solar farm with only one enclosed building (switch room) no special precautions to deal with ground gas will be required for the majority of the development. However, due to the high levels of methane and carbon dioxide encountered special precautions should be taken by site personnel especially if excavating trenches with personal gas monitoring alarms for methane carbon dioxide and hydrogen sulphide worn by all site operatives. To protect the future site users from identified ground gas, proposed enclosed structures such as the switch room will need to incorporate within their construction a suitable ground gas protection system.			
Foundation Solution	In areas investigated for the transformers it is recommended that mass/reinforced concrete strip foundations be used; founded within the firm to stiff brown CLAY at an approximate depth of 0.9m below the existing ground level. An allowable bearing pressure of 40kN/m ² may be used for strips up to 750mm wide.			
Additional Site Investigation	Based on the limited sampling, the soils are considered to be suitable for their intended use, however additional sampling should be undertaken due to the limited coverage across the site.			

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SECTION 1 Introduction & Proposed Development

1.1 Background

Newport City Council is proposing the construction of a new commercial development at Docks Way, Newport. The proposed development will consist of a solar farm in the northern part of the council landfill site. Solar Farm comprising the installation of solar photovoltaic panels and associated infrastructure, including a switch room and fencing. The proposed layout can be seen in **Figure 1.1**.

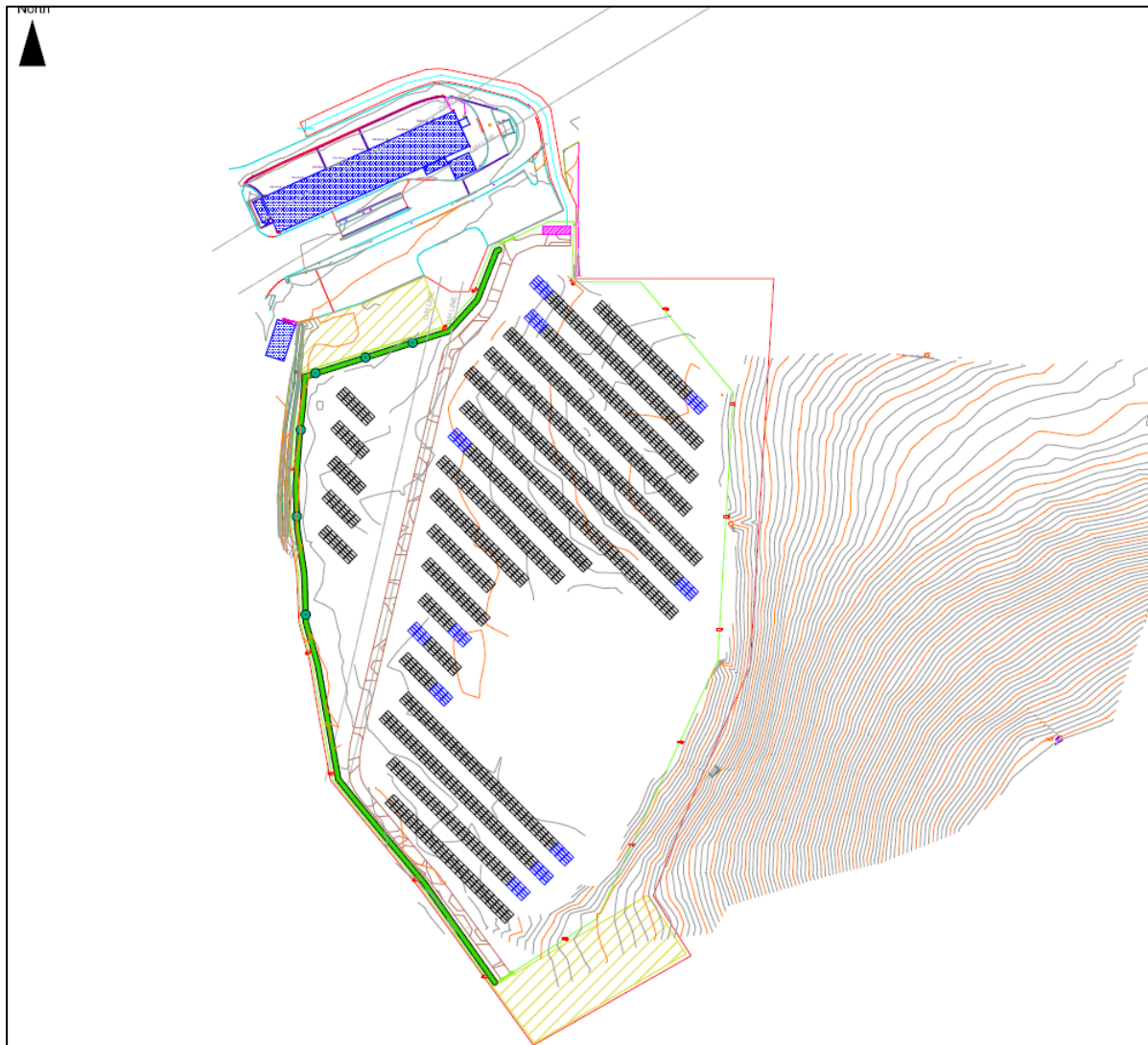


Figure 1.1 Proposed Site Layout

TFW Group Ltd (Terra Firma) have been commissioned by the Client to undertake a Geotechnical and Geoenvironmental Report.

Cambria Consulting Ltd. is the Civil Engineer for the project.

This report contains a Tier 2 assessment (Site Investigation) including a Generic Quantitative Geoenvironmental Risk Assessment and Geotechnical Ground Investigation.

1.2 Objectives

Land Contamination Risk Management (LCRM) guidance provided by the Environment Agency advocates using a tiered approach. This comprises Tier 1; the Preliminary Risk

Assessment, Tier 2; the Generic Quantitative Risk Assessment and Tier 3; the Detailed Quantitative Risk Assessment. As each tier is completed a decision is made whether it is necessary to advance to the next tier.

In addition to LCRM, geotechnical aspects of the development also need to be considered and are approached in a similar manner, with the risks identified in the preliminary assessment, and then investigated through subsequent phase of investigation.

1.2.1 Tier 2

The main objectives of the Tier 2 Generic Quantitative Geoenvironmental Risk Assessment programme are:

- investigate the potential human health and environmental liabilities at the site associated with any contamination; and
- provide a summary of the human health and environmental conditions at the site, together with any necessary further intrusive works and / or remediation works to render the site fit for its intended use.

The main objectives of the Geotechnical Site Investigation are:

- investigate the type, strength and bearing characteristics of the shallow superficial and underlying solid geology;
- provide engineering foundation and floor slab recommendations for the proposed development;
- provide recommendations regarding any other geotechnical aspects pertaining to the development.

In order to achieve the above objectives, Terra Firma carried out an assessment programme a review of existing data, followed by a field investigation to collect geotechnical and geoenvironmental data from selected locations.

The scope of the works including the schedule for in-situ and laboratory testing was determined by Terra Firma.

1.3 Geotechnical Category

In accordance with BS EN 1997-1:2004+A1:2013, the proposed development comprises the following geotechnical category:

Geotechnical Category 1: small and relatively simple structures, with negligible risk.

1.4 Information Sources

The following sources of information have been referenced in support of this assessment:

- client provided information, plans, security fence proposed, etc. (**Figure 1.1**)

It was beyond the scope of Terra Firma's brief to undertake a full Tier 1 desk study.

1.5 Roles & Responsibilities

Table 1.1 Roles and Responsibilities

Role	Organisation
Client/Developer	Newport City Council
Civil/Structural Engineer	Cambria Consulting Ltd.
Geotechnical/Geoenvironmental Consultant	TFW Group Ltd

1.6 Limitations & Exceptions of Investigation

The Client has requested that a Tier 2 Geoenvironmental and Geotechnical Report (GGR) be undertaken to enable the outlined main objectives.

The GGR was conducted, and this report has been prepared for the sole internal reliance of the Client and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of TFW Group Ltd. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geoenvironmental and geotechnical consultants. TFW Group Ltd does not provide legal advice and the advice of lawyers may be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

Human health and environmental risk assessment outcomes may not take into account the potential for the creation of new contaminant linkages as a result of variation to the proposed development and recommended engineering solutions. It is therefore imperative that the Client engages a geoenvironmental consultant to re-visit the conceptual site model and potential risks upon completion of final designs, prior to development.

Whilst this report assesses the suitability of soils in respect to human health and the environment, it is beyond the scope of this report to determine the legal status of imported and re-used soils/aggregates. It is the responsibility of the Client to confirm imported and re-used soils/aggregates have reached 'Non-Waste' status.

1.7 Quality Assurance

The quality, health, safety and environmental aspects of the assessment comply with Terra Firma business management system which is UKAS accredited and complies with the requirements of BS EN ISO 9001:2015, BS EN ISO 14001:2015 and BS EN ISO 45001:2018 standards.

SECTION 2 Review of Existing Data

2.1 Physical Setting & Current Site Use

The development site is circular in shape and is located on Docks Way in Newport (NP20 2NS). The site centres on an approximate National Grid Reference of ST306856, occupying a plan area of approximately 2.60 Hectares.

The site currently comprises a former landfill site located within the historic meandering course of the River Ebbw. The landfill is over 40 years old and has been capped with inert materials in the last few years. The site is predominantly covered with grass, scrub vegetation and mature trees, with a small pond present in the south-eastern part of the site.

The site is bound to the north and northwest by a recycling centre and the Southern Distributor Road. The Ebbw River is situated to the west, flowing southeast toward the Severn Estuary, with the infilled ground extending further to the east and south of the site.

The site elevation is approximately 16m to 14m AOD, with a gentle slope down to the northwest.

The site location can be seen on **Figure 2.1**.



Figure 2.1 Site Location

2.2 Geological Setting

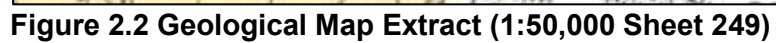
2.2.1 Geological Mapping

The 1:50,000 and 1:10,560 scale British Geological Survey maps of the area, Sheet 249 and Sheet ST38NW respectively, and the online BGS GeoIndex map viewer were consulted for geology underlying the site. Detailed stratigraphical information beneath the site is provided in **Table 2.1**.

Table 2.1 Detailed Stratigraphical Information

Age	Formation	Description
Quaternary	Tidal flat deposits	Mud flat and sand flat deposits, form extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They consist of unconsolidated sediment, mainly mud and/or sand. They may form the top surface of a deltaic deposit.
Triassic	Mercia Mudstone Group	Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite are widespread; thin sandstones are also present. Mid Triassic (Anisian) to latest Triassic (Rhaetian).

Made ground of unknown depth is anticipated at the site. Historically, the area formed part of a meander of the River Ebbw before the river channel was modified between 1945 and 1979 near its mouth. The area was then used as a municipal landfill which according to on line data is over 40years old. In recent years the site was closed and capped with inert materials, the exact thickness of which is unknown. Based upon google map information the landfill is likely to up to 14m deep at its highest point.



SECTION 3 Field Investigation

3.1 Site Works

A geotechnical and geoenvironmental site investigation comprising 16 Windowless Sample Boreholes was undertaken between the 20th and 22nd of April.

The fieldwork was supervised by Terra Firma, who logged the exploratory holes to the requirements of BS 5930:2015+A1:2020. The proposed locations of the exploratory holes were determined by Terra Firma in general accordance with BS 10175:2011+A2:2017 in order to assess the findings of the preliminary conceptual site model.

The purpose of the investigation was to assess the thickness, type, consistency and chemical composition of the inert capping known to have been placed over the landfill. Landfill gas is also to be assessed.

WINDOW SAMPLING

The boreholes referenced WS01 to WS16, were formed using a Terrier 2000 rig. Dynamic sampling techniques were employed from surface to produce a continuous disturbed sample.

Standard penetration tests (SPT) were carried out at regular intervals in general accordance with BS1377: Part 9:1990:3.3. SPT results summarised as N values are presented on the borehole log.

Boreholes were monitored for groundwater ingress as drilling proceeded.

Representative disturbed samples were taken and retained in airtight containers for environmental and geotechnical testing.

The borehole logs are presented in **Annex A**.

BOREHOLE BACKFILL/ INSTALL

On completion of WS03, WS04, WS07, WS09 and WS15 were backfilled with materials arising.

On completion, boreholes WS01, WS02, WS05, WS06, WS08, WS10, WS11, WS12, WS13, WS14, WS16 were installed with slotted standpipes consisting of a 50mm ID HDPE slotted tube set in a granular filter zone and sealed above with a bentonite plug. Installations were protected at surface with an upstanding cover. Full installation details are recorded on the relevant logs.

Exploratory hole locations are shown on **Drawing 01**.

3.2 Ground Conditions

The ground conditions encountered by the exploratory holes can in general be summarised as shown in **Table 3.2** and **Table 3.1**.

Table 3.2 Summary of Typical Ground Conditions in Solar Panel Area

Depth (m)			Thickness (m)	Borehole	Stratum
0.00-	-	0.40/1.00	0.40 - 1.00	All holes	Made Ground: Firm brown slightly gravelly sandy CLAY (Capping)

0.45/1.00	-	0.60/1.40	0.05 - 0.70	WS01 WS03 WS05 WS06 WS07 WS08 WS10 WS11	Made Ground: Very dense light brown sandy GRAVEL/ reddish brown slightly gravelly SAND (Capping)
0.40/1.40	-	> 4.25 Base not proven	1.00- >3.60 Base not proven	All holes except WS15	Made Ground (Waste related to the infilled land): (Very dense to refuse) frequent plastics, bags, bricks and very strong waste odour with a content of black slightly sandy silty clay

Table 3.3 Summary of Typical Ground Conditions in the Switch Room

Depth (m)			Thickness (m)	Borehole	Stratum
0.00-	-	1.40	1.40	WS16	Made Ground: Firm brown slightly gravelly sandy CLAY (Capping)
1.40	-	> 3.36 Base not proven	>3.36 Base not proven	WS16	Made Ground (Waste related to the infilled land): (Very dense to refuse) frequent plastics, bags, bricks and very strong waste odour with a content of black slightly sandy silty clay.

3.3 Groundwater

Groundwater was not encountered in the exploratory holes.

3.4 Installation Well Construction

Groundwater/Gas well locations were selected on a targeted basis to investigate known sources of contamination or potential contamination migration pathways.

Groundwater/Gas installation well construction details are summarised in **Table 3.4**.

Table 3.4 Installation Well Summary

Location	Response Zone		Stratum
	From (m)	To (m)	
WS01	1.00	3.00	Made ground: Waste related to the infilled land
WS02	1.00	2.00	Made ground: Waste related to the infilled land
WS05	1.00	2.00	Made ground: Waste related to the infilled land
WS06	1.00	3.00	Made ground: Waste related to the infilled land
WS08	1.00	2.00	Made ground: Waste related to the infilled land
WS10	1.00	3.00	Made ground: Waste related to the infilled land
WS11	1.00	2.00	Made ground: Waste related to the infilled land
WS12	1.00	3.00	Made ground: Waste related to the infilled land
WS13	1.00	2.00	Made ground: Waste related to the infilled land
WS14	1.00	2.00	Made ground: Waste related to the infilled land
WS16	1.00	2.50	Made ground: Waste related to the infilled land

3.5 Laboratory Chemical Testing

3.5.1 Sampling Strategy

Soil sampling locations were selected on a targeted basis to investigate suspected/known sources of contamination or potential contamination migration pathways within the capping layer.

Sample locations, depths and suspected/known contamination source targets are summarised in **Table 3.5**:

Table 3.5 Sample Locations and Targets

Location	Depth (m)	Type	Testing Suites
WS01	0.8 - 0.9	D1	BRE testing suite D (brownfield site, pyrite present)
WS02	0.3 - 0.4	D1	BRE testing suite D (brownfield site, pyrite present)
WS03	0.3 - 0.4	D1	BRE testing suite D (brownfield site, pyrite present)
WS04	0.3 - 0.4	D1	BRE testing suite D (brownfield site, pyrite present)
WS05	0.4 - 0.5	D1	BRE testing suite D (brownfield site, pyrite present)
WS06	0.3 - 0.4	D1	BRE testing suite D (brownfield site, pyrite present)
WS07	0.30	D1	BRE testing suite D (brownfield site, pyrite present)
WS08	0.30 - 0.50	D1	BRE testing suite D (brownfield site, pyrite present)
WS09	0.40 - 0.50	D1	BRE testing suite D (brownfield site, pyrite present)
WS10	0.40 - 0.50	D1	BRE testing suite D (brownfield site, pyrite present)
WS11	0.60 - 0.70	D1	BRE testing suite D (brownfield site, pyrite present)
WS12	0.90 - 1.00	D1	BRE testing suite D (brownfield site, pyrite present)
WS13	0.50	D1	BRE testing suite D (brownfield site, pyrite present)
WS14	0.30	D1	BRE testing suite D (brownfield site, pyrite present)
WS15	0.3 - 0.4	D1	BRE testing suite D (brownfield site, pyrite present)
WS04	0.2 - 0.4	ES101	Pathfinder Suite A + Asbestos ID + Speciated TPH including BTEX & MTBE
WS09	0.20 - 0.30	ES101	Pathfinder Suite A + Asbestos ID + Speciated TPH including BTEX & MTBE
WS13	0.40	ES101	Pathfinder Suite A + Asbestos ID + Speciated TPH including BTEX & MTBE
WS16	0.5	ES101	Pathfinder Suite A + Asbestos ID + Speciated TPH including BTEX & MTBE
WS16	1.00	D1	BRE testing suite D (brownfield site, pyrite present)

3.5.2 Sample Analysis

During the site investigation works soil samples were collected and despatched to the accredited laboratories of Normec DETS for laboratory chemical analysis. Soil samples were tested for the determinants listed in **Table 3.4**.

Table 3.6 Soil Laboratory Analysis

Metals & Metalloids	In-Organics	Organics	Others
Arsenic	Cyanide	Phenols	pH (acidity)
Cadmium	Sulphate	PAH	Asbestos
Chromium III		Petroleum Hydrocarbons	
Chromium VI		Organic matter	
Copper		BTEX	
Lead		MTBE	

Mercury			
Nickel			
Selenium			
Zinc			

The results are discussed in detail in **SECTION 4** and the laboratory test results certificates may be found in **Annex C**.

3.6 Soil Property Testing

3.6.1 In-situ Strength Testing

SPT

SPT N Values taken within the Made ground revealed an average uncorrected N value of 11 (Range 1 to 50). The distribution of SPT N values against depth is presented in **Table 3.8** Error! Reference source not found..

Table 3.7 Distribution of SPT N Values Against Depth

BH	Depth	SPT N-Value	Soil Type	Description
WS01	1.00 – 1.45	13	Made ground: Waste	(Medium dense)
	2.00 – 2.45	10	Made ground: Waste	(Medium dense)
	3.00 – 3.45	50	Made ground: Waste	(Very dense)
WS02	1.00 – 1.45	23	Made ground: Waste	(Medium dense)
	1.50 – 1.95	50	Made ground: Waste	(Very dense)
WS03	1.00 – 1.45	10	Made ground: Waste	(Medium dense)
	2.00 – 2.45	50	Made ground: Waste	(Very dense)
WS04	1.00 – 1.45	6	Made ground: Waste	(Loose)
	2.00 – 2.45	7	Made ground: Waste	(Loose)
	3.00 – 3.45	1	Made ground: Waste	(Loose)
	3.45 – 3.90	12	Made ground: Waste	(Medium dense)
	3.90 – 4.35	50	Made ground: Waste	(Very dense)
WS05	0.00 – 0.45	7	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	22	Made ground: Clay (Capping)	Stiff
	1.00 – 1.45	32	Made ground: Waste	(Dense)
	1.50 – 1.95	50	Made ground: Waste	(Very dense)
WS06	0.00 – 0.45	14	Made ground: Clay (Capping)	Firm
	0.45 – 0.90	8	Made ground: Sand (Capping)	Medium dense
	1.00 – 1.45	8	No Recovery	-
	2.00 – 2.45	20	Made ground: Waste	(Medium dense)
	3.00 – 3.45	50	Made ground: Waste	(Very dense)
WS07	0.00 – 0.45	7	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	9	Made ground: Clay (Capping)	Firm
	1.00 – 1.45	50	Made ground: Gravel (Capping)	Very dense
WS08	0.00 – 0.45	6	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	9	Made ground: Waste	(Medium dense)
	1.00 – 1.45	10	Made ground: Waste	(Medium dense)
	1.50 – 1.95	50	Made ground: Waste	(Very dense)
WS09	0.00 – 0.45	8	Made ground: Clay (Capping)	Firm
	0.45 – 0.90	13	Made ground: Waste	(Medium dense)
	1.00 – 1.45	6	Made ground: Waste	(Loose)

	1.50 – 1.95	50	Made ground: Waste	(Very dense)
WS10	0.00 – 0.45	9	Made ground: Clay (Capping)	Firm
	0.45 – 0.90	12	Made ground: Waste	(Medium dense)
	1.00 – 1.45	7	Made ground: Waste	(Loose)
	2.00 – 2.45	6	Made ground: Waste	(Loose)
	2.50 – 2.95	50	Made ground: Waste	(Very dense)
WS11	0.00 – 0.45	7	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	13	Made ground: Waste	(Medium dense)
	1.00 – 1.45	12	Made ground: Waste	(Medium dense)
	1.50 – 1.95	50	Made ground: Waste	(Very dense)
WS12	0.00 – 0.45	7	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	17	Made ground: Clay (Capping)	Stiff
	1.00 – 1.45	6	Made ground: Waste	(Loose)
	2.00 – 2.45	11	Made ground: Waste	(Medium dense)
	2.60 – 3.05	50	Made ground: Waste	(Very dense)
WS13	0.00 – 0.45	8	Made ground: Clay (Capping)	Firm
	0.45 – 0.90	11	Made ground: Waste	(Medium dense)
	1.00 – 1.45	11	Made ground: Waste	(Medium dense)
	2.00 – 2.45	50	Made ground: Waste	(Very dense)
WS14	0.00 – 0.45	15	Made ground: clayey silt (Capping)	Firm
	0.45 – 0.90	21	Made ground: Waste	(Medium dense)
	1.00 – 1.45	10	Made ground: Waste	(Medium dense)
	2.00 – 2.45	50	Made ground: Waste	(Very dense)
WS15	0.00 – 0.45	5	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	10	Made ground: Clay (Capping)	Firm
	1.00 – 1.45	50	Made ground: Gravel (Capping)	Very dense
WS16	0.00 – 0.45	5	Made ground: Clay (Capping)	Soft
	0.45 – 0.90	15	Made ground: Clay (Capping)	Firm
	1.00 – 1.45	10	Made ground: Waste	(Medium dense)
	2.00 – 2.45	9	Made ground: Waste	(Medium dense)
	2.80 – 3.25	50	Made ground: Waste	(Very dense)

Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.

3.6.2 Laboratory Geotechnical Testing

A schedule of laboratory tests was prepared by Terra Firma and samples were despatched to the accredited laboratories of Normec DETS. A summary of the testing carried out is presented in **Table 3.8**.

Table 3.8 Summary of Geotechnical Testing

Geotechnical Test	No. Samples Tested
BRE SD1 (Concrete classification)	16

The geotechnical test results are presented in **Annex B** and discussed in **SECTION 8** of this report.

SECTION 4 Evaluation of Geoenvironmental Analytical Results

4.1 Assessment Methodology

4.1.1 Soils

An assessment of the analytical results has been made with comparison with the following generic assessment criteria with preference in most onerous order:

- Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) Suitable 4 Use Levels (S4UL) (Nathanail, CP *et al.*:2015);
- Category 4 Screening Levels (C4SL) provided by the Department for Environment, Food and Rural Affairs (DEFRA:2014);
- Soil Guideline Values (SGV) by the Environment Agency (2009);
- Generic Assessment Criteria (GAC) provided by EIC/AGS/CL:AIRE (2010); and
- Generic Assessment Criteria (GAC) derived in-house.

In the absence of generic assessment criteria, the laboratory limit of detection has been used for comparison, in order to establish the presence/absence of determinants and for initial screening purposes.

An average soil organic matter (SOM) of 1.85% was determined from laboratory analysis, therefore a conservative value of 1.0% SOM has been adopted for the site when assessing appropriate threshold values for analysed determinants.

4.2 Soil Test Results

A summary of the chemical test results from the capping layer, which include the regulatory soil guideline values used in a **commercial setting**, is given in the following tables. The complete results can be found in **Annex B**.

4.2.1 Inorganics

Four samples were tested for a standard suite of inorganics, pH and organic matter. The summarised results are in **Table 4.1**.

Table 4.1 Summary of Soil Chemical Test Results – Inorganics

Determinant	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Arsenic	640	LQM/CIEH	8.0	15	0
Cadmium	190	LQM/CIEH	0.1	0.3	0
Chromium III	8600	LQM/CIEH	22	37	0
Chromium VI	33	LQM/CIEH	<1.0	<1.0	0
Copper	68000	LQM/CIEH	11	21	0
Lead	2330	C4SL	23	39	0
Mercury (inorganic)	1100	LQM/CIEH	<0.05	0.06	0
Nickel	980	LQM/CIEH	18	34	0
Selenium	12000	LQM/CIEH	<0.5	<0.5	0
Zinc	730000	LQM/CIEH	64	140	0
Cyanide	-	-	<0.1	0.1	-

Organic Matter (%)	-	-	0.5	2.7	-
pH	-	-	7.5	8.3	-
Notes: - No available guideline					

4.2.2 Organics

Four samples were tested for speciated polycyclic aromatic hydrocarbons (PAH). The summarised results are in **Table 4.2**.

Table 4.2 Summary of Soil Chemical Test Results – Speciated PAH

Determinand	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Naphthalene	190	LQM/CIEH	<0.03	<0.03	0
Acenaphthylene	83000	LQM/CIEH	<0.03	<0.03	0
Acenaphthene	84000	LQM/CIEH	<0.03	<0.03	0
Fluorene	63000	LQM/CIEH	<0.03	<0.03	0
Phenanthrene	22000	LQM/CIEH	<0.03	0.09	0
Anthracene	520000	LQM/CIEH	<0.03	<0.03	0
Fluoranthene	23000	LQM/CIEH	<0.03	0.12	0
Pyrene	54000	LQM/CIEH	<0.03	0.08	0
Benzo(a)anthracene	170	LQM/CIEH	<0.03	0.05	0
Chrysene	350	LQM/CIEH	<0.03	0.04	0
Benzo(b)fluoranthene	44	LQM/CIEH	<0.03	0.07	0
Benzo(k)fluoranthene	1200	LQM/CIEH	<0.03	<0.03	0
Benzo(a)pyrene	35	LQM/CIEH	<0.03	0.04	0
Indeno(123cd)pyrene	500	LQM/CIEH	<0.03	<0.03	0
Dibenzo(ah)anthracene	3.5	LQM/CIEH	<0.03	<0.03	0
Benzo(ghi)perylene	3900	LQM/CIEH	<0.03	<0.03	0
Total PAH	-	-	<0.10	0.49	-
Notes: Thresholds based on 1.0% soil organic matter - No available guidelines					

Four samples were tested for petroleum hydrocarbon. The summarised results are shown in **Table 4.3**.

Table 4.3 Summary of Soil Chemical Test Results – Petroleum Hydrocarbons

Determinand	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Aliphatic					
PH C5 – C6 Ali	3200	LQM/CIEH	<0.01	<0.01	0
PH C6 – C8 Ali	7800	LQM/CIEH	<0.01	<0.01	0
PH C8 – C10 Ali	2000	LQM/CIEH	<0.01	<0.01	0
PH C10 – C12 Ali	9700	LQM/CIEH	<1.50	<1.50	0
PH C12 – C16 Ali	59000	LQM/CIEH	<1.20	<1.20	0
PH C16 – C21 Ali	1600000*	LQM/CIEH	<1.50	<1.50	0

PH C21 – C35 Ali	1600000*	LQM/CIEH	<3.40	<3.40	0
Aromatic					
PH C5 – C7 Arom	26000	LQM/CIEH	<0.01	<0.01	0
PH C7 – C8 Arom	56000	LQM/CIEH	<0.01	<0.01	0
PH C8 – C10 Arom	3500	LQM/CIEH	<0.01	<0.01	0
PH C10 – C12 Arom	16000	LQM/CIEH	<0.90	<0.90	0
PH C12 – C16 Arom	36000	LQM/CIEH	<0.50	<0.50	0
PH C16 – C21 Arom	28000	LQM/CIEH	<0.60	<0.60	0
PH C21 – C35 Arom	28000	LQM/CIEH	<1.40	<1.40	0
Notes: PH – Petroleum Hydrocarbon Ali – Aliphatic Arom – Aromatic Thresholds based on 1.0% soil organic matter * – Ali C16-21 and C21-C35 based on criteria for Ali EC >16-35					

Four samples were tested for Phenols, BTEX and MTBE compounds. The summarised results are in **Table 4.4**.

Table 4.4 Summary of Soil Chemical Test Results – Phenols, BTEX & MTBE

Determinand	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Phenols	440	LQM/CIEH	<0.3	<0.3	0
Benzene	27	LQM/CIEH	<0.01	<0.01	0
Toluene	56000	LQM/CIEH	<0.01	<0.01	0
Ethylbenzene	5700	LQM/CIEH	<0.01	<0.01	0
Xylene	-	LQM/CIEH	<0.01	<0.01	0
MTBE	-	-	<0.01	<0.01	-
Notes: - No available guideline					

4.2.3 Asbestos Testing

All made ground soil samples were scheduled for asbestos screening. Asbestos was not detected.

SECTION 5 Ground Gas Risk Assessment

5.1 Gas Screening Value

Eleven ground gas monitoring wells were installed in WS01, WS02, WS05, WS06, WS08, WS10, WS11, WS12, WS13, WS14 and WS16.

Six rounds of gas monitoring have been carried out. The installations were tested for carbon dioxide, methane, oxygen, carbon monoxide and hydrogen sulphide using a Gas Analyser GA5000.

Recorded gas concentrations are summarised in **Table 5.1**.

Table 5.1 Measured Gas Concentration Summary

Gas	Minimum (% V/V)	Maximum (% V/V)
Methane	0	74.3
Carbon Dioxide	0.3	33.2
Oxygen	0.1	20.9

Methane levels peaked at 74.3% V/V. Carbon dioxide levels varied between 0.3% and 33.2% V/V. Oxygen concentrations varied between 0.1% and 20.9% V/V.

The gas flow rate from the boreholes was also assessed, a maximum flow rate of 0.1l/hr was recorded.

Based on a flow rate of 0.1 l/hr and the highest recorded carbon dioxide concentration of 33.2%, a gas screening value of 0.03 l/hr is calculated, as follows:

$$(33.2/100) \times 0.1 = 0.033 \text{ l/hr}$$

Based on a flow rate of 0.1 l/hr and the highest recorded Methane concentration of 74.3%, a gas screening value of 0.07 l/hr is calculated, as follows:

$$(74.3/100) \times 0.1 = 0.074 \text{ l/hr}$$

The monitoring results to date are presented in **Annex C**.

5.2 Conclusion

Assessing all lines of evidence, it is considered that a potential pollution linkage exists. Receptors at risk of hazards associated with ground gas will require the site to be first remediated or suitable mitigation adopted, details of which must be prescribed in a site specific Remediation Strategy.

As the development is a solar farm with only one enclosed building (switch room) no special precautions to deal with ground gas will be required for the majority of the development.

Beneath the Switch Room gas preventative measure commensurate with Gas Characteristic Situation CS2 should be installed.

Due to the High levels of methane and carbon dioxide encountered special precautions should be taken by site personnel especially when excavating trenches with personal gas monitoring alarms for methane carbon dioxide and hydrogen sulphide worn by all site operatives.

SECTION 6 Generic Quantitative Risk Assessment

6.1 Contaminants of Concern

All substances tested within the capping layer were found to be present at concentrations below their respective human health threshold level.

Contaminants of concern identified as part of the investigation are summarised in **Table 6.1**, along with an interpretation of the likely contamination source. Where applicable, the contaminant, source relationship is based on the inferences made in the preliminary conceptual site model.

Table 6.1 Contaminants of Concern

Location	Contaminant	Source
WS01 WS02 WS05 WS06 WS08 WS10 WS11 WS12 WS14 WS16	Ground gas (high value of CH ₄ /CO ₂)	Infilled land / Made ground (S1)

6.2 Contaminant Linkages

Based on the findings of the intrusive site investigation and identified contaminants, the preliminary conceptual site model has been revised. Remaining contaminant linkages are tabulated in the refined conceptual site model **Table 6.2**. Identified contaminant linkages may require further investigation, detailed risk assessment and appropriate mitigation or remedial measures.

Table 6.2 Refined Conceptual Site Model

Source	Pathway	Receptor
S1 – Ground gas	Horizontal and vertical migration of ground gases and vapours P1	Construction and maintenance workers R1 Future site users (workers or visitor) R2

6.3 Mitigation & Remedial Measures

The capping layer over the old landfill is considered to be uncontaminated, therefore, requiring no mitigation or remedial measure to be undertaken.

Based on the limited sampling, the soils are considered to be suitable for their intended use, however additional sampling should be undertaken due to the limited coverage across the site.

However, it should be noted that should extensive trenching for services be envisaged, depending upon their depth additional testing should be carried out along the trench routes.

6.3.1 Human Health

Site specific mitigation and remedial measures are not required with respect to human health.

As good practice, construction workers must adhere to good site management, COSHH, good standards of hygiene and appropriate health & safety on site, with personal protection equipment (PPE) and dust suppression where appropriate.

All imported soils must be validated as clean and suitable for use in accordance with 'Requirements for the Chemical Testing of Imported Soils for Various End Uses and Validation Cover Systems'.

For the specification of proposed new supply water pipes, the UK Water Industry Research publication 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, must be consulted.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils destined for off-site disposal must be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and must be classified on the basis of their specific chemical properties.

If during earthworks ground conditions are encountered that are markedly different to those found during the investigation, then the ground must be subject to additional sampling and testing and any necessary remedial measures designed and implemented before continuing with the works.

6.3.1.1 Ground Gas

Six round of ground gas monitoring have been carried out. When monitoring results are compared with Table 8.5 of CIRIA report C665, the site is classified as 'gas characteristic situation 1' (CS1). However, as the peak methane/ carbon dioxide has periodically/regularly risen above the 1%/5% screening threshold level, it is recommended that consideration be given to elevating the gas characteristic situation to CS2.

As the development is a solar farm with only one enclosed building (switch room) no special precautions to deal with ground gas will be required for the majority of the development.

However, due to the high levels of methane and carbon dioxide encountered special precautions should be taken by site personnel especially if excavating trenches with personal gas monitoring alarms for methane carbon dioxide and hydrogen sulphide worn by all site operatives.

To protect the future site users from identified ground gas, proposed enclosed structures such as the switch room will need to incorporate within their construction a suitable ground gas protection system. The ground gas protection system must be designed, specified and verified in accordance with the British Standard 8485:2015+A1:2019 and other relevant guidance, such as CIRIA C735:2014 and NHBC Foundation NF94:2023.

To protect the workers from identified ground gas, all site workers wear personal gas detection monitors while working in the landfill area and there is no smoking on site.

It is important to note that warranty providers may require more or less stringent design, specification and verification to that expected by Local Authority Environmental Health/ Contaminated Land Officers.

It is therefore essential that a specialist consultant, that is competent and suitably indemnified, is retained to prepare a ground gas protection system Design Report and Verification Plan for the proposed development. The Design Report will need to provide justification for the specified ventilation, structural barrier and gas membrane protection elements to be incorporated within the detailed designs. Whereas the Verification Plan is based on the perceived risk associated with the complexity of design, experience of the installer, size of the site and gas risk, and is required to provide a detailed methodology to allow for the successful completion of in-situ verification of the installed protection.

Verification of installed ground gas protection systems by a competent, qualified, accredited, independent third party, will be required upon completion of the protection elements installation. Final verification will only be achieved if evidence gathering processes prescribed in the Verification Plan are fully undertaken.

SECTION 8 Laboratory Geotechnical Testing Results Analysis

Laboratory geotechnical testing results are summarised in the following sections and presented in their entirety in **Annex B**, unless otherwise stated.

8.1 Soil Testing

8.1.1 Concrete Classification Testing

Sixteen samples were subject to testing for concrete classification in accordance with BRE SD1:2015. The results are summarised in **Table 8.1**

Table 8.1 BRE SD1 Testing Summary

Location	Depth (m)	2:1 Water/ Soil Extract	Total Sulphur (%)	pH	Total Potential Sulphate (%)	Design Sulphate Class for Location	ACEC Class for Location
		SO ₄ (mg/l)					
WS01	0.80	270	0.09	8.6	0.27	AC-1s	DS-2
WS02	0.30	44	0.01	8.2	0.03	AC-1s	DS-1
WS03	0.30	29	0.03	7.7	0.09	AC-1s	DS-1
WS04	0.30	18	0.03	7.0	0.09	AC-1s	DS-1
WS05	0.40	32	0.01	7.7	0.03	AC-1s	DS-1
WS06	0.30	62	0.08	9.0	0.24	AC-1s	DS-1
WS07	0.30	27	0.05	8.4	0.15	AC-1s	DS-1
WS08	0.30	34	0.04	8.1	0.12	AC-1s	DS-1
WS09	0.40	18	0.03	6.7	0.09	AC-1s	DS-1
WS10	0.40	47	0.02	8.0	0.06	AC-1s	DS-1
WS11	0.60	20	0.03	7.4	0.09	AC-1s	DS-1
WS12	0.90	120	0.10	9.0	0.30	AC-1s	DS-1
WS13	0.50	34	0.03	8.4	0.09	AC-1s	DS-1
WS14	0.30	31	0.03	8.3	0.09	AC-1s	DS-1
WS15	0.30	49	0.12	8.3	0.36	AC-1s	DS-2
WS16	1.00	15	0.03	9.0	0.09	AC-1s	DS-1
Notes:							
The following stoichiometric equation was employed to determine the Total Potential Sulphate (TPS). $TPS (\% \text{ as } SO_4) = 3.0 \times \text{Total Sulphur (TS \% as S)}$.							
The amount of Oxidisable Sulphides (OS as %SO ₄) has been conservatively calculated by the following equation. $OS = TPS - \text{Acid Soluble Sulphate (AS)}$.							

Based on results obtained, the characteristic values are provided below.

Sulphate (2:1 Water Soluble) as SO₄: 15mg/l to 270mg/l
 pH: 6.7 to 9.0
 Total Potential Sulphate (TPS): 0.03% to 0.36%

The initial classification for the site based on sulphate (2:1 Water Soluble) as SO₄ is Design Sulphate (DS) Class DS-1. The Aggressive Chemical Environment for Concrete (ACEC) Class for the site based on sulphate (2:1 Water Soluble) as SO₄, mobile water and pH is AC-1s.

However, due to the potential presence of sulfides (eg, pyrite/ gypsum) additional consideration is required.

A significant number of samples contained oxidisable sulphides of greater than 0.3%, signifying the likely presence of sulphides. Therefore the TPS concentrations need to be considered in this assessment.

The DS class for the site base on the TPS is DS-1 and DS-2.

The ACEC Class for the site based on TPS and pH is AC-1s.

Based on the above assessment the DS Class for the site is determined as DS-1 and DS-2, and the ACEC Class is AC-1s.

SECTION 9 Engineering Recommendations

9.1 Preparation of Site

Areas of vegetation including all roots must be stripped and removed from beneath the proposed development area.

Allowances should be made for any temporary/permanent support works to any existing adjacent structure necessary as a result of the proposed works.

Contingencies should be made for the protection/diversion of any underground/overhead services present beneath/above the site brought about as a result of the proposed works.

Any reduced levels should be brought up to the required levels with suitable inert mainly granular materials. Department for Transport (DfT) type 2 sub-base or similar should be used and compacted in layers to the requirements of the Specification for Highway Works.

Allowances must also be made for the excavation of any soft spots/areas and their replacement with well compacted imported granular materials.

In accordance with EC Regulation 1272/2008 (Ref) and Environment Agency Guidance WM3 soils and other materials destined for off-site disposal must be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and must be classified on the basis of their specific chemical properties. Terra Firma offer this service if required.

9.2 Foundation & Floor Slab Solution

It is understood that the switch room is to be constructed upon an existing concrete slab.

Investigations in the area of the switch room encountered landfill material beneath an inert capping material.

For the proposed switchroom, maximum total consolidation settlements of <25mm should result with differential movements of the superstructure not exceeding 1:750.

It should also be noted that the foundations will lie above the existing landfill and that due to organic decay of the biodegradable waste within the landfill time dependant settlements will occur.

Measures should therefore be incorporated in the cables entering the switch room to allow for likely differential settlement.

With regards to the foundations for the solar panels, it is also understood that a no-dig ballast foundation will be used.

9.3 Fence Line

The proposed development will comprise the construction of a new security fence around the perimeter of the plot where the solar panels will be installed, shown on **Drawing 02**.

The ground investigation confirmed that the depth to the engineered capping layer varies across the site. The base of the very dense sandy gravel, which comprises the capping layer, was encountered within approximately 0.40 m and 1.40 m bgl, beneath which landfill-derived made ground is present. The capping layer is considered competent to support the proposed fence post foundations.

To minimise the potential for disturbance of the underlying landfill material and to eliminate the potential human health risks associated with encountering landfill waste during installation or future maintenance, it is recommended that the fence posts be designed as partially exposed foundations with the base foundation must be up to 0.30m. This approach will ensure that the foundation elements remain founded within the capping layer and do not penetrate into the underlying landfill waste.

It is recommended that fence posts are set in concrete and that they are at a sufficient set to prevent the structure overturning due to wind loading.

9.4 Excavations & Formations

Most of the shallow excavations will be possible with normal soil excavating machinery.

Shallow perched water and groundwater flows were not encountered during the investigation. Any water inflows together with rainwater infiltration should be dealt with by conventional pumping techniques. However, it should be noted that during times of heavy rainfall a higher water table will be encountered.

The sides of any excavations deeper than 1.20m, or shallower if unstable, should be supported by planking and strutting or other proprietary means.

The sub-formations/formations are likely to be susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic.

Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.

As a minimum the formation/excavation surfaces must be protected by blinding concrete immediately after exposure.

Allowances should be made for the removal of soft spots/areas and their replacement with well compacted granular materials.

Allowances should also be made for special precautions to prevent formation deterioration in addition to the above.

9.5 Protection of Buried Concrete

The BRE Special Digest 1 testing has been undertaken with 16 samples submitted for analysis. Levels within the in-situ materials measured between 15 and 270 mg/l for water soluble sulphate (WS) and the pH varied between 6.7 and 9.0.

When compared to Table C2 (Brownfield Locations) of BRE Special Digest 1 the concrete on site should conform to Design Sulphate Class **DS-1 and DS-2** and to Aggressive Chemical Environment for Concrete Class **AC-1s**.

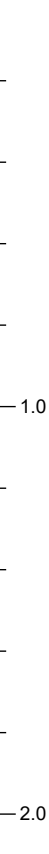
Since OS is below 0.30% in the samples pyrite is not considered to be present and the initial classification can be used.

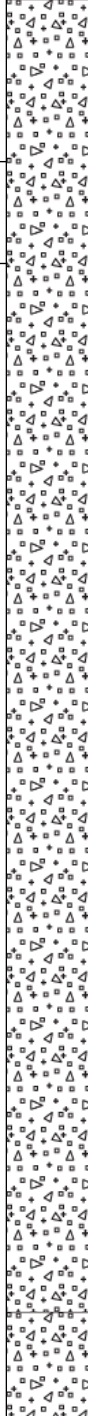
As the water soluble sulphate concentration is below 3000mg/l an additional consideration for the level of magnesium is not required.

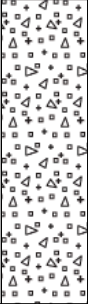
ANNEX A
Borehole Logs

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA			Borehole No. WS01 Sheet 1 of 1		
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026			Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos	
Contractor Terra Firma		Plant Used Archway Dart				Depth Strike After 20 mins Remarks			Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description						Depth Scale
0.80-0.90 m 1 D	6-4-2-2-5-4 N = 13	1		MADE GROUND: Firm brown slightly gravelly sandy CLAY with rootlets, occasional pockets of fine sand and a low cobble content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse brick, sandstone, plastic, glass, ceramic, wood.						1.0
		1.25		MADE GROUND: (Medium dense) light brown sandy GRAVEL with a low cobble content up to 800x750x300 mm. Gravel is angular to sub-angular fine to coarse brick. Sand is fine to coarse.						
				MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium dense to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.						
	3-3-3-2-2-3 N = 10									2.0
										3.0
	10-15-13-13-14-10 N = 50									
WS01 Refusal at 3.37 m										
Remarks: 1] Borehole terminated at 3.37m depth. 2] No groundwater was encountered. 3] Gas/ groundwater monitoring point installed at this location. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA			Borehole No. WS02 Sheet 1 of 1		
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026			Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos	
Contractor Terra Firma		Plant Used Archway Dart				Depth Strike			After 20 mins	
									Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description						Depth Scale
0.30-0.40 m 1 D	2-2-4-4-3-12 N = 23 25-0-50/20mm-0-0-0 N = 50	0.4		MADE GROUND: Firm brown mottled black slightly sandy gravelly CLAY with rootlets. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick. MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium dense to very dense) black mix of plastics, textiles, bags, wood, bricks, slightly sandy silty clay and very strong waste odour.						1.0
				WS02 Refusal at 1.95 m						
Remarks: 1] Borehole terminated at 1.95m depth. 2] No groundwater was encountered. 3] Gas/ groundwater monitoring point installed at this location. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS03 Sheet 1 of 1			
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS		
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details Depth Strike After 20 mins Remarks		Logged By Rocio Albertos		
Contractor Terra Firma			Plant Used Archway Dart				Approved By			
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale	
0.30-0.40 m 1 D	1-1-1-2-3-4 N = 10	0.4		MADE GROUND: Firm brown slightly sandy gravelly CLAY with rootlets. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick. with occasional pockets of fine sand.						
		0.45		MADE GROUND: (Medium dense) reddish brown slightly gravelly clayey fine to coarse SAND with a low cobble content up to 800x750x300mm. Gravel is fine to medium angular to sub-angular of limestone, plastic.						
		MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium dense to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.								
	2-23-50/0mm-0-0-0 N = 50			WS03 Refusal at 2.12 m						
Remarks: 1] Borehole terminated at 2.12m depth. 2] No groundwater was encountered. 3] Upon completion borehole was backfilled with materials arising. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS04 Sheet 1 of 2			
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS		
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details Depth Strike After 20 mins Remarks		Logged By Rocío Albertos		
Contractor Terra Firma			Plant Used Archway Dart						Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale	
0.20-0.40 m ES101	1-2-2-2-1-1 N = 6	0.4		MADE GROUND: Very soft to soft brown slightly sandy gravelly CLAY with rootlets. Sand is fine to coarse. Gravel is fine to medium of mixed lithologies.						
0.30-0.40 m 1 D		0.65		MADE GROUND: Firm brown, grey and black slightly sandy gravelly CLAY with occasional pockets of fine sand. Sand is fine to coarse. Gravel is sub-angular fine to coarse of brick, limestone, wood, plastic.						
		MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium dense to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.								
	2-4-3-2-1-1 N = 7									
	1-0-0-0-1-0 N = 1									
Remarks: 1] Borehole terminated at 4.25m depth. 2] No groundwater was encountered. 3] Upon completion borehole was backfilled with materials arising. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone:029 2073 5354 Email:Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS04 Sheet 2 of 2			
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS		
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos	
Contractor Terra Firma		Plant Used Archway Dart				Depth Strike	After 20 mins	Remarks	Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description						Depth Scale
	2-0-1-2-3-6 N = 12 8-10-12-14-24-0 N = 50			MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium dense to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour. (continued)						4.0
WS04 Refusal at 4.25 m										
Remarks: 1] Borehole terminated at 4.25m depth. 2] No groundwater was encountered. 3] Upon completion borehole was backfilled with materials arising. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

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		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone:029 2073 5354 Email:Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS07 Sheet 1 of 1		
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos
Contractor Terra Firma		Plant Used Archway Dart				Depth Strike	After 20 mins	Remarks	
Contractor Terra Firma		Plant Used Archway Dart		N: L:					Approved By
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale
0.30-0.90 m D	0-0-1-2-2-2 N = 7	1 1.25		MADE GROUND: Firm brown slightly gravelly sandy CLAY with rootlets, occasional pockets of fine sand and a low cobble content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse brick, sandstone, plastic, glass, ceramic, wood.					1.0
	MADE GROUND: (Medium dense) light brown sandy GRAVEL with a low cobble content up to 800x750x300mm. Gravel is angular to sub-angular fine to coarse brick. Sand is fine to coarse.								
				2-2-2-2-2-3 N = 9	MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.				
	2-1-8-42-0-0 N = 50			WS07 Refusal at 1.26 m					
Remarks: 1] Borehole terminated at 1.26m depth. 2] No groundwater was encountered. 3] Upon completion borehole, backfilled with materials arising. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.									

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA			Borehole No. WS08 Sheet 1 of 1		
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026			Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos	
Contractor Terra Firma		Plant Used Archway Dart				Depth Strike After 20 mins Remarks			Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description						Depth Scale
0.30-0.50 m 1 D	0-1-1-1-2-2 N = 6	0.4		MADE GROUND: Soft brown mottled black slightly sandy CLAY with frequent rootlets. Sand is fine to coarse.						1.0
		0.6		MADE GROUND: Medium dense light brown gravelly clayey fine to coarse SAND Gravel is fine to coarse sub-angular of plastic, sandstone, wood and glass.						
	2-2-2-2-2-3 N = 9	MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.								
	1-0-3-3-2-2 N = 10									
	3-4-7-4-5-34 N = 50									
WS08 Refusal at 1.92 m										
Remarks: 1] Borehole terminated at 1.92m depth. 2] No groundwater was encountered. 3] Gas/ groundwater monitoring point installed at this location. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

Page 1 of 1

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS10 Sheet 1 of 1			
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS		
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details Depth Strike After 20 mins Remarks		Logged By Rocio Albertos		
Contractor Terra Firma			Plant Used Archway Dart						Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale	
0.40-0.50 m 1 D	0-0-3-2-2-2 N = 9	0.5		MADE GROUND: Firm brown slightly gravelly sandy CLAY with rootlets, occasional pockets of fine sand and a low cobble content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse brick, sandstone, plastic, glass, ceramic, wood.						
	2-5-3-3-3-3 N = 12	0.6		MADE GROUND: Medium dense light brown sandy GRAVEL Gravel is angular to sub-angular fine to coarse mixed lithologies. Sand is fine to coarse.						
	1-1-1-2-2-2 N = 7			MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.						
	0-1-2-1-1-2 N = 6									
	20-5-50/20mm-0-0-0 N = 50			WS10 Refusal at 2.6 m						
Remarks: 1] Borehole terminated at 2.60m depth. 2] No groundwater was encountered. 3] Gas/ groundwater monitoring point installed at this location. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA			Borehole No. WS11 Sheet 1 of 1	
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos
Contractor Terra Firma						Plant Used Archway Dart		Depth Strike	
Approved By									

Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description	Depth Scale
0.60-0.70 m 1 D	1-1-2-2-1-2 N = 7	0.7		MADE GROUND: Firm to stiff brown and grey slightly sandy CLAY with frequent rootlets. Sand is fine to coarse.	
	3-3-4-4-3-2 N = 13	0.8		MADE GROUND: (Medium dense) brown slightly sandy clayey GRAVEL Gravel is angular to sub-angular fine to coarse brick, concrete, limestone. Sand is fine to coarse.	
	2-1-2-5-3-2 N = 12			MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.	
	25-0-50/75mm-0-0-0 N = 50				
WS11 Refusal at 2.42 m					

Remarks: 1] Borehole terminated at 2.42m depth.
 2] No groundwater was encountered.
 3] Gas/ groundwater monitoring point installed at this location.
 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA			Borehole No. WS12 Sheet 1 of 1		
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026			Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos	
Contractor Terra Firma						Plant Used Archway Dart		Depth Strike After 20 mins Remarks		
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description						Depth Scale
0.90-1.00 m 1 D	1-1-1-2-2-2 N = 7	0.45		MADE GROUND: Soft brown and grey sandy CLAY with frequent rootlets. Sand is fine to coarse.						
	2-3-4-4-5-4 N = 17	0.9		MADE GROUND: Firm to stiff dark brown slightly sandy gravelly CLAY Sand is fine to coarse. Gravel is fine to coarse of brick and plastic.						
	3-2-2-2-1-1 N = 6			MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.						
	2-1-2-2-2-5 N = 11									
	25-0-50/30mm-0-0-0 N = 50			WS12 Refusal at 2.66 m						
Remarks: 1] Borehole terminated at 2.66m depth. 2] No groundwater was encountered. 3] Gas/ groundwater monitoring point installed at this location. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA			Borehole No. WS13 Sheet 1 of 1		
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026			Hole Type WS	
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details Depth Strike After 20 mins Remarks			Logged By Rocio Albertos	
Contractor Terra Firma			Plant Used Archway Dart					Approved By		
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale	
0.40-0.50 m 1D ES-101 0.50-0.60 m	0-0-1-1-3-3 N = 8 3-2-3-3-2-3 N = 11 1-0-0-1-5-5 N = 11 10-15-48-2-0-0 N = 50	0.55		MADE GROUND: Firm brown and grey slightly sandy CLAY. Sand is fine to coarse.						
MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.										
				WS13 Refusal at 2.17 m						
Remarks: 1] Borehole terminated at 2.17m depth. 2] No groundwater was encountered. 3] Gas/ groundwater monitoring point installed at this location. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

Page 1 of 1

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone:029 2073 5354 Email:Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS15 Sheet 1 of 1			
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 20/04/2026 to 20/04/2026		Hole Type WS		
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details			Logged By Rocio Albertos	
Contractor Terra Firma						Plant Used Archway Dart		Depth Strike		After 20 mins
Contractor Terra Firma				Plant Used Archway Dart		N: L:		Approved By		
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale	
0.80-0.90 m, - D- 1 D	0-0-1-1-1-2 N = 5	1		MADE GROUND: Soft to firm brown slightly gravelly sandy CLAY with rootlets, occasional pockets of fine sand and a low cobble content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse brick, sandstone, plastic, glass, ceramic, wood.					1.0	
	2-2-3-3-2-2 N = 10			MADE GROUND: Very dense light brown sandy GRAVEL with a low cobble content up to 800x750x300mm. Gravel is angular to sub-angular fine to coarse brick. Sand is fine to coarse.						
	25-0-50/15mm-0-0-0 N = 50			WS15 Refusal at 1.07 m						
Remarks: 1] Borehole terminated at 1.07m depth. 2] No groundwater was encountered. 3] Upon completion borehole was backfilled with materials arising. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

		Consulting Geotechnical, Geo-Environmental Engineers & Site Investigation Contractors Phone: 029 2073 5354 Email: Cardiff@tfwgroup.co.uk			TFW Group Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		Borehole No. WS16 Sheet 1 of 1			
Project Name Newport Solar Farm				Project No. TF-26-137-CA		Date 01/05/2026 to 01/05/2026		Hole Type WS		
Client Cambria Consulting				Co-ords E: N: L:		Water Strike Details Depth Strike After 20 mins Remarks		Logged By Rocío Albertos		
Contractor Terra Firma			Plant Used Archway Dart						Approved By	
Sample Depth (m)	Test Results	Depth (m)	Legend	Stratum Description					Depth Scale	
0.50-0.60 m 101 ES	0-0-1-1-1-2 N = 5			MADE GROUND: Soft to firm brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick.					1.0	
0.80-0.90 m 1 D	2-3-3-3-4-5 N = 15	1.2		MADE GROUND: Firm brown very sandy gravelly CLAY Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse of mixed lithologies, brick.						
		1.4		MADE GROUND (WASTE RELATED TO THE INFILLED LAND) : (Medium to very dense) black mix of plastics, bags, bricks, slightly sandy silty clay and very strong waste odour.					2.0	
	2-3-3-2-2-2 N = 9									
	2-2-1-2-2-4 N = 9									
	20-5-50/30mm-0-0-0 N = 50							3.0		
				WS16 Refusal at 3.36 m						
Remarks: 1] Borehole terminated at 3.36m depth. 2] No groundwater was encountered. 3] Upon completion borehole was backfilled with materials arising. 4] Density indicator for granular soils in brackets is based on field judgement and is not in accordance with BS5930:2015 but for guidance only.										

ANNEX B
Laboratory Soil Chemical Test Results



Certificate of Analysis

Certificate Number 26-11306

Issued: 19-May-26

Client Terra Firma Group
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HA

Our Reference 26-11306

Client Reference ~ TF-26-137

Order No ~ TF-26-137

Contract Title ~ Solar Farm, Newport

Description 5 Soil samples.

Date Received 13-May-26

Date Started 13-May-26

Date Completed 19-May-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "R. Irfan".

Reyhan Irfan
Operations Manager



2139

Sample Deviations present. See Deviation Table Section for details.

Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis

Soil Samples

Our Ref 26-11306

Client Ref ~ TF-26-137

Contract Title ~ Solar Farm, Newport

Lab No	2685213	2685214	2685215	2685216	2685217
Sample ID ~	WS04	WS09	WS13	WS16	WS16
Depth ~	0.20-0.40	0.20-0.30	0.40	0.50	1.00
Other ID ~					
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	20/04/2026	20/04/2026	20/04/2026	30/04/2026	30/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Preparation								
Moisture Content	DETSC 1004	0.1	%	21	22	21	21	
Metals								
Arsenic	DETSC 2301#	0.2	mg/kg	8.0	15	13	11	
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.3	0.3	0.1	
Chromium	DETSC 2301#	0.15	mg/kg	22	35	37	34	
Chromium III	DETSC 2301*	0.15	mg/kg	22	35	37	34	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	11	21	21	16	
Lead	DETSC 2301#	0.3	mg/kg	23	33	39	25	
Mercury	DETSC 2325#	0.05	mg/kg	0.06	0.05	0.05	< 0.05	
Nickel	DETSC 2301#	1	mg/kg	18	32	34	27	
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	
Zinc	DETSC 2301#	1	mg/kg	64	130	140	110	
Inorganics								
pH	DETSC 2008#		pH	7.5	8.2	8.2	8.3	8.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	< 0.1	< 0.1	< 0.1	
Organic matter	DETSC 2002#	0.1	%	2.6	1.6	0.5	2.7	
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l					15
Sulphur as S, Total	DETSC 2320	0.01	%					0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%					0.33
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	449	502	580	473	
Petroleum Hydrocarbons								
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic >EC10-EC12: EH_2D_AL	DETSC 3521#	1.5	mg/kg	< 1.50	< 1.50	< 1.50	< 1.50	
Aliphatic >EC12-EC16: EH_2D_AL	DETSC 3521#	1.2	mg/kg	< 1.20	< 1.20	< 1.20	< 1.20	
Aliphatic >EC16-EC21: EH_2D_AL	DETSC 3521#	1.5	mg/kg	< 1.50	< 1.50	< 1.50	< 1.50	
Aliphatic >EC21-EC35: EH_2D_AL	DETSC 3521#	3.4	mg/kg	< 3.40	< 3.40	< 3.40	< 3.40	
Aliphatic C5-C35: EH_2D+HS_1D_AL	DETSC 3521*	10	mg/kg	< 10.00	< 10.00	< 10.00	< 10.00	
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic >EC10-EC12: EH_2D_AR	DETSC 3521#	0.9	mg/kg	< 0.90	< 0.90	< 0.90	< 0.90	
Aromatic >EC12-EC16: EH_2D_AR	DETSC 3521#	0.5	mg/kg	< 0.50	< 0.50	< 0.50	< 0.50	
Aromatic >EC16-EC21: EH_2D_AR	DETSC 3521#	0.6	mg/kg	< 0.60	< 0.60	< 0.60	< 0.60	
Aromatic >EC21-EC35: EH_2D_AR	DETSC 3521#	1.4	mg/kg	< 1.40	< 1.40	< 1.40	< 1.40	
Aromatic C5-C35: EH_2D+HS_1D_AR	DETSC 3521*	10	mg/kg	< 10.00	< 10.00	< 10.00	< 10.00	
TPH Ali/Aro Total C5-C35: EH_2D+HS_1D_Total	DETSC 3521*	10	mg/kg	< 10.00	< 10.00	< 10.00	< 10.00	
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	

Summary of Chemical Analysis

Soil Samples

Our Ref 26-11306

Client Ref ~ TF-26-137

Contract Title ~ Solar Farm, Newport

Lab No	2685213	2685214	2685215	2685216	2685217
Sample ID ~	WS04	WS09	WS13	WS16	WS16
Depth ~	0.20-0.40	0.20-0.30	0.40	0.50	1.00
Other ID ~					
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	20/04/2026	20/04/2026	20/04/2026	30/04/2026	30/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.09	< 0.03	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.09	0.12	< 0.03	
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.07	0.08	< 0.03	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.05	< 0.03	
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.04	0.04	< 0.03	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	0.07	< 0.03	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.04	< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	0.30	0.49	< 0.10	
Phenols								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	

Summary of Asbestos Analysis Soil Samples

Our Ref 26-11306

Client Ref ~ TF-26-137

Contract Title ~ Solar Farm, Newport

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2685213	WS04 0.20-0.40	SOIL	NAD	none	Vicky Convery
2685214	WS09 0.20-0.30	SOIL	NAD	none	Vicky Convery
2685215	WS13 0.40	SOIL	NAD	none	Vicky Convery
2685216	WS16 0.50	SOIL	NAD	none	Vicky Convery

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 26-11306
 Client Ref ~ TF-26-137
 Contract ~ Solar Farm, Newport

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2685213	WS04 0.20-0.40 SOIL	20/04/26	GJ 250ml, GJ 60ml, PT 1L	BTEX / C5-C10 (7 days), EPH/Aliphatic/Aromatic (14 days), Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2685214	WS09 0.20-0.30 SOIL	20/04/26	GJ 250ml, GJ 60ml, PT 1L	BTEX / C5-C10 (7 days), EPH/Aliphatic/Aromatic (14 days), Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2685215	WS13 0.40 SOIL	20/04/26	GJ 250ml, GJ 60ml, PT 500ml	BTEX / C5-C10 (7 days), EPH/Aliphatic/Aromatic (14 days), Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2685216	WS16 0.50 SOIL	30/04/26	GJ 250ml, GJ 60ml, PT 1L	BTEX / C5-C10 (7 days), pH + Conductivity (7 days)	
2685217	WS16 1.00 SOIL	30/04/26	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det

Aliphatic C5-C6

Acronym

HS_1D_AL

Certificate of Analysis

Certificate Number 26-11307

Issued: 19-May-26

Client Terra Firma Group
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HA

Our Reference 26-11307

Client Reference ~ TF-26-137

Order No ~ TF-26-137

Contract Title ~ Solar Farm, Newport

Description 15 Soil samples.

Date Received 13-May-26

Date Started 13-May-26

Date Completed 19-May-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "R. Irfan".

Reyhan Irfan
Operations Manager



2139

Sample Deviations present. See Deviation Table Section for details.

Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis

Soil Samples

Our Ref 26-11307

Client Ref ~ TF-26-137

Contract Title ~ Solar Farm, Newport

Lab No	2685218	2685219	2685220	2685221	2685222	2685223	2685224	2685225	2685226	2685227	2685228
Sample ID ~	WS01	WS02	WS03	WS04	WS05	WS06	WS07	WS08	WS09	WS10	WS11
Depth ~	0.80-0.90	0.30-0.40	0.30-0.40	0.30-0.40	0.40-0.50	0.30-0.40	0.30	0.30-0.50	0.40-0.50	0.40-0.50	0.60-0.70
Other ID ~	D1	D1	D1	D1	D1	D1	D1	D1	D1	D1	D1
Sample Type ~	D	D	D	D	D	D	D	D	D	D	D
Sampling Date ~	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026	20/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units											
Inorganics														
pH	DETSC 2008#		pH	8.6	8.2	7.7	7.0	7.7	9.0	8.4	8.1	6.7	8.0	7.4
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	270	44	29	18	32	62	27	34	18	47	20
Sulphur as S, Total	DETSC 2320	0.01	%	0.09	0.01	0.03	0.03	0.01	0.08	0.05	0.04	0.03	0.02	0.03
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.33	0.04	0.05	0.07	0.04	0.17	0.07	0.06	0.07	0.05	0.05

Summary of Chemical Analysis

Soil Samples

Our Ref 26-11307
 Client Ref ~ TF-26-137
 Contract Title ~ Solar Farm, Newport

Lab No	2685229	2685230	2685231	2685232
Sample ID ~	WS12	WS13	WS14	WS15
Depth ~	0.90-1.00	0.50	0.50	0.30-0.40
Other ID ~	D1	D1	D1	D1
Sample Type ~	D	D	D	D
Sampling Date ~	20/04/2026	20/04/2026	20/04/2026	20/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Inorganics							
pH	DETSC 2008#		pH	9.0	8.4	8.3	9.0
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	120	34	31	49
Sulphur as S, Total	DETSC 2320	0.01	%	0.10	0.03	0.03	0.12
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.12	0.06	0.06	0.15

Information in Support of the Analytical Results

Our Ref 26-11307
 Client Ref ~ TF-26-137
 Contract ~ Solar Farm, Newport

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2685218	WS01 0.80-0.90 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685219	WS02 0.30-0.40 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685220	WS03 0.30-0.40 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685221	WS04 0.30-0.40 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685222	WS05 0.40-0.50 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685223	WS06 0.30-0.40 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685224	WS07 0.30 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685225	WS08 0.30-0.50 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685226	WS09 0.40-0.50 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685227	WS10 0.40-0.50 SOIL	20/04/26	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685228	WS11 0.60-0.70 SOIL	20/04/26	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685229	WS12 0.90-1.00 SOIL	20/04/26	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685230	WS13 0.50 SOIL	20/04/26	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685231	WS14 0.50 SOIL	20/04/26	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2685232	WS15 0.30-0.40 SOIL	20/04/26	PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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ANNEX C
Ground Gas Monitoring Results



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DRAWINGS





Site Name: Solar Farm, Newport
Project Number: TF-26-137-CA
Drawing Title: Borehole Layout
Drawing Number: 01
Scale: Not to scale

KEY

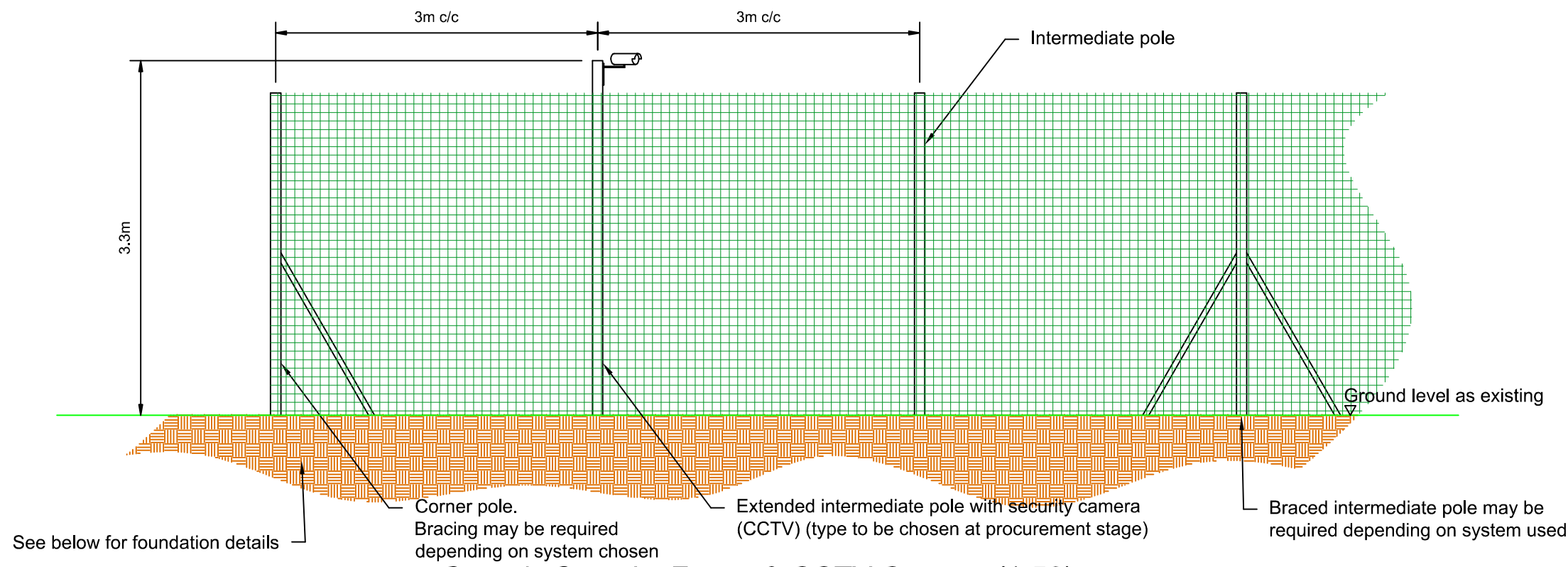


**Windowless borehole
with installation**

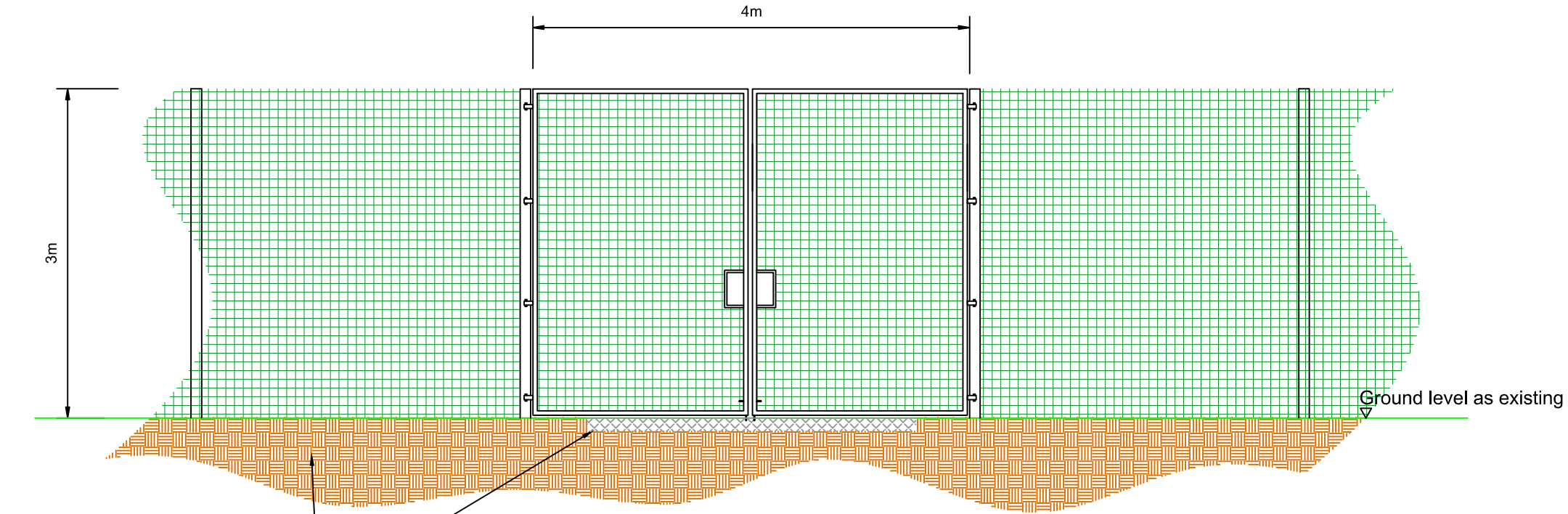


Windowless borehole

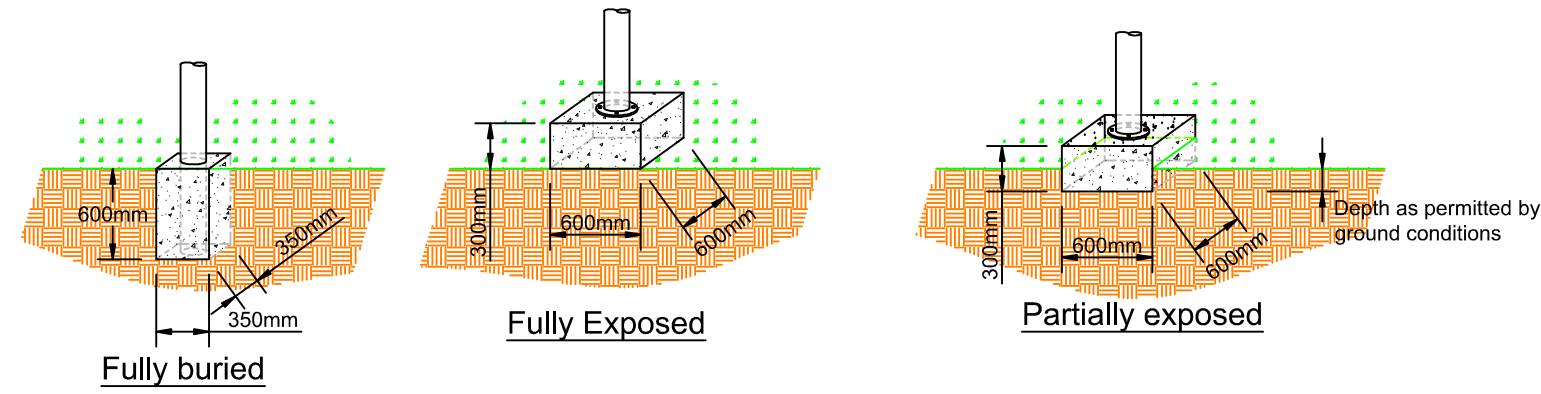




Generic Security Fence & CCTV Camera (1:50)



Generic Security Fence - Gate Detail (1:50)



Foundation Details (N.T.S.)

NOTES

All dimensions in metres unless otherwise specified.

Dimensions are indicative only and are not for construction. Detailed design of the foundation should be undertaken once a ground investigation survey has been undertaken.

External colour and finish of fencing to be advised.

Scale (@ A3) As shown	Date: 16 Aug 2023		
Prepared by:	 dulas inspiring renewable energy		
Client: Newport City Council			
Project: Docksway Solar Farm			
Figure 005 - Typical Security Fence, Gate and CCTV Camera			
Drawn by: CW	Checked by: ASC	Version: A draft0	
Every effort has been made to ensure the accuracy of the information provided on this figure. Dulas Ltd cannot be held responsible for any omissions or errors in the data supplied by third parties and hereby expressly disclaims any responsibility for any losses, disappointment, negligence or damage caused by reliance on the information contained on this figure.   UKAS MANAGEMENT SYSTEMS 305			



TFW Group Ltd, 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff. CF23 7HA
Tel: 033 022 36380 Email: hello@tfwgroup.co.uk www.tfwgroup.co.uk