Little Crow
Solar Park

Little Crow Solar Park, Scunthorpe

ENVIRONMENTAL STATEMENT: TECHNICAL APPENDICES

APPENDIX 3.3

GEOTECHNICAL AND PHASE II CONTAMINATION REPORT

Revision: Submission
APFP Reg: 5(2)(a)
PINS Reference: EN010101

Author: Integral
Date: November 2020

Document			
Document Properties			
Prepared By	Integral		
Title	Environmental Statement: Technical Appendices – Appendix 3.3 Geotechnical and Phase II Contamination Report		
Document Reference	7.5 LC TA3.3		
Version History			
Date	**Version**	**Status**	**Description/Changes**

Geotechnical and Phase II Contamination Report
Proposed Solar Energy Scheme
Little Crow Solar Park
Scunthorpe
Lincolnshire
DN20 0BG

Client: INRG Solar (Little Crow) Limited

Intégrale Report No. 1997/02, Version 5, November 2020, Submission

		Signature/Date
Project Co-ordinator & Report Preparation:	Joseph Begaj	
Mentor Consultant, Advice & Report Approved by:	Dr Kay Boreland	
Final Check by:	Kay Boreland	

This report is addressed to and may be relied upon by the following:

INRG Solar (Little Crow) Limited,

Intégrale is a trading name of Integrale Limited
Registered Office: The Granary, Chewton Fields, Ston Easton,
Somerset, BA3 4BX, United Kingdom
Company Registration No. 2855366 England VAT Reg. No. 609 7402 37

LIST OF CONTENTS

– EXECUTIVE SUMMARY –

1.0 INTRODUCTION 1

1.1 General 1
1.2 Timescales and Limitations 1

2.0 THE SITE 3

2.1 General Summary 3
2.2 Regulators' Initial Comments 4

3.0 GROUND INVESTIGATION 6

3.1 Trial Pitting 6
3.2 Soakaway and Infiltrometer Tests 6
3.3 Windowless Sample Boreholes 6
3.4 Groundwater and Soils Gas Standpipe Installations and Monitoring 7
3.5 Geotechnical Laboratory Testing 7
3.6 Contamination Analyses 8
3.7 Referencing 9

4.0 GROUND & GROUNDWATER CONDITIONS 10

4.1 Summary of Strata Encountered 10
4.2 Groundwater 12
4.3 Ground Gas Regime 13
4.4 Strata Properties 14
4.4.1 Made Ground / Topsoil 14
4.4.2 Superficial Deposits 15
4.4.3 Inferior Oolite Group 16
4.4.4 Weathered Lias Group 16
4.4.5 Lias Mudstones and Ironstones 17
4.4.6 Coleby Mudstone and Marlstone Rock Bed 18

5.0 GEOTECHNICAL CONSIDERATIONS 19

5.1 Scheme Details & Structural Loadings 19
5.2 Site Preparation and Earthworks 19
5.3 Foundations, Ground Floor Slabs and Other Infrastructure 20
5.3.1 Typical Ground Conditions 20
5.3.2 Design Bearing Pressures for Spread Footings 21
5.3.3 Shallow Pin Piles 21
5.3.4 Ground Slabs 22
5.3.5 Formations and Inspections 22
5.4 Pavement Design 22
5.5 Protection of Buried Concrete 23
5.6 Drainage Considerations 23

6.0 GENERIC QUANTITATIVE CONTAMINATION ASSESSMENT 25

6.1 Summary of Soils Results with Respect to Human Health 25
6.2 Summary of Soils Results with Respect to Phytotoxicity 25
6.3 Summary of Soils Results with Respect to WRAS 25
6.4 Controlled Waters 26
6.4.1 Conceptual Model 26
6.4.2 Summary of Leachate Results 26
6.5 Gas Mitigation 27
6.6 Conceptual Exposure Model & Risk Assessment 27
6.7 Recommendations 28
6.7.1 For Protection of Human Health 28
6.7.2 For Protection of Groundwater / Surface Water 28
6.7.3 For Protection of Building Materials & Services 28
6.7.4 For Protection of New Vegetation 28
6.7.5 Reuse and Disposal of Surplus Spoil 28
6.7.6 Recommended Further Action 28

FIGURES

1. Exploratory Hole Location Plan
2. TRL Probe Location Plan

APPENDICES

A. Site Location
B. Site Description / Photographs
C. Additional Desk Study Information
D. Trial Pit Logs
E. Borehole Logs
F. In-Situ Testing (Permeability & CBRs)
G. Gas & Groundwater Monitoring
H. Results of Geotechnical Laboratory Testing
I. Results of Contamination Analyses
J. Proposed Redevelopment

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

EXECUTIVE SUMMARY
Geotechnical and Phase II Contaminated Land Report
Little Crow Solar Park

INRG Solar (Little Crow) Limited are considering the construction, operation, maintenance and decommissioning of a ground mounted solar park with an intended design capacity of over 50MWp (megawatts peak) with associated development.

The 225 hectare site comprises a higher eastern area of level or gently eastward sloping arable land, a central zone moderately sloping down to the west, and a lower western area of very gentle to level ground. Agricultural soils predominate, with small areas of woodland & vegetation. To the west of the site are opencast ironstone workings and steel works.

Geological records indicate the lower slopes overlain by thick Blown Sand. The bedrock forms a sequence of north-south outcrops. The higher eastern area comprises Jurassic limestones; the central area is underlain by Jurassic mudstones and locally limestones; the middle and lower slopes are blanketed in the Blown Sand, underlain by mudstones and marls, including the commercially important Pecten Ironstone. The complete site area is classified as freely draining slightly acid sandy soils.

Trial pitting and boreholes have confirmed the anticipated ground conditions and found little evidence of former ironstone working, but with localised minor backfilling in the extreme southwest area. Groundwater stands below 2m in the higher area, at 1-1.5m centrally and at 0.5-1m depth in the lower area. Ditches in the lower area held water during late winter.

The ground gas regime is near normal, with elevated carbon dioxide where the Alluvium is peaty.

Design bearing pressures are given for shallow spread foundations for the limited structures proposed. Design CBR values are given for the access roads and hardstanding areas. The superficial silty sands will require care to prevent erosion and run-off. Soakage testing confirmed the majority of rainfall infiltration will soak away rapidly.

Contamination assessment concludes that any new water pipes require protection against chemical attack. Carbon dioxide could pose a risk to groundworkers if any confined space working is undertaken. No protective measures are considered necessary for in-ground plant. No contaminants were proven in excess of acceptance criteria adopted or human health protection. No evidence of significant leachable contamination has been found.

1.0 INTRODUCTION

1.1 General

INRG Solar (Little Crow) Limited are considering the construction, operation, maintenance and decommissioning of a ground mounted solar park with an intended design capacity of over 50MWp (megawatts peak) with associated development. Their planning consultants are Pegasus Planning Group.

Integrale Limited (Intégrale) have been commissioned to undertake a ground investigation and complete a Geotechnical and Phase II Contamination Report. The investigation scope was determined by Intégrale in liaison with the client. The previous Phase 1 Desk Study [Document Ref 7.4 LC TA3.2] was originally issued to North Lincolnshire Council Environmental Health section and the Environment Agency in September 2018. Their comments have been taken into account in scoping this intrusive investigation.

This interpretative report summarises the Phase 1 Desk Study, describes the scope of fieldworks, laboratory investigations and monitoring, discusses the ground and groundwater conditions encountered, and gives advice on foundations and other specific geotechnical aspects.

The results of contamination analyses and generic quantitative risk assessment are reported and used to update the conceptual model of pollutant linkages. Potential implications for the development are discussed and recommendations for remedial works and design measures given.

1.2 Timescales and Limitations

The Phase 1 Desk Study was originally undertaken in August 2017 and a Version 1 draft report prepared. As the project has progressed the desk study has been updated and was issued to North Lincolnshire Council Environmental Health section and the Environment Agency in September 2018. Their comments were taken into account in scoping the intrusive investigations which are reported here.

The original desk study was completed without a site visit, and was therefore based on photographic and satellite imagery, mapping and data reports by others. Site visits were then completed during September and November 2018 to undertake the fieldworks and intrusive investigation reported here, and both documents updated where appropriate, based on those site visits.

The siteworks were undertaken across predominantly arable land with growing crops. Some initial trial pitting was timed prior to seeding in September 2018, and subsequent fieldwork in November 2018 was located around field margins, or between crop ‘tramlines’. Investigation has been located across the various geological zones, to provide an overall assessment of ground conditions.

Gas and groundwater monitoring were completed between October 2018 and March 2019, so represent the complete autumn and winter periods. The standpipes have since been cut down below ground level and the headworks removed to preclude damage to farming equipment.

2.0 THE SITE

2.1 General Summary

A Phase I Ground Conditions Desk Study (Intégrale Report No. 1844, Version 8, October 2020, Submission) [Document Ref 7.4 LC TA3.2] has been completed, which should be read alongside this report. For completeness, the executive summary is reproduced below:

"A Phase 1 Desk Study on ground conditions, geotechnical and contamination aspects for this proposed solar energy scheme has been completed.

The 225 hectare site comprises a higher eastern area of level or gently eastward sloping arable land, a central zone moderately sloping down to the west, and a lower western area of very gentle to level ground. Agricultural soils predominate, with small areas of woodland & vegetation. To the west of the site are opencast ironstone workings and steel works

Geological records indicate the lower slopes overlain by Blown Sand comprising up to 7m of fine-grained silty sand. The bedrock beneath forms a sequence of north-south outcrops. The higher eastern area comprises Jurassic limestones; the central area is underlain by Jurassic mudstones and locally limestones; the middle and lower slopes are blanketed in the Blown Sand, underlain by mudstones and marls, including the commercially important Pecten Ironstone. The complete site area is classified as freely draining slightly acid sandy soils.

There are potentially small-scale surface ironstone workings in the lower western area. Northeast of the site is the Broughton B1 conventional oil well trial, sunk to 1.9km depth in 1984. This Report includes additional information on the well site, subsequent to the scoping direction by the Planning Inspectorate.

Historically the majority of site has remained agricultural, with Gokewell Priory Farm in the north. Overhead power cable routes cross the site and mapping indicates periodic expansion of the ironstone workings and steel plant to the west. A former WWII anti-aircraft battery in the eastern area is reported removed.

In the higher area, the regional strata dip to the east directs surface water and moderate depth groundwater flow to the east, forming a Principal Aquifer. Midslope surface water and shallow groundwater flow within the Blown Sand is to the west, forming a Secondary A Aquifer, with a discontinuous springline midslope. Very shallow groundwater is anticipated in the lower western area where drainage ditches are frequent, with hummocky marshy areas.

Potential contaminant sources are considered limited to remnant metals in soils within any localised backfilled ironstone pits, and air-borne particulates from the industrial complex to the west, within topsoil.

Potential receptors comprise construction workers and maintenance staff. Drainage ditches and the groundwater within the Principal and Secondary A aquifers are controlled waters receptors. For the limited groundworks, risk to groundworkers is considered negligible with standard protection.

The shallow groundworks will have negligible potential to cause or increase leaching. Run-off during construction works will need to be controlled and managed, as standard practice. Future run-off is unlikely due to predominant topsoil cover and anticipated infiltration characteristics but requires consideration.

Combined geotechnical and contaminated land assessment should concentrate on specific features from historical maps to confirm ground conditions within solar panel array zones, occurrence of small scale ironstone working, typical gas regime, infiltration and permeability of near surface soils and identify any specific areas of concern.

There is no current evidence of ground conditions that would preclude development".

During the 2018 site visits, supplementary photographs were taken with typical views included in Appendix B.

2.2 Regulators' Initial Comments

The Phase 1 Ground Conditions Desk Study was issued in 2018 to both the Environment Agency (EA) and North Lincolnshire Council for comment on the report and the proposed ground investigations. Their responses are included in Appendix C.

The EA are in agreement with the initial conceptual site model and proposed investigations. However, they require further phased contamination investigation (presumably dependent on the initial findings). The EA have provided a draft of their likely requirements for the Development Consent Order. The scope of investigation undertaken in 2018 took account of the regulators responses.

The Local Authority also agreed on the scope of investigation and overall approach as well as advising the developer about the potential for historical ironstone 'gullets' (deep, linear quarries) and mine shafts.

The Phase 1 Desk Study includes additional information on the off-site conventional oil well, as requested by the Planning Inspectorate in their 2019 responses.

3.0 GROUND INVESTIGATION

In view of the anticipated ground conditions, current site layout and proposed redevelopment, the following scope of investigation was completed. The locations were based on the desk study findings to give a broad spread across anticipated variations in ground conditions and to target potential historical ironstone workings.

3.1 Trial Pitting

23 No. trial pits were mechanically excavated using a wheeled JCB 3CX on 12th September and between 25th and 27th September 2018. The targeted trial pit locations chosen by Intégrale are shown on Figure 1 and were referenced as TP1-21, with two further trial pit locations, TP5A and TP22, selected whilst works were ongoing. Specific locations were agreed to limit disturbance within the agricultural fields. The general procedures adopted during trial pitting, together with the detailed trial pit records are included in Appendix D. The red outline given in Figure 1 is indicative of the study area and does not represent the Order Limits.

3.2 Soakaway and Infiltrometer Tests

9 No. soakaway tests were carried out in roughly 0.3x0.3m hand dug trial pits alongside the investigative trial pitting at TP1, TP7-10, TP13-14, TP17-19 and TP21 along with 5 No. dual ring infiltrometer tests undertaken in surface soils at TP2, TP5A, TP11 and TP15-16. The soakaways and infiltrometer rings were filled from containers and the fall in water level measured over time. General procedures adopted during soakaway and infiltrometer testing together with the associated records are included in Appendix F and discussed in Section 5.

3.3 Windowless Sample Boreholes

10 No. boreholes were sunk using a tracked windowless sample rig between 14th and 15th November 2018. The targeted borehole locations were chosen by Intégrale following the preliminary ground investigation in order to further investigate four areas of interest within the site as follows:

- Area 1 – proposed Substation Building & Compound (Work No. 4): boreholes required for strength testing of the soils for geotechnical advice and bearing pressures;
- Area 2 – proposed Battery Energy Storage System (Work No. 2A)*: boreholes with standpipe installations to monitor the winter water level;
- Area 3 – northwest site area: borehole with a standpipe installation to monitor any ground gases generated by the peaty deposits proven during earlier trial pitting;
- Area 4 – southwest site area: boreholes to prove the extent of the Made Ground encountered during the previous trial pitting.

*The potential alternative Battery Energy Storage System location (Work No. 2B) north of the proposed Substation Compound was not known in 2018 and no specific investigation undertaken there, although similar ground conditions to the Substation area are anticipated.

Borehole locations are detailed on Figure 1 and were referenced WS1-8, with two further locations, WS4A and WS9, selected whilst the works were ongoing.

3.4 Groundwater and Soils Gas Standpipe Installations and Monitoring

Standpipes were installed in trial pits TP5-7, TP9-10 and TP5A, typically to 2m depth, and also in boreholes WS1-3, WS5 and WS7-9, typically between 2m and 3m depth. Monitoring was undertaken on 4 and 3 No. occasions for the trial pit and borehole standpipes respectively. The monitoring visits were completed between October 2018 and March 2019. The results are included in Appendix G, together with the general procedures adopted for installing standpipes.

3.5 Geotechnical Laboratory Testing

A schedule of complementary soils testing was prepared by Intégrale. The physical tests were completed in accordance with BS 1377 (1990) by Southwest Geotechnical Limited and the chemical testing by Chemtest Limited. The results are provided in Appendices H and I and the following shows the testing strategy:

Location	Depth (m)	Stratum	Testing	Criteria for test selection
TP1	0.5	Blown Sand	BRE (Reduced) Suite	Concrete classification
TP1	1.8	WLG	Natural Moisture Content, Atterberg Limits	Strata characteristics and classification
TP2	0.2	Topsoil	Particle Size Distribution*	Strata classification
TP2	1.2	WLG	BRE (Reduced) Suite	Concrete classification
TP4	0.3	Topsoil	Particle Size Distribution*	Strata classification
TP4	2.3	WLG	Natural Moisture Content, Atterberg Limits	Strata characteristics and classification
TP8	0.8	WLG	Natural Moisture Content, Atterberg Limits	Strata characteristics and classification
TP9	0.8	Blown Sand	Particle Size Distribution*	Strata classification
TP10	0.5	Blown Sand	Particle Size Distribution*	Strata classification
TP11	0.2	Topsoil	Particle Size Distribution*	Strata classification
TP15	0.5	WLG	BRE (Reduced) Suite	Concrete classification

TP16	0.2	Topsoil	Particle Size Distribution*	Strata classification
TP19	0.2	Topsoil	Particle Size Distribution*	Strata classification
TP20	0.4	Topsoil	Particle Size Distribution*	Strata classification
TP22	1.0	WIOG	BRE (Reduced) Suite	Concrete classification

Note: WLG – Weathered Lias Group; WIOG – Weathered Inferior Oolite Group
* For all PSDs, both a wet sieve and sedimentation by pipette were completed.

3.6 Contamination Analyses

In view of the desk study and fieldwork findings, a schedule of soils and leachate analyses was prepared. The analyses were completed by Chemtest Limited and the results are provided in Appendix I. The following shows the testing strategy:

Location	Depth (m)	Stratum	Testing	Criteria for test selection
TP6	0.3	Topsoil	Generic Contamination and Leachate Suites	Residual contamination from airborne particulates. Downward transfer of potential contaminants from the topsoil into underlying strata.
TP10	0.1	Topsoil	Generic Contamination and Leachate Suites	
TP15	0.2	Topsoil	Generic Contamination and Leachate Suites	
TP20	0.2	Topsoil	Generic Contamination and Leachate Suites	
TP1	0.2	Topsoil	Generic Contamination Suite	Residual contamination from airborne particulates.
TP9	0.2	Topsoil	Generic Contamination Suite	
TP17	0.1	Topsoil	Generic Contamination Suite	
TP21	1.0	Made Ground	Generic Contamination and Asbestos Screen	Contamination related to the assumed backfill of historic ironstone workings.
WS9	1.25	HWLM	Generic Contamination, Total TPH and Asbestos Screen	
WS9	1.75	WLM&I	Generic Contamination, Total TPH	

Note: HWLM – Highly Weathered Lias Mudstones; WLM&I – Weathered Lias Mudstones & Ironstones

3.7 Referencing

Locations of the exploratory positions were set out using taped offsets from existing features. Ground levels at the exploratory positions have been determined by interpolating between spot levels given on the site survey drawing.

4.0 GROUND & GROUNDWATER CONDITIONS

4.1 Summary of Strata Encountered

The strata encountered across this large site can be broadly divided into 4 zones as follows:

A) <u>Higher Eastern Area at or above c. 55-60m AOD (TPs 7, 13-14, 16-20 & 22; WS4, 4A)</u>
Weathered Oolitic Limestones (Lincolnshire Limestone Formation of Inferior Oolite Group)

<u>Depth (m)</u>	<u>Description</u>
GL to 0.25/0.35	TOPSOIL and SUBSOIL (brashy Sand with limestone gravel)
0.25/0.35 to 1.0/1.5	Medium dense silty SAND with increasing gravel and sandy GRAVEL with a variable (loamy) silty binder, clayey in parts (WEATHERED INFERIOR OOLITE GROUP)
Below 1.0/1.5	Weak cream oolitic LIMESTONE, highly fractured with brown sandy SILT infilling, or medium dense clayey sandy SILT with siltstone lithorelicts (WEATHERED INFERIOR OOLITE GROUP)

All locations remained dry within the upper 2m from ground level.

B) <u>Central Area between typically 50-60m AOD (TPs 8 & 15; WS3)</u>
Sandy Ironstone and Sandstones (Grantham Formation & Northampton Sand or Coleby Mudstones)

<u>Depth (m)</u>	<u>Description</u>
GL to 0.3	TOPSOIL and SUBSOIL (slightly stony and very sandy)
0.3 to 1.0/1.5	Medium dense yellow brown and grey slightly gravelly clayey silty SAND and SILT, or firm to stiff sandy CLAY (WEATHERED LIAS GROUP)
1.0/1.5 to 2.0/2.2+	Firm to stiff becoming stiff grey or grey brown silty CLAY, sandy gravelly in parts. (LIAS GROUP)

Pits were initially dry, but a localised standing level c. 1.2m depth has been monitored at the base of the more weathered material.

C) <u>Central & Western area between 30-50m AOD (TPs 1-4, 6 & 10-11; WS 1-2)</u>
Blown Sand overlying Lias Mudstones

Depth (m)	Description
GL to 0.3/0.5	TOPSOIL and SUBSOIL (slightly stony Sand)
0.3/0.5 to 0.7/1.5	Loose or medium dense yellow orange brown silty fine to medium SAND with some gravelly sand (SUTTON SAND / DEVENSIAN BLOWN SAND)
0.7/1.5 to 1.8/2.3 (locally)	Loose occasionally medium dense cream silty fine to medium SAND (HIGHLY WEATHERED MARLSTONE ROCK BED)
1.8/2.3 to 2.2/3.0+	Firm to stiff dark grey silty fine to medium SAND or (locally soft) gravelly sandy silty CLAY (WEATHERED LIAS GROUP)
Below 2.2/3.0+	Moderately strong yellow orange or brown laminated MUDSTONE, SILTSTONE, or SANDSTONE (LIAS MUDSTONES AND IRONSTONES)

Pits were dry on excavation however standing groundwater levels were monitored c. 1.3-1.9m depth at the base of the Blown Sands.

D) Lower Western area at or below 30m AOD (TPs 5, 5A, 9 & 12; WS 5-9)

Blown Sand overlying Lias Mudstones & Pecten Ironstone

Depth (m)	Description
GL to 0.25/0.5	TOPSOIL and SUBSOIL (very sandy)
0.25/0.5 to 0.8/1.7	Loose or medium dense yellow orange brown silty fine to medium SAND (SUTTON SAND / DEVENSIAN BLOWN SAND)
0.8/1.7 to 1.5/2.5+	Firm organic black silty sandy CLAY with PEAT horizons (ALLUVIUM / RECENT BLOWN SAND DEPOSITS)
1.5/2.5+ to 1.5/3.0+	Medium dense orange grey silty fine to medium SAND, or firm silty CLAY, including bluish green sandy glauconitic CLAY (HIGHLY WEATHERED LIAS MUDSTONES)
1.5/3.0+ to 2.5/3.0+	Firm to stiff sandy clayey SILT, with mudstone lithorelics and ironstones (WEATHERED LIAS MUDSTONES & IRONSTONES)

Water seepage occurred at typically 1.5-2.5m depth and stood at 0.5-1m where peaty organic horizons are present, or 2-2.5m where organic material was thinner.

Trial Pit 21 was an anomaly and was located within a 'bean' shaped depression in the lower southwestern area, suspected as a past area of ironstone working. This pit found Made Ground to 2.3m depth, comprising an upper organic red brown silty sand, over a thick deposit of burnt shale and resinous, odorous slag, becoming ironstone gravel and ashy slag. This presumably represents filling from the adjacent iron/steel works. The area was further investigated with 4 boreholes: the same Made Ground was not proven in the boreholes, although the (presumed in-situ) Blown Sand was a more reddish brown in this area. The boreholes were located at the periphery, but still within the depression (WS8 & WS9), at the deepest point of the depression (WS7) and just beyond the depression (WS6). There is no strong evidence of substantial backfilling of the depression / ironstone working, but the ground gas in this area is somewhat abnormal, with carbon dioxide of 2.5-8% and markedly reduced oxygen at 0.4-10%.

4.2 Groundwater

It is anticipated that rainfall infiltration will rapidly move down through the free-draining topsoil and into the superficial granular deposits in the central and western area, and into the fissured predominant limestones in the higher eastern area.

The groundwater table within the higher Lincolnshire Limestone Formation will be controlled by regional dip direction, which here is predominantly eastwards at 1-3°. The likely groundwater elevation is between 45-55m AOD, i.e. at least 5m below ground level in this higher area. Monitoring has not shown the water table present within the upper 2m from ground level.

In the central area between 50-60m AOD there is locally evidence for a standing water level at 1-1.5m depth at the interface of the more weathered soils and the firm or stiff clayey soils beneath.

Between 30-50m AOD the occurrence of Blown Sand deposits appears to promote good drainage of the shallow depth soils, and the moderate slopes within the central area at 1 in 10 to 1 in 20, are likely to have an unconfined groundwater table within the basal layers of these sands. Indeed, monitoring indicates standing levels at 1.3-2m depth. Spring issues are noted on the historical mapping at around 40-43m AOD and drainage ditches are prevalent below this elevation. There was no direct evidence of the groundwater table being intercepted in the investigation positions in late summer/autumn, but early winter monitoring suggests this is between 1-2m.

During the final monitoring visit undertaken during early March 2019, the mid-slope swales between 45-50m AOD were noted to contain surface water with low flow recorded in the drainage ditches slightly further down the slopes. The emergence of surface water in these locations correlates with shallower groundwater levels being encountered in TP6 and TP10 (the latter containing groundwater for the first time).

Below 30m AOD on the lowest western area, the Blown Sands become more clayey or silty, and there is an underlying organic peat and sand sequence in most of the investigation locations. This together with the underlying Coleby Mudstone of the Upper Lias, with a shallow surface slope of 1in 50 to 1 in 60 promotes a shallower water table at 0.5-1m. The extreme western area has more poorly draining shallow soils, with frequent drainage ditches required. In particular, the potential ironstone working depression at TP21 shows localised poorly drained surface soils and hydrophilic vegetation with the ground fairly boggy and groundwater intercepted at just 0.2m BEGL in WS7.

4.3 Ground Gas Regime

There is a substantial industrial area downslope to the west and major opencast ironstone workings, which may have been partially backfilled. It is not anticipated that an abnormal ground gas regime will be present beneath the majority of the site, in view of the higher elevation and topography, distance and apparent lack of continuity within the Blown Sand deposits.

However there remains a potential for abnormal ground gas locally where historic small-scale ironstone workings may have occurred or been backfilled.

The monitoring visits indicate near normal ground gas regime in most locations, with no methane or gas flow and carbon dioxide of less than 5%. However, in the southwestern area around TP21/WS9 and at TP5/TP5A in the northwest the carbon dioxide is higher at 2.5-15%. Summary results are detailed below with full information provided in Appendix G.

Exploratory Location	TP5	TP5A	TP6	TP7	TP9	TP10
Response Zone (m) / Strata	1.6-1.9 Alluvium	1.3-1.6 Blown Sand	1.4-1.7 WLG	1.5-1.8 WIOG	1.4-1.7 WLM&I	1.5-1.85 WLM&I
Evidence of Contamination	None	None	None	None	None	None
Monitoring Visits (No.)	1	4	4	4	4	4
Methane (%)	0.1	0.0-0.1	0.0-0.1	0.0-0.1	0.0-0.1	0.0
Carbon Dioxide (%)	11.8	0.3-6.1	0.1-3.8	1.6-3.2	1.4-4.9	2.1-2.5
Oxygen (%)	9.2	19.4-21.9	19.1-21.6	19.0-19.9	13.8-19.6	18.8-20.1

VOCs (ppm)	0.3	0.1-1.1	0.0-0.1	0.0-0.1	0.0-0.1	0.0
Gas Flow (litres/hr)	0.2-0.3	0.0-0.3	0.1-0.3	0.0-0.2	0.0-0.3	0.1-0.2
Water levels (mBGL)	1.73	0.25-0.68	0.87-1.75	Wet mud at base or dry	Dry	Dry until 4th visit (0.72)
Atmospheric Pressure Range (mb)	1010	991-1014	991-1014	991-1010	991-1014	991-1014

Exploratory Location	WS1	WS2	WS3	WS5	WS7	WS8	WS9
Response Zone (m) / Strata	1-3 BS/WLG	1-3 BS/WLG	1-2 WLG	1-2 Alluvium	0.5-1.5 BS/All	0.7-2.7 BS/All/ WLM&I	0.6-2.65 BS/All/ HWLM/W LM&I
Evidence of Contamination	None	None	None	None	None	None	None
Monitoring Visits (No.)	3	3	3	3	3	3	3
Methane (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0-0.1
Carbon Dioxide (%)	0.6-0.7	0.4-0.5	0.8-2.0	3.0-4.0	1.2-2.7	1.7-4.5	7.7-15.1
Oxygen (%)	20.3-21.4	20.3-21.4	18.0-19.5	17.3-18.8	18.4-20.6	2.1-19.4	0.4-8.0
VOCs (ppm)	0.6	0.5	0.3	0.0	0.1-2.4	0.3-2.1	0.3-2.8
Gas Flow (litres/hr)	0.0-0.2	0.0-0.1	0.1-0.2	0.0-0.1	0.2-1.2	0.0-0.2	0.0-0.2
Water levels (mBGL)	1.26-1.39	1.73-2.01	1.18-1.83	0.88-1.04	0.2-0.56	2.0-2.70	1.89-2.45
Atmospheric Pressure Range (mb)	991-1015	991-1015	991-1015	991-1015	991-1015	991-1015	991-1015

Note: All – Alluvium; BS – Blown Sand; HWLM – Highly Weathered Lias Mudstones; WLG – Weathered Lias Group; WIOG – Weathered Inferior Oolite Group; WLM&I – Weathered Lias Mudstones & Ironstones

4.4 Strata Properties

4.4.1 Made Ground / Topsoil

Topsoil, typically 150-300mm thick, was proven in all exploratory positions. Made Ground was encountered in the southwest of the site and an isolated area on the higher eastern plateau.

Made Ground Type/Location	Made Ground (TP21)	Made Ground (TP18)	Topsoil
Min/Max. thickness (m)	2.3 proven	1.0 proven	0.16/0.5
Main Constituents	Reddish-brown or orange silty Sand or sandy Silt with ironstone, ashy and resinous slag and burnt shale.	Yellow-brown gravel, cobbles, clay, rotting organic matter, wet hay and bark.	Typically brown silty sand or occasionally slightly clayey to clayey sandy Silt.
Properties	Granular, loosely to moderately compact.	Granular, compact.	Granular, moderately compact. Typical PSD: 0-1% Gravel; 82-89% Sand; 11-17% Clay/Silt.
Visual Contamination/ Odours	Strong odour.	Putrid odour.	None.

4.4.2 Superficial Deposits

Superficial deposits comprising Blown Sand were proven in most exploratory positions, typically in central and western areas. In lower western areas, typically below c.30m AOD, the Blown Sand was underlain by Alluvium.

Stratum	Blown Sand	Alluvium
Min / Max Thickness (m)	0.4/2.0 (proven to end of hole)	0.15/1.6
Soil Strength /Properties	Granular, loose to medium dense. Pale grey or orange fine to medium Sand, slightly silty to silty, rare gravel, occasional compact clasts. PSD: 0-3% Gravel; 78-91% Sand; 6-22% Clay/Silt. SPT N = 10	Cohesive, firm or granular, medium dense. Pale grey silty Sand or grey brown sandy Clay, decaying organic matter or pseudofibrous peat.
Occurrence	Central & Western Areas at or below c.30m up to 50m AOD.	Lower Western Area at or below c.30m AOD.
Sulphate /pH	SO_4 0.079 g/l pH 7.2	-
Visual Contamination/ Odours	None.	Putrid odour.

4.4.3 Inferior Oolite Group

For the purposes of this report the uppermost horizons of the Inferior Oolite Group have been defined as Weathered where they are firm silt or medium dense to dense sand or gravel with bedrock defined where cobbles of strong grey limestone were recovered or the bucket of the JCB scraped along the base of the trial pit. The properties can be summarised as:

Stratum	Weathered Inferior Oolite Group	Inferior Oolite Group
Min / Max Thickness (m)	0.75/1.55 (proven to end of hole)	0.2 (proven to end of hole)
Soil Strength/ Properties	Typically granular, medium dense. Grey silty Sand and/or Gravel with moderate limestone cobble content. Occasionally soft firm sandy gravelly Silt. Cu = 45 kPa	Granular, dense. Grey cobbles with some sand and gravel with clay infill. SPT N = 50+
Occurrence	Higher Eastern Area above c.55-60m AOD.	
Sulphate /pH	SO_4 0.053 g/l pH 8.5	-
Visual Contamination/ Odours	None.	None.

4.4.4 Weathered Lias Group

Common throughout the Central and Western Areas of the site, typically comprising clays with some subordinate sand layers grading into the underlying Lias Mudstones and Ironstones in Lower Western Areas.

Stratum	Weathered Lias Group
Min / Max Thickness (m)	0.2 (proven to end of hole)/1.7
Soil Strength /Properties	Cohesive, firm to stiff rarely soft to firm. Grey mottled orange clay, slightly sand, silty to very silty occasionally medium dense sandy silty Clay or medium dense silty Sand. Clay strata: NMC: 15-36%. LL: 54-92%; PL: 22-30%; PI: 32-62%. Clays of High to Extremely High Plasticity. Soils of Medium to High Volume Change Potential. SPT N = 11-19; Cu = 29-76 kPa
Occurrence	Central & Western Areas at or below c.30m up to 50m AOD.
Sulphate /pH	SO_4 0.083-0.093 pH 5.4-8.2

Visual Contamination/ Odours	None.

4.4.5 Lias Mudstones and Ironstones

For the purposes of this report Lias Mudstones and Ironstones have been defined as Weathered where they are firm to stiff silty Clay or medium dense sandy Gravel. Bedrock was defined where laminated mudstones were excavated alongside nodular ironstone cobbles. The properties can be summarised as:

Stratum	Weathered Lias Mudstones and Ironstones	Lias Mudstones and Ironstones
Min / Max Thickness (m)	1.2/1.4 (proven to end of hole)	0.1 (proven to end of hole)
Soil Strength /Properties	Cohesive or granular, firm to stiff. Orange-brown/grey silty Clay or clayey sandy Gravel of mudstone and ironstone. Cu = 110 kPa	Medium strong, yellow-brown mudstone and ironstone.
Occurrence	Lower Western Areas below c.30m AOD.	Lower Central Areas c.30-40m AOD.
Sulphate /pH	-	-
Visual Contamination/ Odours	None.	

4.4.6 Coleby Mudstone and Marlstone Rock Bed

The Coleby Mudstone was located in TP15 only along the ridgeline marking the western extremity of the Higher Eastern Plateau, with the Marlstone Rock Bed located in TP3 and TP11 striking NE-SW across the Central Area of the site.

Stratum	Weathered Coleby Mudstone	Highly Weathered Marlstone Rock Bed
Min / Max Thickness (m)	0.3	0.9/1.5
Soil Strength/ Properties	Cohesive, stiff. Grey silty Clay.	Granular, loose to medium dense Pale creamy grey or cream silty fine to medium Sand.
Occurrence	East of Central Area above c.50m AOD.	Central Areas between c.30-50m AOD.
Sulphate /pH	-	-
Visual Contamination/ Odours	None.	None.

5.0 GEOTECHNICAL CONSIDERATIONS

5.1 Scheme Details & Structural Loadings

The proposed development will be largely constructed close to existing grade. The development is to comprise:

- The proposed solar panel arrays are to be laid in rows approximately east – west across the field enclosures. Arrays are typically mounted on a metal framework, fixed onto steel pins driven between 1-2m depth into the ground, depending on the ground conditions. Alternatively, a system of installing small 'foot pads' for the arrays may be adopted. It is assumed that the east-west alignment across these gentle to moderate westerly facing slopes will require either very minor cutting into the slope, or more likely design of the metal frameworks to incorporate any more critical slope angles.

- In addition there will be a requirement for shallow depth cable trenches, assumed no deeper than 0.5m below existing ground level. Gravel filled drainage trenches of up to 0.5m depth are also assumed.

- The transformer and containerised battery units will be placed on reinforced concrete foundation slabs. These will be constructed on a 300mm permeable gravel bed to allow attenuation and infiltration of rainfall and surface run-off into the underlying soil, using a surrounding drain if required.

At the time of writing no structural loading information is available. Indicative drawings suggest all structures will be lightly loaded. Generic figures for the loadings of arrays of solar panels, due to both self-weight and maximum wind plus snow loadings, indicate that (for ease of calculation) a worst case maximum superimposed loading for solar panel arrays of 15kN/m^2 could well be appropriate.

The transformer and containerised battery units are assumed to be lightly to moderately loaded areas. Within the substation compound, the single storey Control Room building would have a maximum height of 8m. A small single storey building housing Customer Switchroom would have a maximum height of 5m.

The following geotechnical comments must be considered in relation to actual structural loads and detailing before foundations are finalised.

5.2 Site Preparation and Earthworks

Topsoil, typically 200mm thick, and any localised areas of particularly poor quality Made Ground, should be removed from beneath proposed inverter platforms, and substations, although it is accepted that the topsoil will be left

in place beneath the majority of the solar panel arrays. Excavations to at least 0.5-1m depth are likely to be feasible with conventional, light weight soils excavating machinery. Pneumatic tools may be required to break out rocky bands.

A majority of spoil resulting from excavations in the Blown Sand could well be unsuitable for reuse as structural fill if it is too silty or has been multi-handled. At least 50% of spoil resulting from excavations in the natural ground should be suitable for reuse.

Most shallow excavations in the central and eastern areas may either remain dry or encounter only slight infiltration or perched groundwater seepage. Such excavations can be kept dry by intermittent pumping from a convenient sump. In the extreme lower western area, the groundwater table could stand at only 0.5m depth in winter and such excavations could require more continuous pumping.

Temporary excavations in the Blown Sands will probably stand unsupported in the very short term at gradients of about 1 on 2 but will be subject to ravelling and overbreak and hillwash if exposed for longer term in poor weather.

Formations for structures in the majority of shallow sands and clayey soils will be moderately or very susceptible to deterioration due to site traffic and weather and should be protected immediately on exposure with 200mm of granular material, or 100mm of lean mix concrete.

Any root invaded clayey soils (likely to be limited) should be excavated and made good with well compacted granular material.

Attention is drawn to the old maps which suggest that there could be anomalous features (such as backfilled workings, minor ponds, old hedge lines and boundary ditches) beneath localised areas of the proposed solar park. Intégrale can give further advice on request.

5.3 Foundations, Ground Floor Slabs and Other Infrastructure

5.3.1 Typical Ground Conditions

In the northern central area where the Substation Compound (Work No. 4) is proposed, the typical ground conditions proven were medium dense silty sand and gravel to 1-1.5m depth grading into weak oolitic limestone or siltstone lithorelics, as found in TP22 and WS boreholes 4 and 4A. These ground conditions are anticipated to continue northwards across the alternative Battery Energy Storage System location (Work No. 2B).

In the western area of the compound, TP15 and WS3 found medium dense silt/sand or firm to stiff sandy clay, underlain by firm to stiff silty clays, of the Weathered Lias Group below 1-1.5m depth.

The groundwater table is below this depth and consequently the Weathered Inferior Oolite and Lias Group soils can provide an adequate bearing stratum for shallow spread foundations.

In the currently proposed Battery Energy Storage System area (Work No. 2A) the typical ground conditions are loose or medium dense Blown Sand to 0.7/1.5m depth, underlain by firm to stiff grey silty sand or sandy silty clay of the Weathered Lias Group. Here the groundwater table appears to stand at 1-2m depth near the base of the Blown Sand.

5.3.2 Design Bearing Pressures for Spread Footings

The following design bearing pressures are given for guidance:

Depth (m) BEGL	Stratum (SPT 'N' or Cu kN/m^2)	Design Bearing Pressure (kN/m^2)		
		1m*	2m*	3m*
1.0-1.5	Loose or medium dense Sand (SPT 'N' = 8-10)	100	75	50
1.0-1.5	Medium dense silty Sand or Firm Clay (SPT 'N' = >10; Cu = >60kN/m^2)	125	100	75
1.5-2.0	Stiff silty Clay to Very weak Limestone/Siltstone (Cu = >100kN/m^2)	200	175	150

Notes: * Indicates width of foundation

At the intensities of loading given above, total settlements should not exceed 25mm, with differential settlement between adjacent pad footings of about half this value, or angular rotation along a typical 10m long strip footing of not worse than 1 in 750.

5.3.3 Shallow Pin Piles

Solar panel arrays are typically installed using pin foundations beneath the arrays, to depths of 1-1.5m. In the higher limestone areas it may be too difficult to drive pins to this depth. Consideration could be given to screw auger piles to achieve adequate resistance to overturning due to wind loading within a shallow depth. Alternatively, kentledge could be provided to surface or shallow depth pads or trays.

5.3.4 Ground Slabs

Ground slabs can be designed as ground bearing onto natural ground. In line with current guidelines, suspended slabs should be adopted where they are underlain by 600mm or more of 'non-engineered' Made Ground.

5.3.5 Formations and Inspections

It is likely that the limestone formations will be frost susceptible in this area and such formations should be provided with a minimum of 450mm of frost protection cover.

All foundation, ground slab or other substructure formations should be checked and approved by a suitably qualified and experienced engineer or geotechnical specialist.

5.4 Pavement Design

The equivalent CBR strength of anticipated pavement formations has either been determined using a Mexecone Penetrometer in trial pits and at three locations within the proposed substation area with a TRL Dynamic Cone Penetrometer. The following tentative design values are given for guidance, but should be checked on-site using a Mexecone Penetrometer during construction:

Stratum	Design CBR	Typical Depth (m) BEGL
Blown Sand	2-3%	0.3-0.6
WIOG or WLG	3-4%	0.5-1.0

Note: WIOG – Weathered Inferior Oolite Group ; WLG – Weathered Lias Group

The TRL DCP results indicate CBRs of 4% at 0.1m, 6-8% at 0.4m and 4-5% below in the clayey western zone of the substation area (TRL1). In the central and eastern zone (TRL2 & 3) the more granular soils showed 4-5% to 0.3m depth and >15% to 0.7m depth.

It would be prudent to allow a contingency for treating 'soft-spots' equivalent to 25% of the proposed hardstanding area to a depth of typically 350mm. All soft spots should be excavated and replaced with suitable well compacted granular material.

Where there could be rapid variations in formation strength, consideration should be given to a sandwiched geogrid construction which will help even out those variations to within acceptable limits. Intégrale can give further guidance on request.

5.5 Protection of Buried Concrete

In line with BRE Special Digest 1:2005 'Concrete in Aggressive Ground', 4 No. samples of natural soils were tested for water soluble sulphate, total acid soluble sulphate, total sulphur and pH. The results are reported in Appendix I.

The desk study and ground investigation indicate the site can be categorised as being:

- Natural ground unlikely to contain pyrites, although the presence of ironstones locally is noted;
- Mobile groundwater conditions, as water will flow into excavations or is percolating slowly through the ground.

The tests were scheduled on samples from the proposed substation and current proposed battery energy storage system areas. Strictly in accordance with the guidance, the number of tests completed is insufficient to categorise this type of site as a whole and the design team should consider whether further analysis should be completed.

The results show a highest water soluble sulphate of 0.09mg/l. The lowest value for pH was 5.4. The results for total acid soluble sulphate (0.03% to 0.21%) and total sulphur (<0.01% to 0.1%) indicate pyrite which may oxidise is not present. It is therefore recommended that a Design Sulphate Class of DS-1 and an ACEC Class of AC-2z be adopted for budgeting purposes.

5.6 Drainage Considerations

9 No. soakaway trials and 5 No. surface dual-ring infiltrometer tests were completed at various investigation locations. A portable water tank was used to fill hand excavated trial pits to 300mm depth. The drop in water level was recorded over time, and the results are included in Appendix F. The results indicate a typical soil infiltration rate of $1x10^{-5}$m/s between ground level and 0.35m depth.

The dual-ring infiltrometer results from ground level indicate a more rapid infiltration rate in the surface (often ploughed) soils of typically c.$5x10^{-4}$m/s.

Particle size analyses of the Topsoil samples typically record c.90% sand (of which 15-20% was defined as 'fine'). The remaining 5-15% was silt and clay sized particles. This correlates well with the measured infiltration rates.

It is considered that given the depth to standing groundwater (>1.5m) and granular nature of the shallow natural soils, the majority of rainfall infiltration will simply soak away rapidly.

In the extreme lower western area, groundwater can stand higher at 0.5 to 1.0m depth, although the surface soils are often still very sandy. Here

infiltration rates could be slower and the current fields are drained via drainage ditches.

6.0 GENERIC QUANTITATIVE CONTAMINATION ASSESSMENT

6.1 Summary of Soils Results with Respect to Human Health

The conceptual model based on the source-pathway-receptor linkages is summarised as:

SOURCE		PATHWAY		RECEPTOR
Contaminated soils	→	Dermal exposure (during groundworks)	→	On-site construction worker /maintenance engineer
Contaminated soils	→	Inhalation of soil dust	→	On-site construction worker /maintenance engineer

A generic risk assessment has been undertaken by comparing proven concentrations of contaminants against generic assessment (or screening) criteria (AC).

The AC adopted are the published LQM/CIEH Suitable For Use Levels (S4UL's), for a generic commercial /industrial end-use, adopted under licence no. 3580. These provide a precautionary approach, based on the principle of minimal or tolerable risk, but relying on conservative values for soil type (sandy loam) and organic matter contents of 1, 2.5 or 6% as appropriate. Where no S4UL is published, e.g. lead, the alternative AC is the most recently published industry standard value.

If the proven contaminant concentration is less than the respective AC, it is considered there is no significant risk to human health from these substances.

No contaminants were present in the analysed samples in excess of the relevant assessment criteria.

6.2 Summary of Soils Results with Respect to Phytotoxicity

The soil samples where phytotoxic contaminants exceeded the former ICRCL 59/83 thresholds are:

Standard	Substance	Stratum	Depth BEGL	Area / Zone
Phytotoxic Target	Nickel, zinc	Made Ground	1.0-1.75m	TP21, WS9

These results are insignificant given their depth and the proposed grassed soil cover beneath the solar panels.

6.3 Summary of Soils Results with Respect to WRAS

The soil samples which exceeded the Water Regulations Advisory Scheme (WRAS) guidance on water supply pipes are:

Standard	Substance	Stratum	Depth BEGL	Area / Zone
WRAS	pH, arsenic, chromium	Natural Soils & Made Ground	GL-1.5m	Range of locations
	TPH	Made Ground	1.75m	WS9

This suggests that new water pipes laid through the Blown Sand or Made Ground will need to be protected against chemical attack. Requirements should be confirmed with the water supply company.

6.4 Controlled Waters

6.4.1 Conceptual Model

The assessment of risks to controlled waters follows guidance provided by the Environment Agency, including their Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination (2006). The conceptual site model has been developed based on the source-pathway-receptor linkages identified during the desk study and fieldworks. Possible sources, pathways and receptors have been assessed, which identifies the potential pollutant linkages as:

SOURCE		PATHWAY		RECEPTOR
Contaminated soils	→	Leaching from soils or migration of liquid contaminants through the unsaturated zone.	→	Groundwater
Contaminated soils	→	Leaching from soils or migration of liquid contaminants through service runs	→	Surface Water Courses
Contaminated soils	→	Run-off from disturbed surface soils (during groundworks)	→	Surface Water Courses

Leachate results have therefore been compared against the freshwater environmental quality standards (EQS) adjusted for water hardness. In the absence of EQS values, then DEFRA Freshwater Standards (FS), Surface Water Abstraction Directive (SWAD) values, or UK Drinking Water Standards (UKDWS), have been adopted, in priority order.

6.4.2 Summary of Leachate Results

No substances were present in the analysed leachate samples in excess of the criteria.

6.5 Gas Mitigation

The monitoring, based on 3-4 visits, indicates a typical Gas Regime classification of Characteristic Situation 1 for the majority of the site. At TP5/5A, the organic peaty soils produced 6-12% carbon dioxide with very low flow of 0.3 l/hr. At WS9, carbon dioxide of 3-15% was recorded with slightly higher flow of 1.2 l/hr. Nowhere was methane measured at >0.1% by volume.

At TP5/TP5A in the northwest of the site, there appears to be 0.8-1.7m cover of topsoil and Blown Sands overlying the Alluvium which is producing this slightly abnormal carbon dioxide level.

In the southwest of the site at TP21/WS9 there is Made Ground locally, however it appears to be the organic Alluvium underlying the Topsoil and Blown Sand, again between 0.7-1.5m depth BEGL, generating the abnormal carbon dioxide.

It is concluded that there is no need to adopt any protective measures against gas ingress for in-ground plant and services or for the proposed structures and infrastructure in the substation and battery energy storage system areas.

However, in the extreme lower western area, where Alluvium is present (as summarised in Section 4.1 D) there is an increased risk of abnormal carbon dioxide concentrations. No protective measures should be needed for in-ground plant, however appropriate precautions should be taken for construction or maintenance workers if any excavations below 1m are required in such ground conditions.

6.6 Conceptual Exposure Model & Risk Assessment

The potential hazards and risks from soils, water and gas contamination have been developed as a Conceptual Exposure Model, based on desk studies, proven ground conditions, analytical and monitoring results and the proposed redevelopment. Substances actually proven, or strongly suspected present, have been assessed against potential exposure pathways and available receptors.

The following hazard-pathway-receptor linkages are therefore established for this site:

- WRAS Contaminant Threshold Concentrations are exceeded in a range of locations;
- Carbon dioxide is slightly elevated in the Alluvial areas which could pose a risk to ground workers if any confined space working is undertaken.

6.7 Recommendations

6.7.1 For Protection of Human Health

Based on the generic screening assessment undertaken to date, the following measures will be necessary to protect the health of construction/ground workers and maintenance engineers.

a) Advice and protection to groundworkers during excavations.

6.7.2 For Protection of Groundwater / Surface Water

Based on the generic screening assessment undertaken to date, the following remedial measures will be necessary to protect the groundwater table and adjacent surface water courses:

a) Adoption of an appropriate buffer zone alongside all ditches and water courses with no access during works;
b) Measures to prevent soil erosion and rainfall run-off during the complete construction period.

6.7.3 For Protection of Building Materials & Services

To protect new building materials the following precautions will be necessary:

a) Specification of appropriate concrete protection for the sulphate/pH environment, as detailed in Section 5;
b) Use of protective pipework for all new water supplies.

6.7.4 For Protection of New Vegetation

Based on the results to date it seems unlikely that any measures are required.

6.7.5 Reuse and Disposal of Surplus Spoil

It seems unlikely to be possible to reuse any excavated spoil comprising the Made Ground from the TP21 area in the southwest of the site.

Should soils need removal to a suitably licensed tip, waste characterisation and classification in accordance with the Environment Agency's Technical Guidance will need to be undertaken to comply with the Duty of Care.

6.7.6 Recommended Further Action

A watching brief should be kept at all times while groundworks are occurring. Should any signs of unforeseen contamination be found during groundworks, Intégrale should be contacted immediately to determine the best course of action.

Copies of this report were provided to the Local Authority and Environment Agency to confirm their agreement with the findings and recommendations.

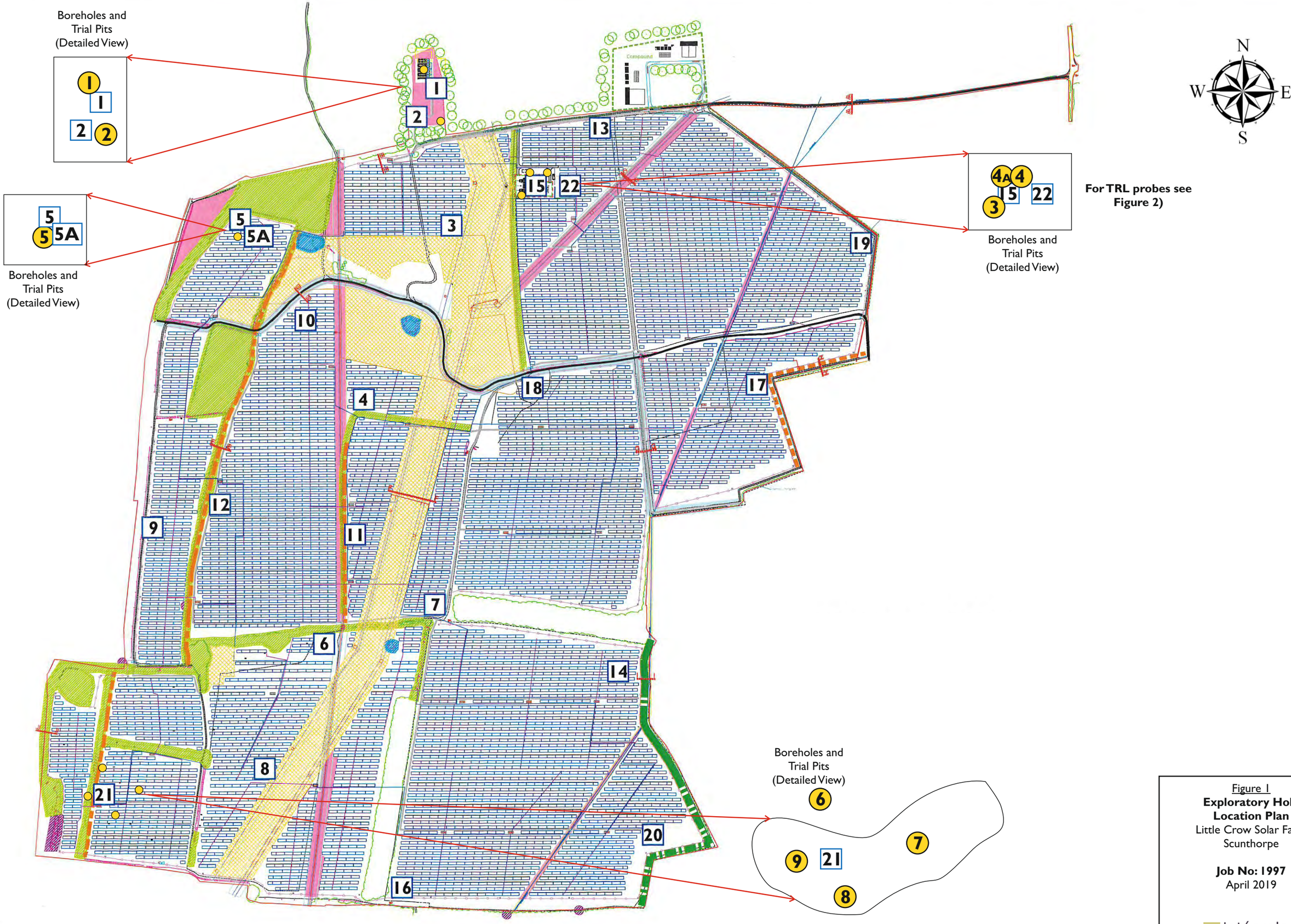
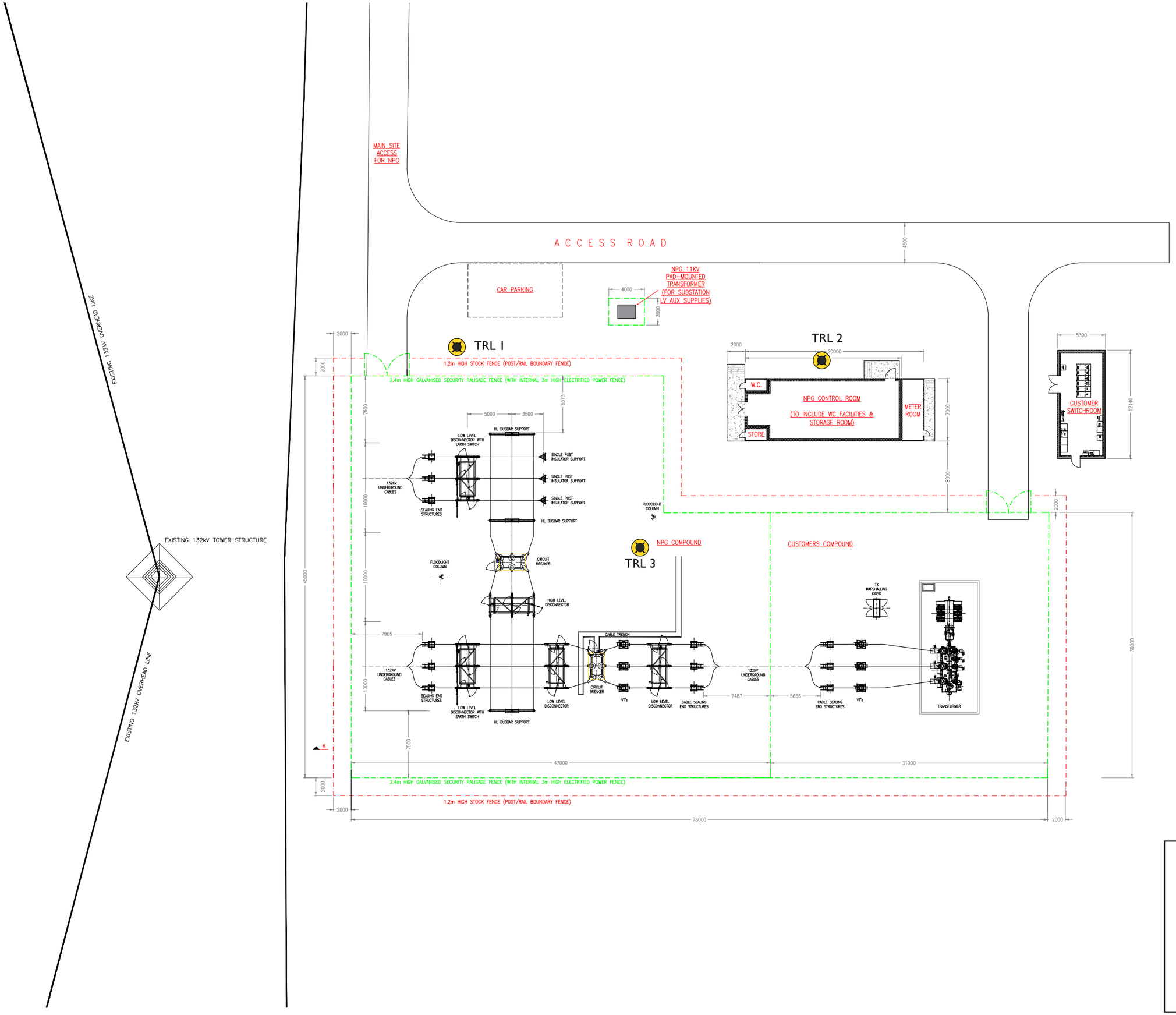


Figure 1
Exploratory Hole Location Plan
Little Crow Solar Farm
Scunthorpe

Job No: 1997
April 2019

Intégrale
Understanding Ground Conditions



Scale 1:400 @ A3

Figure 2
TRL Probe Location Plan
Little Crow Solar Farm
Scunthorpe

Job No: 1997
April 2019

Intégrale
Understanding Ground Conditions

Appendix A

Site Location

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

N
W
E
S
0 50 150 250m

Coronation Wood
Wood
Santon Wood
Well
Heron Lodge
Heron Ho
Little Crow Covert
Poultry Farm
Gokewell Strip
Icehouse Strip
Home Be
66
62
44
95
94
53
57
43
40
58
55
63

KEY: LAND & ORDER LIMITS PLAN

ORDER LIMITS

AREA EXCLUDED FROM ORDER LIMITS

DOCUMENT REFERENCE NUMBER: °2.1 LC DRW°

APFP REG 5 (2)(i)(i)

LITTLE CROW SOLAR PARK - **LAND PLAN INCLUDING ORDER LIMITS**

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | www.pegasusgroup.co.uk | TEAM/DRAWN BY: RIT | APPROVED BY: GR | DATE: 30/10/2020 | SCALE: 1:2500 @ A0 | DRWG: **P17-0718**_29 SHEET NO: __ REV: E | CLIENT: **INRG SOLAR (LITTLE CROW) LTD.** |

Pegasus Design

Appendix B

Site Description / Photographs

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

REFERENCES	
Project No & Address	1997 – Land West of the B1207, Scunthorpe, DN16 1XP
Grid Reference	E494000 N410000
Date of Visit	25-27.09.18
Site developers	David Dean - INRG Solar (Little Crow) Lts
Prepared by	JB
SITE – GENERAL	
Plan of site	See Figure 1.
Site size (area):	Farmland: 85%, open space: 5%, woodland: 5%, access tracks: 5%.
Current use:	Arable farmland.
Site Area:	Approximately 215Ha, irregular in plan view.
Maximum Dimensions:	1700m N-S by 1100-1500m E-W.
Boundaries:	Agricultural fences, hedgerows and mixed mature deciduous and evergreen trees.
Limitations for plant hire:	None.
Specific working hours/requirements:	08:00-17:00, code for padlock on entrance gate.
Site-specific H&S considerations:	Sloping ground, lone working.
Water/power supply, hydrant:	2 No. 1000L IBCs delivered to site.
SITE – BUILDINGS	
Gokewell Priory (ruin) located within a dense copse of trees and thick overgrowth is within the archaeological buffer zone.	
SITE – EXTERNAL	
Hard surfacings:	Made and unmade access tracks cross the site. Potholes are common in the unmade tracks and where tarmac is present it is very worn and breaking along the margins of the road.
Landscaped areas/soft landscaping:	Arable farmland with small areas of mature woodland. Grassy scrub and other vegetation in SW and extreme N in proposed battery storage area. Crops planted in extreme E of the site and will not be affected by works. Site investigation conducted in this area on 12th September.
Invasive species noted:	None noted.
Can investigation be in landscaped areas:	N/A
Site topography:	Higher eastern plateau (60-67mAOD), very gently sloping E. Central area at (40-60mAOD), moderately sloping W. Western zone (30-40mAOD), moderately sloping W. Extreme western zone (25-30mAOD), very gently sloping W.
Evidence of filling or raising, mass movement etc. Sloping ground – any indication of instability:	Bean-shaped depression in SW may indicate infilling and settlement of historic ironstone workings.
Soil drainage:	Appreciable sand in topsoil with is dominantly silt.
Trees:	Icehouse Strip (S) and Gokewell Strip (E) penetrate into

	the site from perimeter woodland and do not form part of the proposals. Santon Wood (N) surrounds the proposed battery storage area.
Rock/soil exposures:	Topsoil exposed in freshly ploughed fields.
Drainage:	Number of dry ditches on field boundaries in the W of the site.
Other evidence of Services:	Overhead cables cross the site at height with a number of pylons located within the site. Smaller telegraph poles are present. All overheads generally running N-S or NE-SW across the site.
Vehicle maintenance:	N/A
Waste:	None.
Sub-stations:	N/A
Ecological features of note:	None.
Any seepages on or adjacent to site.	None.
Watercourses, water levels, direction and rate of flow.	Little Crow Covert (approx. 8m deep) forms western boundary of the site, flowing south. A number of drainage ditches are present in the west of the site and flow downhill towards the covert. A pond in the NW of the site also feeds into the covert.
Other features of note within site.	None.
SURROUNDING LAND USES	
General site context:	Predominantly agricultural.
Land use – north:	Woodland and arable farmland.
Land use – south:	Woodland, arable farmland and Ravensthorpe Solar Farm.
Land use – east:	Woodland, poultry farm and arable farmland.
Land use – west:	Steel works and disused open cast ironstone workings.
Nearby (<500m) sources of pollution:	Steel works (British Steel), historic ironstone workings.
Nearby river / surface water features:	Little Crow Covert forms W boundary of site.
Local ground profiles and signs of instability.	Some rotated trees on the covert banks, appears more to be age and weather related rather than slope instability.
Evidence of structural distress on nearby buildings.	N/A
Evidence of mining history:	Linear ironstone quarries (gullets) to W of site with hummocky ground.
Nearby rock/ soil outcrops.	None.
Vegetation – distinctive change in vegetation:	Lush grass coverage is SW of site with sporadic hydrophyllic vegetation.
Adjacent geotechnical features of note:	Ironstone quarries.
Other features of note adjacent to site.	None.

	
Plate 1 – Looking S across the higher eastern plateau towards the proposed substation area.	Plate 2 – Looking E across the higher eastern plateau from the substation area (WS3 pictured in foreground).
	
Plate 3 – Looking W downslope towards the steelworks from the substation area.	Plate 4 – Looking NW across the battery storage area.
	
Plate 5 – Looking S across the midslope section of the site from the track adjacent to the battery storage area.	Plate 6 – Looking W downslope from the site centre (edge of the archaeological no dig zone pictured right).

	
Plate 7 – Looking S across the midslope section of the site, upslope from TP6 (Icehouse Strip pictured top left).	Plate 8 – Looking SE from the NW corner of the site (WS5 pictured in foreground).
	
Plate 9 – Looking S along the W boundary of the site.	Plate 10 – Looking W from the depression in the SW of the site (WS8 pictured in foreground).
	
Plate 11 – Looking W across the depression in the SW of the site towards the steelworks.	Plate 12 – Hydrophilic vegetation in depression in SW of the site (WS7 pictured in foreground).

Intégrale

Appendix C

Additional Desk Study Information

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

INTER OFFICE	**MEMO**	NORTH LINCOLNSHIRE COUNCIL

To: Andrew Law, Development Management

From: Environmental Health (Commercial)

Your Ref: Pre planning application, PRE/2018/137

Our Ref PLU 003933

Subject: Ground mounted solar park up to 150MWp

Location: Little Crow Solar Park, Santon, Scunthorpe

Date: 30 August 2018

Thank you for your email requesting this department's comments on the above pre Application request.

The applicant has included details of the proposed development for the installation of a solar park with a maximum export capacity of 100Mw. The proposal will also include approximately 50Mw of battery storage containers that will provide a frequency response to the national grid at times when the solar park is not exporting at peak capacity.

There will also be electrical connection infrastructure and the point of connection into the local electricity grid is directly to the 132kva electricity overhead pylon which already runs through the development site.

Due to the potential generating capacity, at over 50Mw, this project constitutes a Nationally Significant Infrastructure Project and the application will go to the Secretary of State for a Development Consent Order.

The proposed development is 140m to the nearest sensitive residential receptors, this department therefore requires the following with any planning permission applied for.

Construction Environmental Management (CEMP)

This department is concerned that noise, dust, light etc. during the construction phase has the potential to impact on amenity. To prevent local residents and other sensitive receptors being affected during the construction of the proposed development, this department recommends the inclusion of the following conditions:

1. No stage of the development hereby permitted shall commence until a Construction Environmental Management Plan (CEMP) has been submitted to and approved in writing by the Local Planning Authority. The CEMP shall include the following:-

   Noise and vibration: The CEMP shall set out the particulars of –

   a) the works, and the method by which they are to be carried out;

   b) the noise and vibration attenuation measures to be taken to minimise noise and vibration resulting from the works, including any noise limits; and

   c) a scheme for monitoring the noise and vibration during the works to ensure compliance with the noise limits and the effectiveness of the attenuation measures

   Light: The CEMP shall set out the particulars of –

   a) Specified locations for contractors' compounds and materials storage areas,

   b) Areas where lighting will be required for health and safety purposes,

   c) Location of potential temporary floodlights,

   d) Identification of sensitive receptors likely to be impacted upon by light nuisance,

   e) Proposed methods of mitigation against potential light nuisance, including potential glare and light spill, on sensitive receptors.

   Dust: The CEMP shall set out the particulars of –

   a) Site dust monitoring, recording and complaint investigation procedures
   b) b) Identification of receptors and the related risk of dust impact at all phases of the development, including when buildings and properties start to be occupied

   c) Provision of water to the site

   d) Dust mitigation techniques at all stages of development

   e) Prevention of dust trackout

   f) Communication with residents and other receptors

   g) A commitment to cease the relevant operation if dust emissions are identified either by regular site monitoring or by the local authority

   h) A no burning of waste policy

2. Construction and site clearance operations shall be limited to the following days and hours:

    - 07:00 to 19:00hrs Monday to Friday.
    - 07:00 to 13:00hrs Saturday.
    - No construction or site clearance operations on Sundays or public holidays.
    - HGV movements shall not be permitted outside these hours during the construction phase without prior written approval from the Local Planning Authority.
    - Installation of equipment on site shall not be permitted outside these hours without prior written approval from the Local Planning Authority.

Operational noise

The applicant has not provided any information in relation to operational noise of the development site including the use of battery storage containers. However, given the location and nature of the proposed development, it is likely that operational noise will not give rise to significant adverse impact provided that any necessary mitigation measures are included. This department would expect a planning application to include details of operational noise sources and predicted noise levels at relevant locations.

Contaminated Land

A desk study has been included with this application. The desk study has indicated that the current site has a prolonged history of agricultural usage, with no evidence of large scale ironstone extraction or landfilling within the boundaries. However due to the proximity to the steel works, this department would recommend checking for the location of ironstone gullets and mineshafts in the area before any development is undertaken.

[redacted]
Integrale
Unit 7
Westway Farm Wick Road
Bishop Sutton
Bristol
BS39 5XP

Our ref: AN/2018/127969/02-L01
Your ref:
Date: 28 September 2018

Dear [redacted]

Construction of a solar farm (126MW) - Development Consent Order
Little Crow Solar Farm, Broughton, Scunthorpe, DN16 1XP

Thank you for requesting our pre-application advice in respect of the above project, which is provided below.

We have reviewed the 'Phase I Ground Conditions Desk Study' (ref 1844, version 4, July 2018), whilst referring to the Flood Risk Assessment and Drainage Strategy (FRADS) (undertaken by Clive Onions, 26 July 2018 version 2) for background information. Please note that we have not undertaken a detailed review of the FRADS as the site does not lie within the Environment Agency's floodplains for tidal and fluvial risk and issues relating to other sources of flooding are outside of our remit.

The site overlies numerous geologies, but includes limestone and superficial deposits, which are classified as Principal and Secondary A aquifers respectively. The previous use of the site is largely greenfield, although the area has a history of quarrying and workings and as a result there are possible areas of infill on the site. The site is also adjacent to an historic landfill, Scunthorpe Concast, to the west.

The report presents a good conceptual site model and we are in agreement with the conclusions reached in section 4 of the report. Limited intrusive investigation is proposed in the areas of possible infill to add to the conceptual understanding of the site. We are also in agreement with the proposed sampling locations.

From a controlled water perspective we are satisfied with the proposed approach. During any formal consultation in respect of the Development Consent Order we are likely to request the imposition of a requirement for further phased land contamination investigation. The following gives a draft of our likely requirement:

Contaminated land and groundwater scheme
(1) No part of the authorised development may be commenced until a scheme to deal with the contamination of any land (including groundwater) within the Order limits that is likely to cause significant harm to persons or pollution of controlled waters or the environment has been submitted to, and approved by, the local planning authority in consultation with the Environment Agency.
(2) The scheme must include an investigation and assessment report, prepared by a specialist consultant approved by the local planning authority, to identify the extent of any contamination and the remedial measures to be taken for that stage to render the land fit for its intended purpose, together with a management plan which sets out long-term measures with respect to any contaminants remaining on the site.
(3) No remedial work constituting a material operation (as defined in section 155 of the 2008 Act) in respect of contamination of any land (including groundwater) within the Order limits may be carried out until the scheme has been approved.
(4) In carrying out the works for the authorised development, the undertaker must not conduct trenchless technique operations unless the scheme includes a hydrogeological risk assessment demonstrating that such operations are unlikely to cause an unacceptable risk to groundwater quality.
(5) Remediation must be carried out in accordance with the approved scheme.
(6) In this Requirement, “controlled waters” has the meaning given in Part 3 of the Water Resources Act 1991.

The above advice is provided under our cost recovery agreement number ENVPAC/1/LNA/00031 and an invoice for £300 plus VAT will be issued to you shortly.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

[redacted]
Principal Planning Adviser

Direct dial [redacted]
Direct e-mail [redacted]@environment-agency.gov.uk

End

Appendix D

Trial Pit Logs

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

STANDARD METHODOLOGY FOR MECHANICAL TRIAL PITTING

Trial pits are mechanically excavated using a wheeled or tracked backhoe or mini-excavator, typically fitted with toothed buckets. The trial pit locations are selected using information on the proposed redevelopment, existing buried services and structures, ongoing site use, reinstatement requirements and time constraints. Those positions are shown on Figure 1 and the trial pit records included as a separate appendix.

Trial pitting was directed and supervised full-time by an experienced engineering geologist who carried out insitu testing, kept a record of the strata encountered, noted the pit side stability and ease of digging, any water ingresses, took photographs and recovered representative disturbed samples.

Insitu testing comprised hand shear vane measurement in appropriate cohesive strata to provide a direct reading of insitu undrained shear strength. Tests were completed from within the pit to depths of approximately 1.2m below ground level and within excavated spoil below this. The hand shear vane is inserted into cohesive soil and rotated at an even speed equivalent to one rotation per 60 seconds. Three tests are typically taken and the average result used as the undrained shear strength in kN/m^2.

Mexicone penetrometer testing was undertaken either from ground level or at shallow depth within trial pits and the test results are included in the trial pit records. The mexicone penetrometer is a simple, hand-held device which gives a direct read out of equivalent CBR strength, on a cylindrical gauge. Readings are recorded for each 75mm penetration and where suitable soils are present, successive readings up to 0.6m total penetration can be achieved. However, the test can abort on coarse granular soils or other obstructions and in this case the term 'refusal' is given in the test records.

On completion the pits were backfilled with their spoil, compacted with the excavator bucket and the surplus left mounded to allow for subsequent consolidation settlement. If specific reinstatement has been requested by the client, this is confirmed in the main text of this report.

The trial pit records have been prepared using Gint software, taking into account both site descriptions and subsequent laboratory testing.

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

EXPLORATORY HOLE EXPLANATION SHEET

SAMPLES AND TESTS

AMAL	Amalgamated sample
B	Bulk disturbed sample
BLK	Block sample
C	Core sample
CBR	CBR mould sample
D	Small disturbed sample
ES	Environmental sample
EW	Environmental water sample
G	Gas sample
J	Jar sample
LB	Large bulk disturbed sample
M	Mazier type sample
SPTLS	Standard penetration sample
TW	Thin-walled push in sample
U	Undisturbed sample - open drive
UT	Thin wall open drive tube sampler
W	Water sample
HVP	Hand-held shear vane test
HSV	Hand-held shear vane test
MEX	Mexicone penetrometer test
PID	Photoionization detector (gas)

SOILS

- Topsoil
- Concrete
- Made Ground (Fill)
- Peat
- Clay
- Silt
- Sand
- Gravel
- Cobbles
- Boulders

Note: composite soil types will be signified by combined soil types e.g.

- Silty Sand

SEDIMENTARY

- Chalk
- Limestone
- Conglomerate
- Breccia
- Sandstone
- Siltstone
- Mudstone
- Shale
- Coal
- Pyroclastic (Volcanic Ash)
- Gypsum, Rocksalt, etc.
- Void/Broken Ground

IGNEOUS

- Coarse Grained Igneous
- Medium Grained Igneous
- Fine Grained Igneous

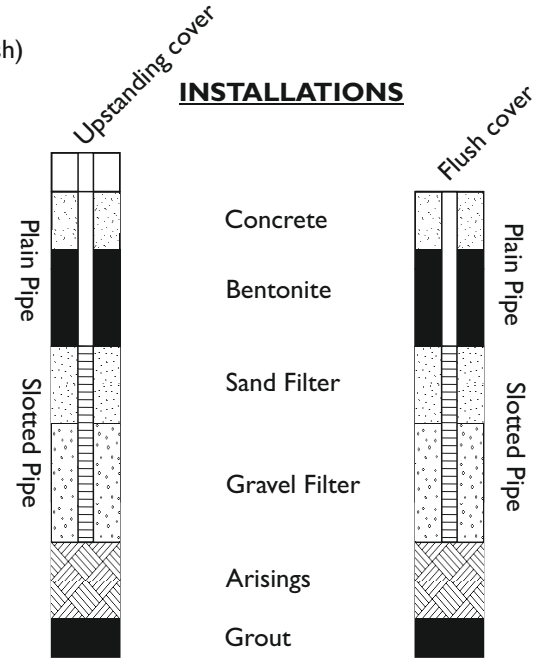
METAMORPHIC

- Coarse Grained Metamorphic
- Medium Grained Metamorphic
- Fine Grained Metamorphic

WATER SYMBOLS

- Water Level (after 20 minutes)
- Water Strike

INSTALLATIONS



Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP01
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 47.23	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 1.9 x 0.7 Depth 2.30	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL: (Comprising grass over moderately compact brown silty fine to medium Sand).
				0.35	46.88		
	0.50	D					[Loose to medium dense] orange silty fine to medium SAND. (BLOWN SAND)
							MEX at 0.7m = 1,2,3,6,14,12,Refusal.
	1.20	D					
				1.60	45.63		Firm to stiff grey mottled orange extremely plastic CLAY. (WEATHERED LIAS GROUP)
			HVP=56				
	1.80	D					
			HVP=60				
	2.30	D		2.30	44.93		End of pit at 2.30 m

1
2
3

Remarks: No groundwater encountered.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP02
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 46.82	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): Depth 2.20 (2 × 0.7)	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL: (Comprising grass over moderately compact brown very silty fine to medium Sand. One bone fragment).
				0.40	46.42		[Loose to medium dense] pale grey slightly silty fine to medium SAND. Occasional clasts of sub-rounded compact orange-brown silty sand. (BLOWN SAND)
	0.60	D					*MEX at 0.6m = 7,14,14,12, Refusal*
	0.85	D		0.80	46.02		[Medium dense] orange brown silty fine to medium SAND. (BLOWN SAND)
				0.90	45.92		Firm to stiff grey locally mottled orange-brown slightly sandy silty CLAY. Sand is fine to medium. Lenses of damp silty sand between Ø 50-100mm. (WEATHERED LIAS GROUP)
			HVP=76				
	1.20	D					
	2.00	D	HVP=50				
				2.20	44.62		End of pit at 2.20 m

1
2
3

Remarks: No groundwater encountered.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP03
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 48.73	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 2.30	2.2 × 0.7	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL with some MADE GROUND: (Comprising moderately compact brown slightly clayey silty fine to medium Sand with rare gravel. Gravel is fine to medium sub-angular to sub-rounded brick and cinder).
				0.40	48.33		
	0.50	D					[Loose to medium dense] orange-brown clayey silty fine to medium SAND with occasional very compact sub-rounded medium to coarse clasts of silty sand and clasts of orange brown clay. (BLOWN SAND)
							MEX = 4,7,10,12,7,12,12,14
	1.00	D					
				1.40	47.33		[Loose to medium dense] cream fine to medium SAND. (MARLSTONE ROCK BED)
	1.80	D					
				2.30	46.43		End of pit at 2.30 m

1
2
3

Remarks: No groundwater encountered.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP04
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 42.88	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): 2.7 × 0.7, Depth 2.70		Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES		0.50	42.38		TOPSOIL: (Comprising loose to moderately compact brown slightly clayey silty fine to medium becoming medium Sand).
	0.80	D		0.90	41.98		[Loose to medium dense] orange brown fine to medium SAND. (BLOWN SAND) *MEX at 0.6m depth = 2,3.5,5,5,10,14,Refusal.*
	1.30	D		1.80	41.08		[Loose to medium dense] pale cream grey slightly silty fine to medium SAND. (HIGHLY WEATHERED MARLSTONE ROCK BED) *Below 1.5m depth gravel and cobble-sized clasts of compact silty sand.*
	1.90	D		2.70	40.18		Soft to firm locally very soft grey sandy very silty CLAY with bands of dark grey clayey silty sand. Sand is fine to medium. (WEATHERED LIAS GROUP) *Below 1.8m depth becoming very damp.* End of pit at 2.70 m
	2.30	D					

1 2 3

Remarks: No groundwater encountered but strata damp below 1.8m depth.

Stability: Spalling in slabs below 1.2m.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP05
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 25.55	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.1 × 0.7, Depth 2.40	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	25.25		TOPSOIL: (Comprising moderately compact dark brown silty fine to medium Sand).
	0.60	D					[Loose to medium dense] orange-brown silty fine to medium SAND. (BLOWN SAND)
							MEX at 0.7m = 8,7,5,5,3,4.5,13,Refusal.
	0.90	ES		0.80	24.75		Firm grey brown locally stained black silty sandy CLAY with decaying organic matter (roots and twigs) and pockets of sand. Sand is fine to medium. Stratum has a putrid odour. (ALLUVIUM)
	1.30	D		1.00	24.55		[Medium dense] pale grey silty fine to medium SAND with decaying organic matter/peat. (ALLUVIUM)
							Stratum is damp.
	2.20	D		2.40	23.15		End of pit at 2.40 m

1
2
3

Remarks: Trial pit terminated on presumed rockhead.
Groundwater seepage at base.
Monitoring well installed to 2.0m depth.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP05A
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 25.25	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.6 × 1.3, Depth 2.50	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES					TOPSOIL over MADE GROUND: (Comprising moderately compact brown slightly clayey very silty fine to medium Sand with very compact clasts of sandy silt).
	0.45	ES		0.40	24.85		MADE GROUND: (Comprising compact dark brown and black slightly clayey slightly gravelly Silt. Gravel is angular to sub-angular fine to coarse cinder).
				0.50	24.75		[Loose to medium dense] pale grey silty fine to medium SAND. (BLOWN SAND)
	1.00	D					
				1.70	23.55		[Medium dense] grey silty fine to medium SAND with pockets of spongy dark brown pseudo-fibrous peat. (ALLUVIUM)
	1.80	D					
	1.90	D					
				2.50	22.75		End of pit at 2.50 m

Remarks: Groundwater seepage below 1.7m depth.
Monitoring well installed to 2.0m.

Stability: Sidewalls collapsing below 0.4m depth.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP06
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 41.87	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 2.20	2.5 × 0.7	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES		0.40	41.47		TOPSOIL: (Comprising moderately compact brown silty fine to medium Sand).
	0.70	D					[Loose to medium dense] orange-brown locally creamy silty fine to medium SAND. (BLOWN SAND) *MEX at 0.5m = 0.5,1,1.5,2,5,7.5,10,12*
	1.10	D		1.00	40.87		[Loose to medium dense] grey silty fine to medium SAND. (WEATHERED LIAS GROUP)
	1.40	D	HVP=29	1.20	40.67		Soft grey mottled orange slightly sandy silty CLAY with rare organic matter. Sand is fine to medium. (WEATHERED LIAS GROUP)
	2.00	D	HVP=42	1.70	40.17		Soft to firm grey silty CLAY. (WEATHERED LIAS GROUP)
				2.20	39.67		End of pit at 2.20 m

1 2 3

Remarks: No groundwater encountered.
Monitoring well installed to 2.0m depth.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP07
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 59.00	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.4 x 0.8 Depth 2.00	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES					TOPSOIL: (Comprising moderately compact brown slightly gravelly clayey sandy Silt with compact clasts of the same material. Sand is fine to medium. Gravel is sub-angular to sub-rounded fine to coarse limestone).
				0.45	58.55		[Medium dense] slightly clayey silty fine to coarse SAND and angular to sub-angular fine to coarse GRAVEL of limestone with medium cobble content. Cobbles are angular to sub-angular limestone. (WEATHERED INFERIOR OOLITE GROUP)
							MEX at 0.5m = 7,13,12,Refusal
	0.80	D					
	1.30	D					
				1.50	57.50		[Medium dense] cream grey slightly clayey slightly sandy gravelly SILT. Sand is fine to medium. Gravel is angular to sub-angular fine to coarse siltstone. (WEATHERED INFERIOR OOLITE GROUP)
	1.80	D					
				2.00	57.00		End of pit at 2.00 m

1
2
3

Remarks: No groundwater encountered.
Monitoring well installed to 2.0m depth.

Stability: Vertical and stable.

Trial Pit Log

Intégrale — Understanding Ground Conditions

Trialpit No **TP08** — Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 40.56	Date 27/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): 2.4 × 0.7, Depth 2.00		Scale 1:15
Client:	INRG Solar Limited			Logged JB

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL: (Comprising moderately compact brown slightly gravelly clayey sandy Silt. Gravel is angular to sub-angular fine to medium mudstone and ironstone with rare rounded quartzite).
				0.30	40.26		
	0.40	D					[Medium dense] brown slightly gravelly clayey sandy SILT with a low cobble content of sub-rounded ironstone nodules and gravel-size clasts of clay throughout. Gravel is angular to sub-angular fine to medium mudstone and ironstone. (WEATHERED LIAS GROUP)
				0.50	40.06		Firm to stiff friable grey mottled brown slightly sandy slightly gravelly silty CLAY with a low cobble content of rounded ironstone. Gravel is angular to sub-angular fine to coarse mudstone and ironstone. (WEATHERED LIAS GROUP)
	0.80	D					*MEX at 0.5m = 8.5,6,4,9.5,14,13,Refusal*
							Below 1.4m depth becoming very gravelly with thick laminations.
	1.60	D					
				2.00	38.56		End of pit at 2.00 m

Remarks: No groundwater encountered.

Stability: Slight spalling below 1.70m.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP09
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 27.68	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.2 × 0.7, Depth 2.60	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL: (Comprising loose brown slightly silty fine to medium typically fine Sand. Stratum becomes increasingly silty sand with depth).
				0.40	27.28		[Loose to medium dense] orange-brown slightly silty slightly gravelly fine to medium SAND with pockets of dark grey sand and gravel. Gravel is angular to sub-angular fine mudstone. (BLOWN SAND)
							MEX at 0.6m = 0.5,2,10,10,4,13,12,Refusal
	0.80	D					
							Below 1.0m depth becoming wet.
	1.20	D					
				1.40	26.28		Firm orange and grey slightly sandy silty CLAY. Sand is fine to medium. (WEATHERED LIAS MUDSTONES/IRONSTONES)
	1.50	D					
				1.70	25.98		[Firm to stiff] orange-brown sandy locally very sandy clayey fine to coarse angular to sub-angular GRAVEL of mudstone and ironstone. (WEATHERED LIAS MUDSTONES/IRONSTONES)
	2.00	D					
				2.60	25.08		End of pit at 2.60 m

1 2 3

Remarks: Slight groundwater seepage at base.
Monitoring well installed to 2.0m depth.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP10
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 34.80	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.2 × 0.7, Depth 2.20	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					TOPSOIL: (Comprising moderately compact brown slightly clayey silty fine to medium Sand).
				0.30	34.50		[loose to medium dense] orange-brown locally slightly clayey silty fine to medium SAND with occasional very compact clasts of orange-brown silty sand. (BLOWN SAND)
	0.50	D					*MEX at 0.6m = 4,3.5,7,8,8,9,12,13*
				0.70	34.10		Stiff grey locally mottled pale orange-brown silty CLAY. (LIAS MUDSTONES/IRONSTONES)
	1.10	D	HVP=110				
	1.90	D					
	2.15	D		2.10	32.70		Medium strong yellow to orange-brown MUDSTONE and IRONSTONE. (LIAS MUDSTONES/IRONSTONES)
				2.20	32.60		End of pit at 2.20 m

1
2
3

Remarks: No groundwater encountered.
Monitoring well installed to 2.0m depth.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP11
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 44.35	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.4 × 0.6, Depth 2.40	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	44.05		TOPSOIL: (Comprising moderately compact brown slightly clayey silty fine to medium Sand with occasional compact clasts of slightly clayey silty sand).
	0.50	D		0.70	43.65		[Loose to medium dense] orange-brown silty fine to medium SAND. (BLOWN SAND) *MEX at 0.5m = 2.5,3,7,12,12,Refusal*
	1.40	D		2.20	42.15		[Loose] cream silty fine to medium SAND. (HIGHLY WEATHERED MARLSTONE ROCK BED) *Below 1.6m depth becoming damp.*
	2.30	D		2.40	41.95		[Medium dense] dark grey silty fine to medium SAND. (WEATHERED LIAS GROUP) End of pit at 2.40 m

1
2
3

Remarks: No groundwater encountered.

Stability: Faces unstable and collapsing below 0.4m depth.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP12
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 31.29	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.2 × 0.7, Depth 2.50	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL: (Comprising moderately compact brown slightly clayey silty fine to medium Sand).
	0.40	D		0.35	30.94		[Medium dense] brown slightly clayey very sandy SILT. Sand is fine to medium. (ALLUVIUM)
				0.50	30.79		[Medium dense] pale grey silty fine to medium SAND. (BLOWN SAND)
							MEX at 0.5m = 2,6.5,12.5,12,Refusal
	1.00	D					
				1.60	29.69		[Medium dense] brown silty fine to medium SAND. (BLOWN SAND)
							Below 1.6m depth becoming wet.
	1.80	D					
							Below 2.0m depth becoming pale brown.
	2.30	D					
				2.50	28.79		End of pit at 2.50 m

1
2
3

Remarks: No groundwater encountered.

Stability: Faces unstable and collapsing below 0.5m.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP13
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 64.77	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 0.90	2.2 × 0.8	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					TOPSOIL: (Comprising moderately compact brown slightly gravelly clayey sandy Silt. Sand is fine to medium. Gravel is fine to coarse sub-angular to sub-rounded fine to coarse limestone and siltstone).
	0.30	D		0.25	64.52		[Medium dense] orange-brown slightly gravelly clayey silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse limestone. (WEATHERED INFERIOR OOLITE GROUP)
	0.70	D		0.45	64.32		[Medium dense] pale yellow-brown silty very sandy angular to sub-angular fine to coarse flaggy GRAVEL of oolitic limestone. Sand is fine to coarse. (WEATHERED INFERIOR OOLITE GROUP) *MEX at 0.6m = 13,8,12,Refusal*
				0.90	63.87		End of pit at 0.90 m

1
2
3

Remarks: No groundwater encountered.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP14
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 56.60	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.2 × 0.7, Depth 0.55	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					TOPSOIL: (Comprising compact brown slightly gravelly clayey sandy Silt. Sand is fine to medium. Gravel is sub-angular fine to coarse limestone).
	0.40	D		0.35	56.25		[Dense] grey angular to sub-angular COBBLES of limestone with some sand and gravel. Sand is fine to medium. Gravel is angular to sub-angular fine to coarse limestone. Some clay infill. (INFERIOR OOLITE GROUP)
				0.55	56.05		End of pit at 0.55 m

1
2
3

Remarks: No groundwater encountered.
Trial pit terminated on limestone rockhead.
Mexecone not applicable due to shallow bedrock.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP15
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 62.52	Date 25/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 2.20	2.1 × 0.7	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	62.22		TOPSOIL: (Comprising firm to compact brown slightly gravelly sandy very clayey Silt. Sand is fine to medium. Gravel is sub-angular medium to coarse limestone).
	0.50	D	HVP=76				Firm to stiff yellow-brown becoming grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to sub-angular fine to coarse platy ironstone and siltstone. (WEATHERED LIAS GROUP) *MEX at 0.5m = 2.5,2.5,7,6,4.5,Refusal*
	1.00	D		0.90	61.62		Stiff grey silty CLAY. (WEATHERED COLEBY MUDSTONE)
	1.50	D		1.20	61.32		[Dense] pale grey very gravelly fine to medium SAND. Gravel is angular fine to coarse sandstone. (WEATHERED LIAS GROUP)
	2.00	D		1.90	60.62		[Medium dense] yellow silty fine SAND. (WEATHERED LIAS GROUP)
	2.20	D		2.20	60.32		End of pit at 2.20 m

1
2
3

Remarks: No groundwater encountered.
Trial pit terminated on sandstone rockhead.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP16
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 62.08	Date 27/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 1.80	2.2 × 0.7	Scale 1:15
Client:	INRG Solar Limited			Logged JB

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	61.78		TOPSOIL: (Comprising moderately compact brown slightly clayey silty gravelly fine to medium Sand with rare cobbles. Gravel is angular to sub-angular fine to coarse typically fine to medium limestone. Cobbles are sub-angular limestone).
	0.50	D					[Loose becoming medium dense] yellow-brown slightly clayey sandy gravelly SILT. Gravel is fine to coarse angular to sub-angular limestone and increases in abundance with depth. (WEATHERED INFERIOR OOLITE GROUP)
							MEX at 0.5m = Refusal
							Between 0.7-1.2m depth high cobble content of sub-angular limestone.
	1.50	D					
				1.80	60.28		End of pit at 1.80 m

Remarks: No groundwater encountered.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP17
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 55.16	Date 12/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 1.46	2.8 × 0.7	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.16	55.00		TOPSOIL: (Comprising loose dull orange-brown slightly gravelly clayey silty fine to medium Sand. Gravel is angular to sub-angular fine to coarse of limestone).
	0.30	D		0.42	54.74		[Medium dense] brown slightly gravelly clayey sandy SILT. Sand is fine. Gravel is angular to sub-angular fine to coarse of limestone. (WEATHERED INFERIOR OOLITE GROUP) *MEX at 0.4m = 9,7,11,Refusal*
	0.50	D		0.62	54.54		[Medium dense] orange-brown slightly clayey slightly gravelly silty fine SAND. Gravel is angular to sub-angular fine to coarse of limestone. (WEATHERED INFERIOR OOLITE GROUP)
	0.70	D		1.00	54.16		[Medium dense] pale grey-brown very silty very gravelly fine to medium SAND. Gravel is angular to sub-angular fine to coarse of oolitic limestone. (WEATHERED INFERIOR OOLITE GROUP)
	1.20	D		1.46	53.70		[Dense] pale grey-brown and cream very silty very sandy angular to sub-angular fine to coarse flaggy GRAVEL of siltstone with high cobble content. Sand is fine to medium. Cobbles are flaggy angular to sub-angular of siltstone. (WEATHERED INFERIOR OOLITE GROUP) End of pit at 1.46 m

1
2
3

Remarks: No groundwater encountered.
Trial pit terminated on rockhead.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP18
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 62.37	Date 26/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.2 × 0.7, Depth 1.50	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	62.27		MADE GROUND: (Comprising grass over wet hay and bark mixture).
							Strata are wet.
	0.70	ES					MADE GROUND: (Comprising compact yellow-brown clayey very sandy sub-angular fine to coarse Gravel of limestone with a high cobble content. Sand is fine to medium. Cobbles are sub-angular limestone. Locally areas of dark brown black rotting organic matter with putrid odour [informal hardstanding]).
				1.00	61.37		
	1.20	D					[Medium dense] sandy angular to sub-angular fine to coarse GRAVEL of limestone with a high cobble content. Sand is fine to coarse. Cobbles are angular to sub-angular limestone. (WEATHERED INFERIOR OOLITE GROUP)
				1.50	60.87		End of pit at 1.50 m

1
2
3

Remarks: No groundwater encountered.
No Mexecone as strata too gravelly.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP19
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 54.43	Date 12/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 3 × 0.7, Depth 1.90	Scale 1:15
Client:	INRG Solar Limited			Logged TF

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.35	54.08		TOPSOIL: (Comprising loose brown slightly clayey silty fine Sand with some medium sand).
	0.50	D		0.69	53.74		[Loose to medium dense] orange-brown slightly clayey slightly gravelly silty fine SAND. Gravel is angular to sub-angular fine to coarse limestone. Occasional very compact sub-rounded clasts of slightly clayey silty sand (Ø20-100mm). (WEATHERED INFERIOR OOLITE GROUP) *MEX at 0.5m = 1.5,1.5,1.5,2,2,2,Refusal*
	0.80	D		1.27	53.16		[Medium dense] dull orange-brown angular to sub-angular blocky COBBLES of limestone. Some clay and sand and very frequent gravel. Sand is fine to medium. Gravel is blocky angular to sub-angular fine to coarse limestone. (WEATHERED INFERIOR OOLITE GROUP)
	1.40	D	HVP=45	1.50	52.93		Soft to firm orange-brown slightly silty slightly sandy CLAY. Sand is fine to medium. (WEATHERED INFERIOR OOLITE GROUP)
	1.80	D		1.70	52.73		Soft to firm pale brown cream slightly sandy silty CLAY. Sand is fine to medium. (WEATHERED INFERIOR OOLITE GROUP)
				1.90	52.53		[Medium dense] pale brown cream clayey sandy very gravelly SILT. Sand is fine to medium. Gravel is tabular angular to sub-angular fine to coarse siltstone. (WEATHERED INFERIOR OOLITE GROUP)
							End of pit at 1.90 m

1
2
3

Remarks: No groundwater encountered.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP20
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 58.56	Date 27/09/2018
Location:	Scunthorpe, DN16 1XP	Dimensions (m): Depth 1.60	2.3 × 0.7	Scale 1:15
Client:	INRG Solar Limited			Logged JB

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	58.26		TOPSOIL: (Comprising moderately compact brown slightly gravelly very silty fine to medium Sand with rare cobble content. Gravel is angular to sub-angular fine to coarse limestone. Cobbles are angular to sub-angular limestone).
	0.40	D					[Medium dense] yellow-brown clayey very silty very sandy angular to sub-angular fine to coarse GRAVEL of limestone with a low cobble content. Cobbles are angular to sub-angular limestone. Stratum increases in competence with depth. (WEATHERED INFERIOR OOLITE GROUP)
							Between 0.3-0.5m depth becoming orange-brown.
							MEX at 0.5m = 12.5,Refusal
	1.00	D					
							Below 1.3m depth gravel and cobble content decreases.
	1.50	D					
				1.60	56.96		End of pit at 1.60 m

1
2
3

Remarks: No groundwater encountered.
Trial pit terminated on bedrock.

Stability: Vertical and stable.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP21
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 26.43	Date 27/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.1 × 0.7, Depth 2.60	Scale 1:15
Client:	INRG Solar Limited			Logged JB

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.20	26.23		MADE GROUND: (Comprising loose grey-brown slightly gravelly silty Sand with fine rootlets throughout. Gravel is sub-rounded medium ironstone).
	0.50	D					MADE GROUND: (Comprising loose red-brown slightly organic silty Sand). *MEX = 7,Refusal*
	1.00	ES		0.90	25.53		MADE GROUND: (Comprising red orange clayey silty gravelly fine to medium Sand. Gravel is angular to sub-angular fine to coarse ironstone, burnt shale and resinous slag. Stratum has a strong odour).
	1.50	ES		1.10	25.33		MADE GROUND: (Comprising grey black clayey sandy gravelly Silt. Gravel is angular to sub-angular fine to medium ironstone and ashy slag).
▼	2.40	D		2.30	24.13		[Dense] grey brown silty sandy angular fine to coarse GRAVEL of fossiliferous limestone. (WEATHERED LIAS MUDSTONES/IRONSTONES)
				2.60	23.83		End of pit at 2.60 m

1
2
3

Remarks: Groundwater at 2.3m depth.
Trial pit terminated on presumed limestone rockhead.

Stability: Slight spalling from faces below 1.8m.

Intégrale
Understanding Ground Conditions

Trial Pit Log

Trialpit No
TP22
Sheet 1 of 1

Project Name:	Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: - Level: 64.09	Date 27/09/2018
Location:	Scunthorpe, DN16 1XP		Dimensions (m): 2.2 x 0.7, Depth 2.20	Scale 1:15
Client:	INRG Solar Limited			Logged JB

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					TOPSOIL with some MADE GROUND: (Comprising brown slightly gravelly sandy very clayey Silt. Gravel is fine to coarse limestone with rare timber, plaster, plastic and a metal fragment). *Between 0-0.2m depth fine rootlets.*
	0.40	D		0.35	63.74		[Medium dense] light brown silty gravelly SAND. Gravel is angular to sub-angular fine to coarse limestone. (WEATHERED INFERIOR OOLITE GROUP)
				0.55	63.54		[Dense] yellow-brown slightly silty sandy angular fine to coarse GRAVEL of limestone with a high cobble content of angular limestone. Sand is fine to medium. (WEATHERED INFERIOR OOLITE GROUP) *MEX at 0.55m = Refusal*
	1.00	D					
	1.70	D		1.50	62.59		[Dense] yellow-grey slightly sandy silty sub-angular fine to coarse GRAVEL of weathered siltstone with a low cobble content of siltstone. (WEATHERED INFERIOR OOLITE GROUP)
				2.20	61.89		End of pit at 2.20 m

1
2
3

Remarks: No groundwater encountered.
Trial pit terminated on siltstone rockhead.

Stability: Vertical and stable.

Intégrale

Appendix E

Borehole Logs

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

STANDARD METHODOLOGY FOR WINDOWLESS SAMPLING BOREHOLES & CONTINUOUS DYNAMIC PENETRATION TESTING (CDPT)

Windowless sampling boreholes and heavy or super heavy continuous dynamic penetration tests were sunk using a small tracked drilling and probing rig. The types of drilling are identified on each of the borehole records included as a separate appendix. The locations are given in Figure 1 and selected using information on the proposed redevelopment, existing buried services and structures, ongoing site use, reinstatement requirements and time constraints.

The windowless sampling technique consists of driving a hollow tube sampler with a plastic liner into the ground by repeated blows using the dynamic probing apparatus. This sampler is extracted from the ground by a pneumatically operated jack and the sample extracted from the plastic liner for logging. Deeper sections of the strata are sampled by driving successively smaller diameter samplers into the ground. If the material is suitable, the soil strength is examined using a pocket penetrometer.

Continuous dynamic probing is a simple test consisting of driving a rod, with an oversized cone point, into the ground with a uniform hammer blow. The blow count is recorded for every 100mm penetration (N100). The equipment is a machine driven unit using a 63.5kg hammer dropping through 0.75m onto 32mm diameter rods with a 1500mm^2 cone. The equipment confirms to the DPSH probing apparatus in Clause 3.2 of Part 9 of BS 1377 (199)). The equivalent SPT 'N' value can be estimated by multiplying the blow count by 3-5, dependant on soil characteristics. This method has been used to interpret soil strengths given on the CDPT plots.

Drilling was directed and supervised full-time by an experienced geologist who kept a record of the strata encountered, recorded the groundwater ingress and also recovered representative disturbed samples.

On completion the boreholes were either backfilled with their spoil, and if requested the surface reinstated, or a standpipe installation fitted.

The borehole records have been prepared using Gint software, taking into account both site descriptions and subsequent laboratory testing.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS1
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 47.80	Scale 1:20
Client: INRG Solar Limited		Dates: 14/11/2018 - 14/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over TOPSOIL: (Comprising [medium dense] dark brown very silty fine to medium Sand with fine fibrous rootlets throughout).
					0.40	47.40		[Medium dense becoming dense] orange-brown silty fine to medium SAND. (BLOWN SAND)
		1.00		SPT (3,3/3,3,2,2) N = 10				
					1.40	46.40		Firm to stiff grey mottled orange-brown slightly sandy silty CLAY. (WEATHERED LIAS GROUP) *From 1.4 to 1.6m: Stratum is very sandy.* *Below 1.6m: Stratum is fissured.*
		2.00	D		2.00	45.80		Firm to stiff grey mottled reddish-brown locally iron-stained slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium platy siltstone. Gravel content and competence increase with depth. (WEATHERED LIAS GROUP)
		2.00		SPT (2,1/2,2,3,4) N = 11				
		2.25	D					
		2.60	D					
		3.00		SPT (2,2/3,4,5,7) N = 19	3.00	44.80		End of borehole at 3.00 m

Remarks
No groundwater encountered.
Monitoring well installed to 3m depth.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS2
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 47.21	Scale 1:20
Client: INRG Solar Limited		Dates: 14/11/2018 - 14/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over TOPSOIL: (Comprising [medium dense] dark brown very silty fine to medium Sand with fine fibrous rootlets throughout).
					0.40	46.81		[Medium dense] becoming dense orange-brown silty fine to medium SAND. (BLOWN SAND)
					1.40	45.81		Firm to stiff grey mottled orange-brown slightly sandy silty CLAY. (WEATHERED LIAS GROUP) *From 1.4 to 1.6m: Stratum is very sandy.* *Below 1.6m: Stratum is fissured.*
		1.90	D					
					2.00	45.21		Firm to stiff grey mottled reddish-brown locally iron-stained slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium platy siltstone. Gravel content and competence increase with depth. (WEATHERED LIAS GROUP)
		2.50	D					
		2.90	D					
					3.00	44.21		End of borehole at 3.00 m

1
2
3
4

Remarks
No groundwater encountered.
Monitoring well installed to 3m depth.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS3
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 61.75	Scale 1:20
Client: INRG Solar Limited		Dates: 14/11/2018 - 14/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.28	61.47		Crop over TOPSOIL: (Comprising dark brown slightly sandy slightly gravelly clayey Silt with fine fibrous roots throughout. Gravel is angular to subangular fine to medium sandstone, ceramic fragments and charcoal).
		0.80	D					Firm to stiff fissured yellowish-brown slightly sandy slightly gravelly becoming gravelly CLAY. Gravel is angular to subangular fine to coarse platy siltstone with lesser ironstone and crystalline limestone. (WEATHERED LIAS GROUP)
		1.00		SPT (4,4/4,4,4,4) N = 16				
					1.35	60.40		Stiff to very stiff thinly to thickly laminated slightly sandy gravelly CLAY. Gravel is fine to medium platy siltstone. (WEATHERED LIAS GROUP)
		1.80	D					
		2.00		SPT (8,10/8,10,12,20 for 70mm) N = 50	2.00	59.75		End of borehole at 2.00 m

Remarks
No groundwater encountered.
Monitoring well installed to 2m depth.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS4
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 64.27	Scale 1:20
Client: INRG Solar Limited		Dates: 14/11/2018 - 14/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25	64.02		Crop over TOPSOIL: (Comprising dark brown slightly sandy slightly gravelly clayey Silt with fine fibrous roots throughout. Gravel is angular to subangular fine to medium sandstone, ceramic and glass fragments with rare timber).
								Firm becoming stiff friable yellowish-brown slightly gravelly sandy silt. Gravel is angular to subangular fine to coarse sandstone and oolitic limestone. Gravel content and competence increase with depth. (WEATHERED INFERIOR OOLITE GROUP)
		0.84		SPT (10,14/27,23 for 35mm) N = 57	0.80 0.85	63.47 63.42		Strong grey oolitic LIMESTONE. (INFERIOR OOLITE GROUP) End of borehole at 0.85 m

1
2
3
4

Remarks
No groundwater encountered.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS4A
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 64.20	Scale 1:20
Client: INRG Solar Limited		Dates: 14/11/2018 - 14/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25	63.95		Crop over TOPSOIL: (Comprising dark brown slightly sandy slightly gravelly clayey Silt with fine fibrous roots throughout. Gravel is angular to subangular fine to medium sandstone, ceramic and glass fragments with rare timber).
		0.80	D					Firm to stiff friable yellowish-brown slightly sandy gravelly SILT. Gravel is angular to subangular fine to coarse sandstone and limestone. (WEATHERED INFERIOR OOLITE GROUP) *From 0.25 to 0.3m: 1 No. angular cobble of limestone.*
					0.90	63.30		Weak yellow-grey sandy oolitic LIMESTONE. (INFERIOR OOLITE GROUP)
					1.00	63.20		End of borehole at 1.00 m

1
2
3
4

Remarks
No groundwater encountered.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS5
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 25.40	Scale 1:20
Client: INRG Solar Limited		Dates: 14/11/2018 - 14/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25	25.15		Crop over TOPSOIL: (Comprising [medium dense] dark brown silty fine to medium Sand with fine fibrous roots throughout).
					0.80	24.60		[Loose to medium dense] brown silty fine to medium SAND. (BLOWN SAND)
		0.90	D		1.10	24.30		Soft spongy black mottled dark grey pseudofibrous PEAT. (ALLUVIUM)
		1.50	D		2.00	23.40		[Medium dense] dark grey slightly organic silty fine to medium SAND with rotting matter and a putrid odour throughout. (ALLUVIUM)
		2.10	D		2.15	23.25		Friable spongy black mottled dark brown pseudofibrous PEAT. (ALLUVIUM)
					3.00	22.40		[Medium dense] grey silty fine to medium SAND. (HIGHLY WEATHERED LIAS MUDSTONES)
								End of borehole at 3.00 m

Remarks
No groundwater encountered.
Hole collapsing back in below 2.0m.
Monitoring well installed to 2.0m depth.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS6
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 27.46	Scale 1:20
Client: INRG Solar Limited		Dates: 15/11/2018 - 15/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	D					Grass over TOPSOIL: (Comprising [loose] dark brown very silty fine to medium Sand with fine fibrous rootlets throughout).
		0.30	D		0.25	27.21		[Loose] light brown slightly silty fine to medium SAND. (BLOWN SAND)
					0.42	27.04		[Loose] reddish-brown slightly silty fine to medium SAND. (BLOWN SAND)
					1.40	26.06		[Medium dense] grey very silty fine to medium SAND. (BLOWN SAND)
		1.75	D		1.67	25.79		Soft spongy black slightly sandy amorphous PEAT. (ALLUVIUM/RECENT DEPOSITS)
					2.10	25.36		Firm friable bluish-green grey slightly sandy slightly gravelly glauconitic CLAY. (HIGHLY WEATHERED LIAS MUDSTONES) *From 2.1 to 2.15m: Band of firm to stiff orange-brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to medium ironstone.*
		2.70	ES		2.50	24.96		[Dense] blueish-green mottled brown silty sandy angular to subangular fine to coarse GRAVEL of fossiliferous limestone and lesser ironstone. (WEATHERED LIAS MUDSTONES/ IRONSTONES) *Below 2.65m: Stratum is stained.*
					3.00	24.46		End of borehole at 3.00 m

1 2 3 4

Remarks
No groundwater encountered.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS7
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 26.46	Scale 1:20
Client: INRG Solar Limited		Dates: 15/11/2018 - 15/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	D					Grass over TOPSOIL: (Comprising [medium dense] dark brown very silty fine to medium Sand with fine fibrous rootlets throughout).
					0.47	25.99		
		0.65	D					[Medium dense] brown silty fine to coarse SAND with rare angular to subangular fine gravel of quartzite. (BLOWN SAND) *Below 1.0m: Stratum is wet.*
	▼	1.50	D		1.38	25.08		[Medium dense becoming dense] dark grey becoming greyish-brown slightly organic clayey silty fine to medium SAND. Organic content increases with depth. (ALLUVIUM/RECENT DEPOSITS) *From 1.38 to 1.44m: Band of firm dark brown very sandy amorphous PEAT.* *From 1.7 to 1.75m: Band of spongy black sandy amorphous PEAT.*
		1.85	D		2.10	24.36		Firm friable bluish-green grey slightly sandy slightly gravelly glauconitic CLAY. (HIGHLY WEATHERED LIAS MUDSTONES)
					2.50	23.96		[Dense] blueish-green mottled brown silty sandy angular to subangular fine to coarse GRAVEL of fossiliferous limestone. (WEATHERED LIAS MUDSTONES/ IRONSTONES)
					3.00	23.46		End of borehole at 3.00 m

1 2 3 4

Remarks
Groundwater seepage at 1.5m.
Hole collapsing back in below 2.0m.
Monitoring well installed to 2.5m depth.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS8
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 26.89	Scale 1:20
Client: INRG Solar Limited		Dates: 15/11/2018 - 15/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	D					Grass over TOPSOIL: (Comprising [medium dense] dark brown very silty fine to medium Sand with fine fibrous rootlets throughout).
					0.25	26.64		[Loose] light brown slightly silty fine to medium SAND. (BLOWN SAND)
					0.45	26.44		[Loose] reddish-brown slightly silty fine to medium SAND. (BLOWN SAND)
		0.90	D					
					1.05	25.84		[Medium dense] greyish-brown slightly silty becoming silty fine to medium SAND. (ALLUVIUM/RECENT DEPOSITS)
								From 1.3 to 1.45m: Stratum contains appreciable organic matter.
		1.50	D					*From 1.35 to 1.6m: Stratum is stained dark with organic matter.*
					1.65	25.24		Soft blueish-grey glauconitic CLAY. (HIGHLY WEATHERED LIAS MUDSTONES)
		1.75	D					
					1.85	25.04		[Dense] blueish-green silty sandy angular to subangular fine to coarse GRAVEL of fossiliferous limestone. (WEATHERED LIAS MUDSTONES/ IRONSTONES)
								From 2.0 to 2.05m: Band of brown CLAY.
		2.50	D					
					3.00	23.89		End of borehole at 3.00 m

Remarks
No groundwater encountered.
Monitoring well installed to 2.7m depth.

Intégrale
Understanding Ground Conditions

Borehole Log

Borehole No.
WS9
Sheet 1 of 1

Project Name: Little Crow Solar, Scunthorpe	Project No. 1997	Co-ords: -	Hole Type WS
Location: Scunthorpe, DN16 1XP		Level: 26.54	Scale 1:20
Client: INRG Solar Limited		Dates: 15/11/2018 - 15/11/2018	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over TOPSOIL: (Comprising [medium dense] dark brown very silty fine to medium Sand with fine fibrous rootlets throughout).
					0.25	26.29		[Loose] light brown slightly silty fine to medium SAND. (BLOWN SAND)
					0.45	26.09		[Loose] reddish-brown slightly silty fine to medium SAND. (BLOWN SAND)
					0.65	25.89		Spongy friable black locally iron-stained very sandy pseudofibrous PEAT. (ALLUVIUM/RECENT DEPOSITS)
		0.80	D					
					1.00	25.54		Soft blueish-green glauconitic CLAY. (HIGHLY WEATHERED LIAS MUDSTONES) *From 1.0 to 1.05m: Band of orange-brown CLAY.*
		1.25	D					
					1.50	25.04		[Dense] greenish-grey locally stained clayey sandy angular to subangular fine to coarse GRAVEL of fossiliferous limestone and lesser ironstone. (WEATHERED LIAS MUDSTONES AND IRONSTONES)
		1.75	D					
		2.25	D					
		2.50	D					
					2.60	23.94		End of borehole at 2.60 m

1
2
3
4

Remarks
No groundwater encountered.
Refused on assumed limestone rockhead.
Monitoring well installed to 2.6m depth.

Intégrale

Appendix F

In-Situ Testing (Permeability & CBRs)

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

STANDARD METHODOLOGY FOR SOAKAWAY TESTING

Some trial pits also include soakaway testing in order to assess the soils permeability for design of stormwater drainage. The soakaway tests were completed in accordance with BRE Digest 365 (September 1991). This included excavation of pits to generally 1-2m depth, which were then filled with water on one to three occasions depending on the rate of infiltration. The water was supplied by a water bowser and discharged into the pits using a centrifugal pump. The falling head was recorded and therefore the rate of infiltration into the soils beneath.

The soakaway results have been prepared using a Microsoft Excel spreadsheet.

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP1**
Prepared By:	JB	Date:	25/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

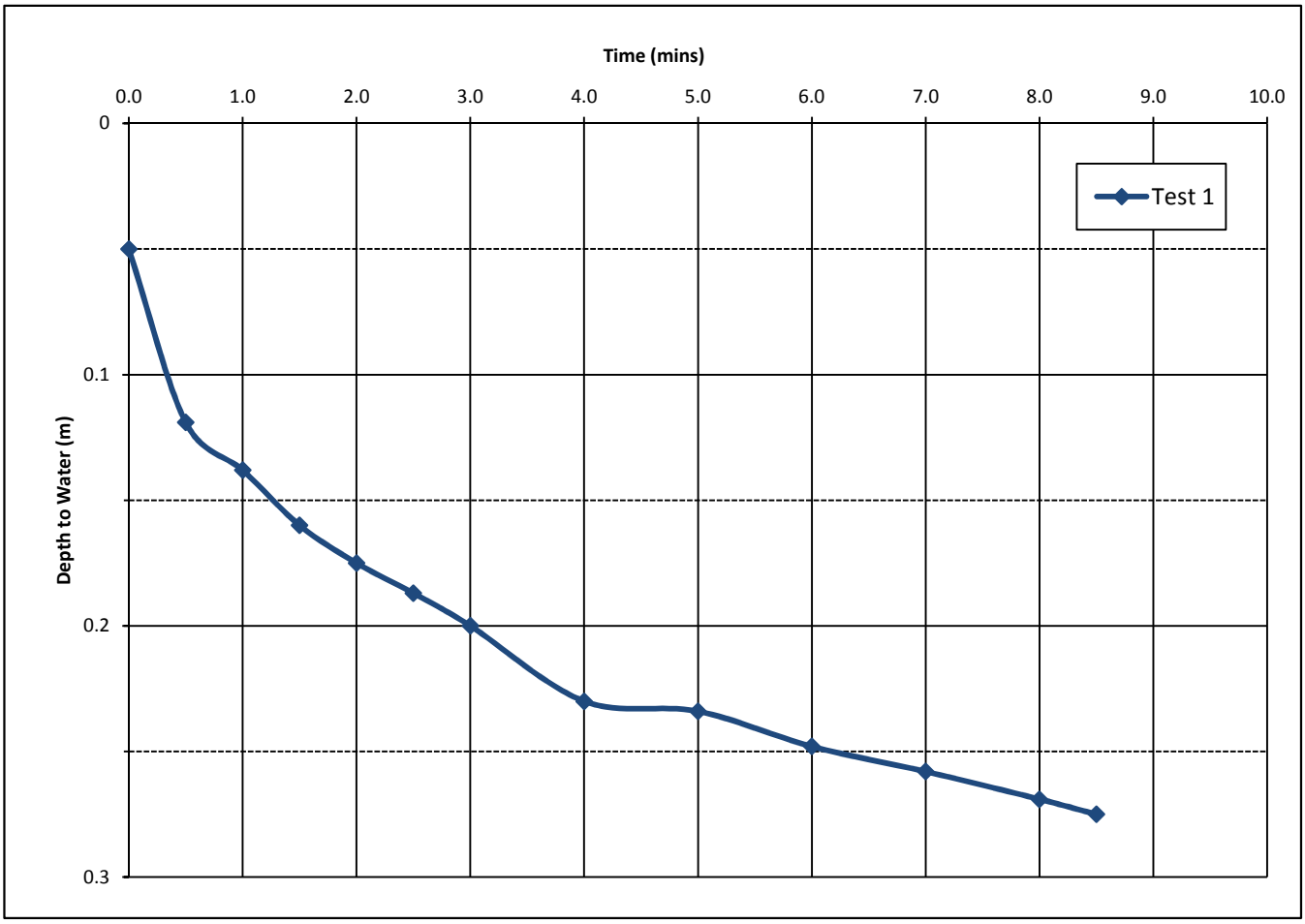
Date of Test: **25/09/2018**

Length (m): **0.30** **Width (m):** **0.30** **Depth (m):** **0.35**

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.15	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.27	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	7.8	N/A	N/A
Soil Infiltration Rate (m/s)	**1.06E-04**	**N/A**	**N/A**

Soil Infiltration Rate (m/s)	**1.06E-04**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP7**
Prepared By:	JB	Date:	26/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

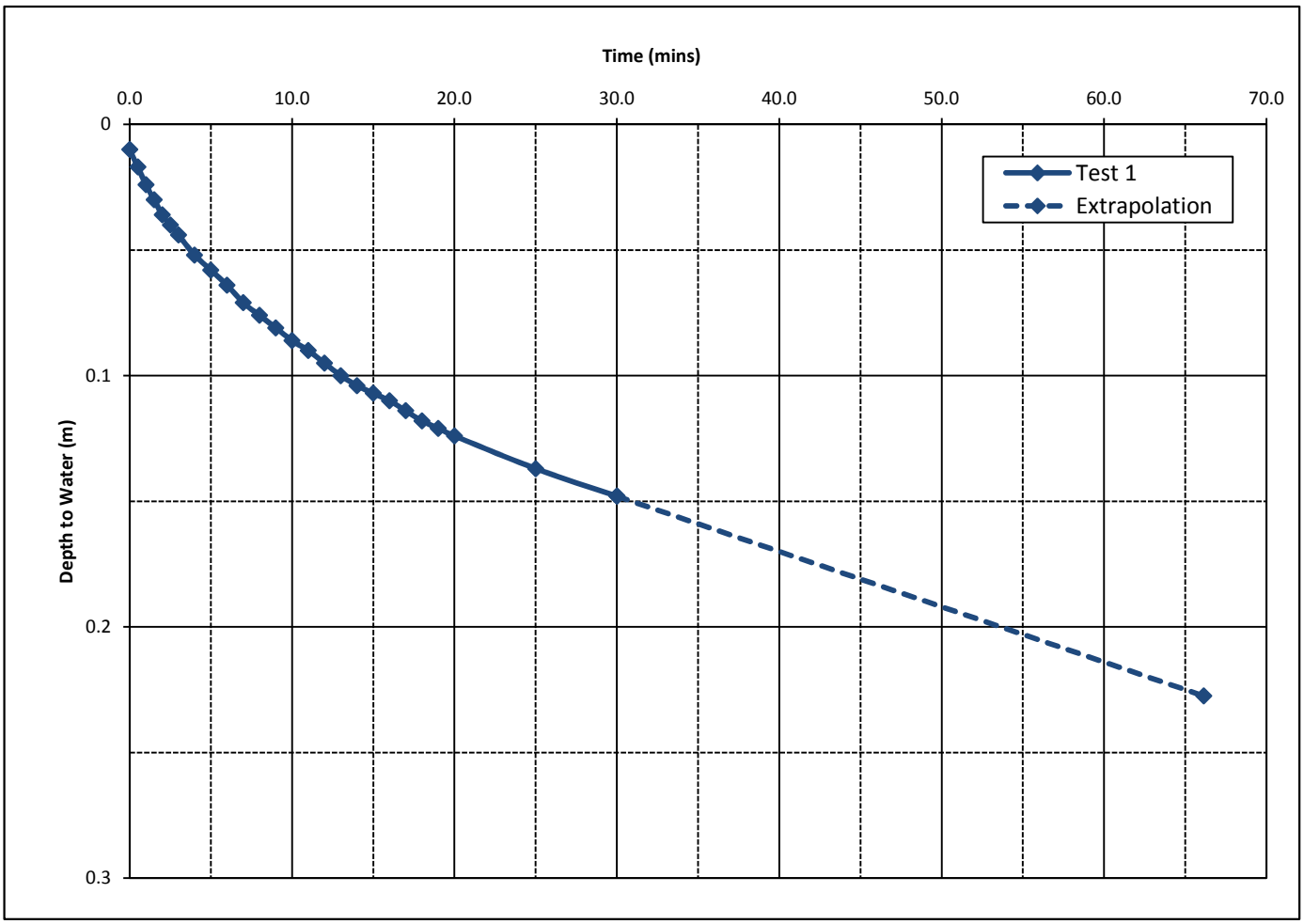
Date of Test: 26/09/2018

Length (m): 0.30 **Width (m):** 0.30 **Depth (m):** 0.30

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.15	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.26	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	56.6	N/A	N/A
Soil Infiltration Rate (m/s)	**1.45E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**1.45E-05**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP8**
Prepared By:	TF	Date:	27/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

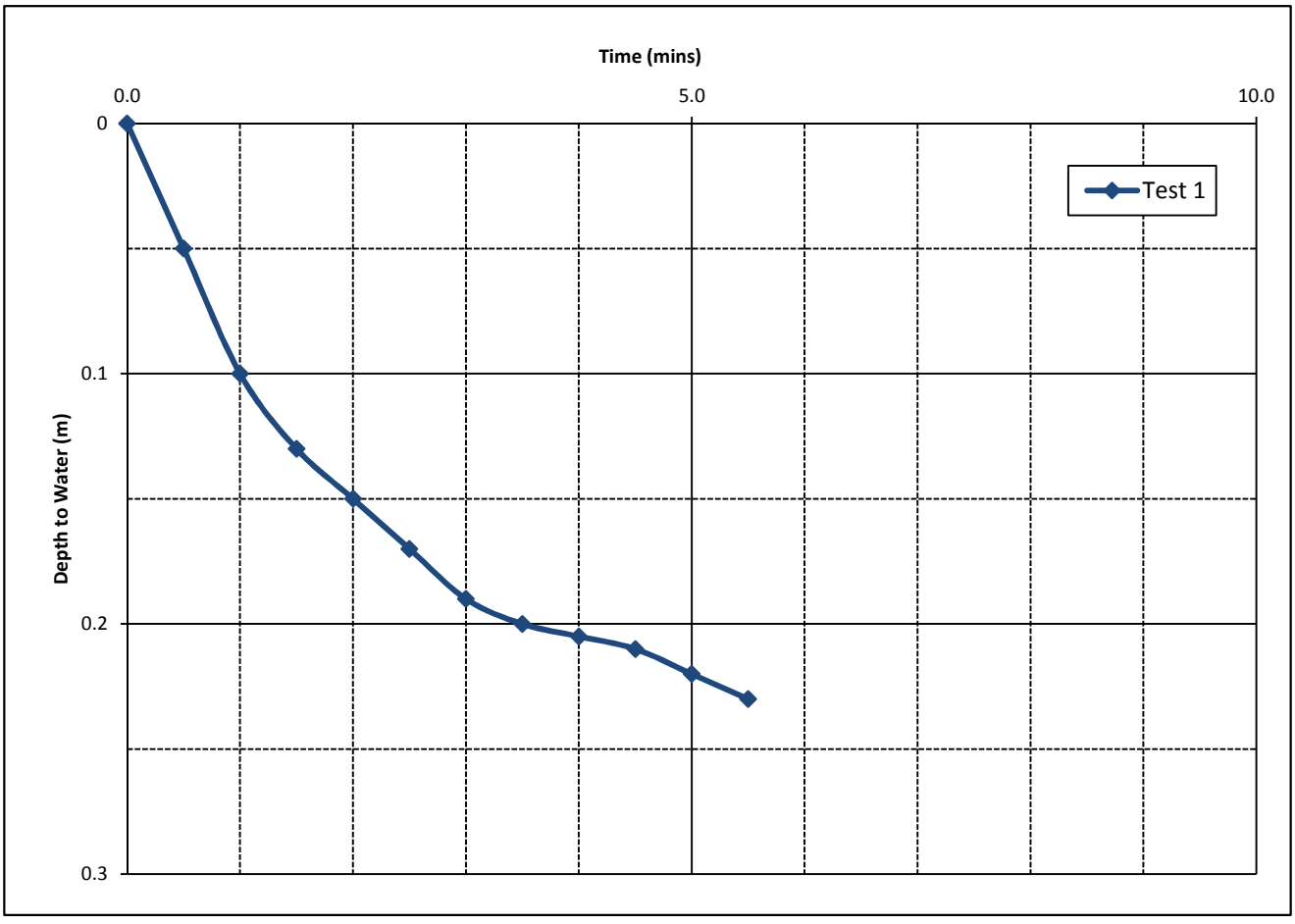
Date of Test: 27/09/2018

Length (m): 0.30 **Width (m):** 0.30 **Depth (m):** 0.30

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.15	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.27	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	4.5	N/A	N/A
Soil Infiltration Rate (m/s)	**1.85E-04**	N/A	N/A

Soil Infiltration Rate (m/s)	**1.85E-04**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP9**
Prepared By:	JB	Date:	26/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

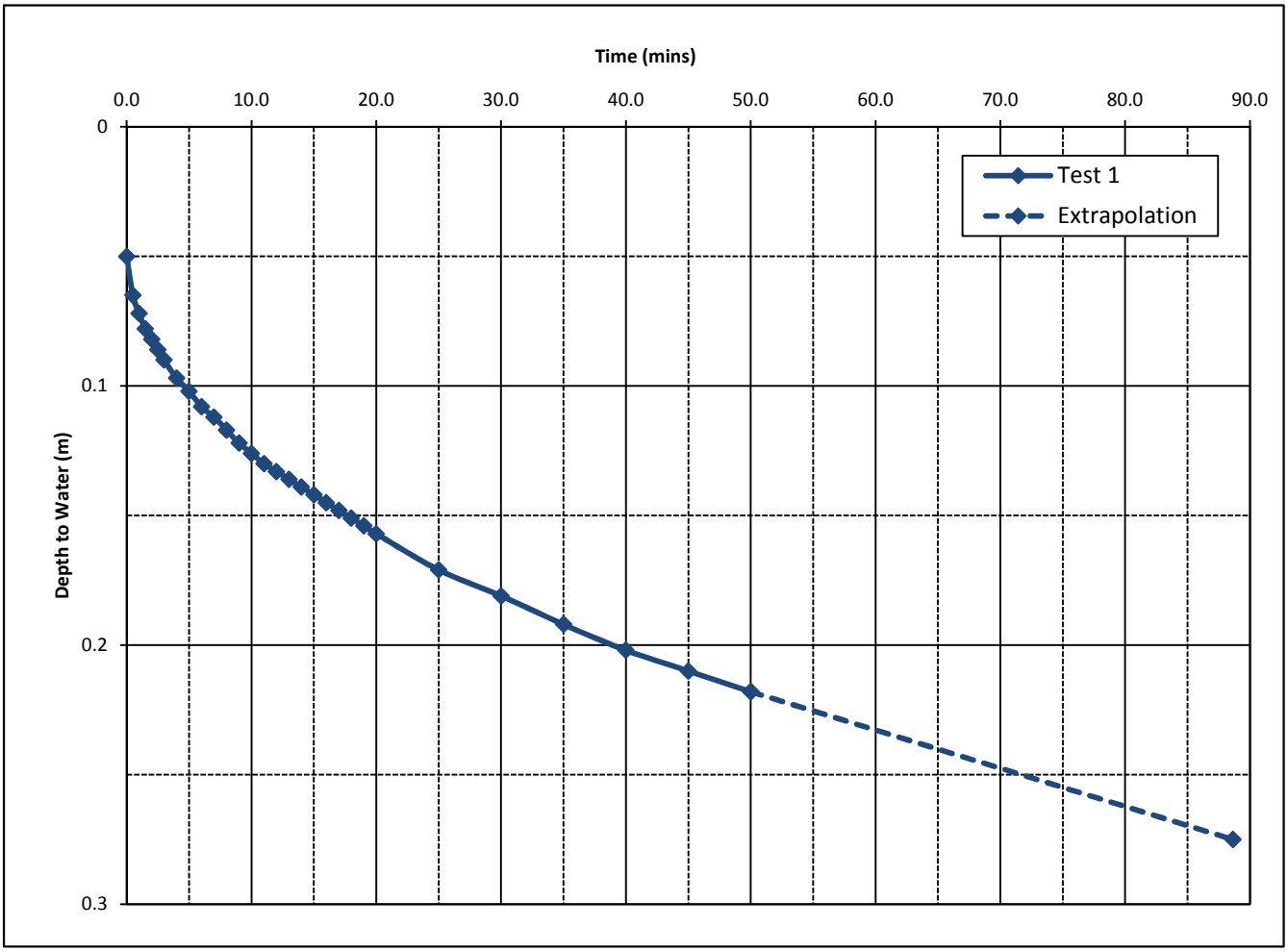
Date of Test: 26/09/2018

Length (m): 0.30 **Width (m):** 0.30 **Depth (m):** 0.35

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.15	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.27	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	78.9	N/A	N/A
Soil Infiltration Rate (m/s)	**1.06E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**1.06E-05**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP10**
Prepared By:	JB	Date:	25/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

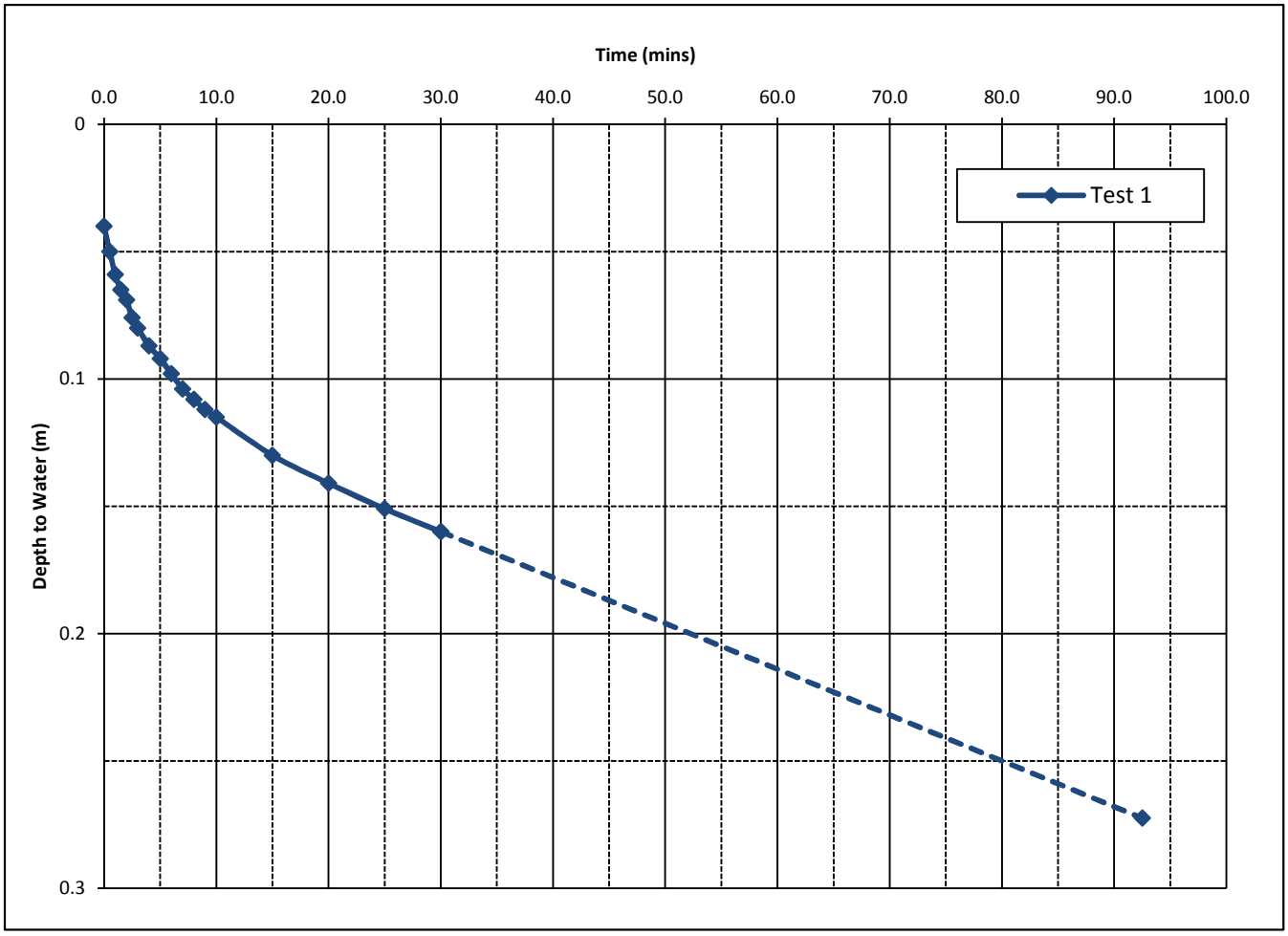
Date of Test: **25/09/2018**

Length (m): **0.30** **Width (m):** **0.30** **Depth (m):** **0.35**

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.16	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.28	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	81.7	N/A	N/A
Soil Infiltration Rate (m/s)	**1.03E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**1.03E-05**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP13**
Prepared By:	JB	Date:	25/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

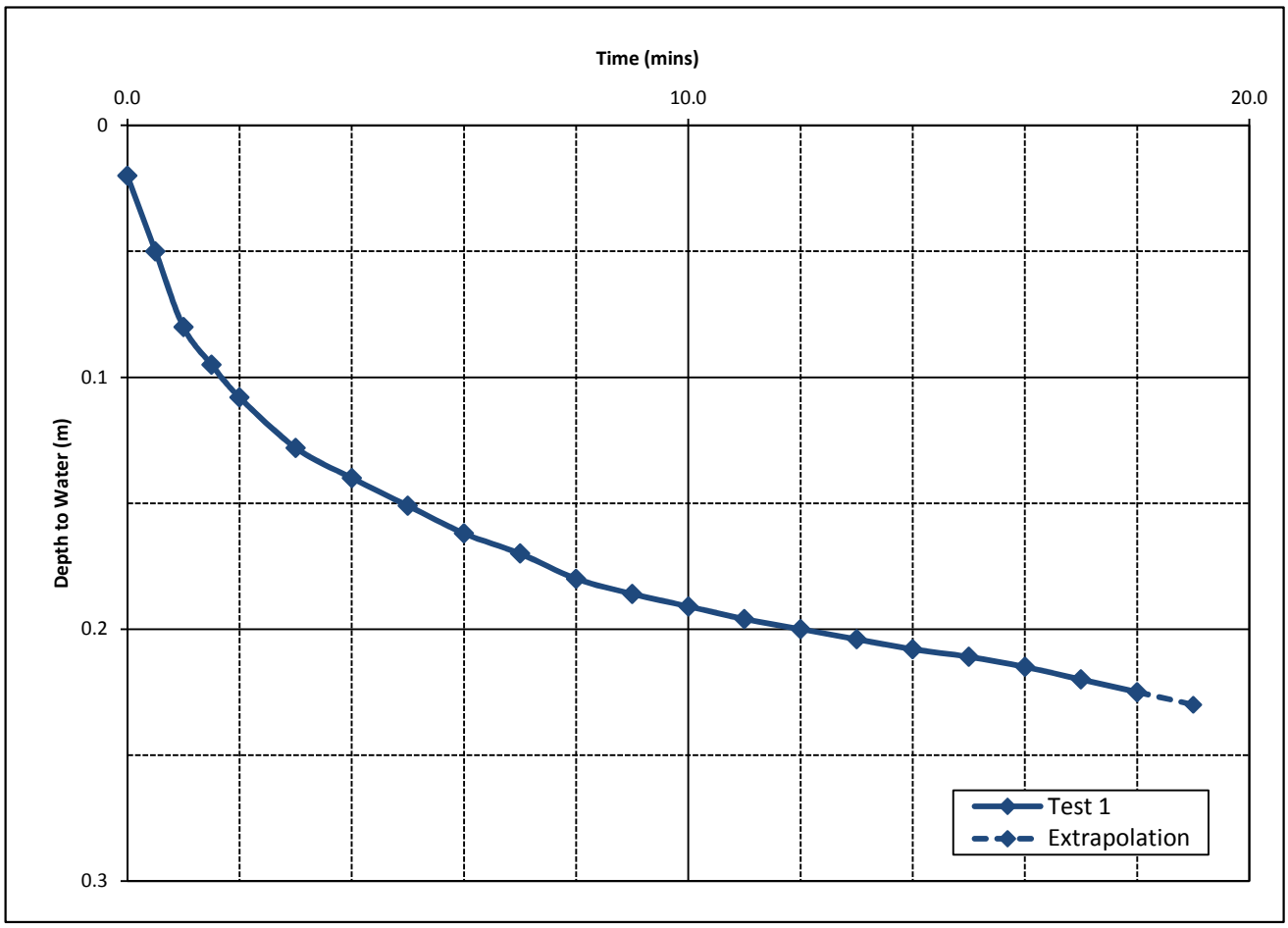
Date of Test: **25/09/2018**

Length (m): **0.32** **Width (m):** **0.30** **Depth (m):** **0.30**

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.14	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.27	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	17.7	N/A	N/A
Soil Infiltration Rate (m/s)	**4.70E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**4.70E-05**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP14**
Prepared By:	JB	Date:	26/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

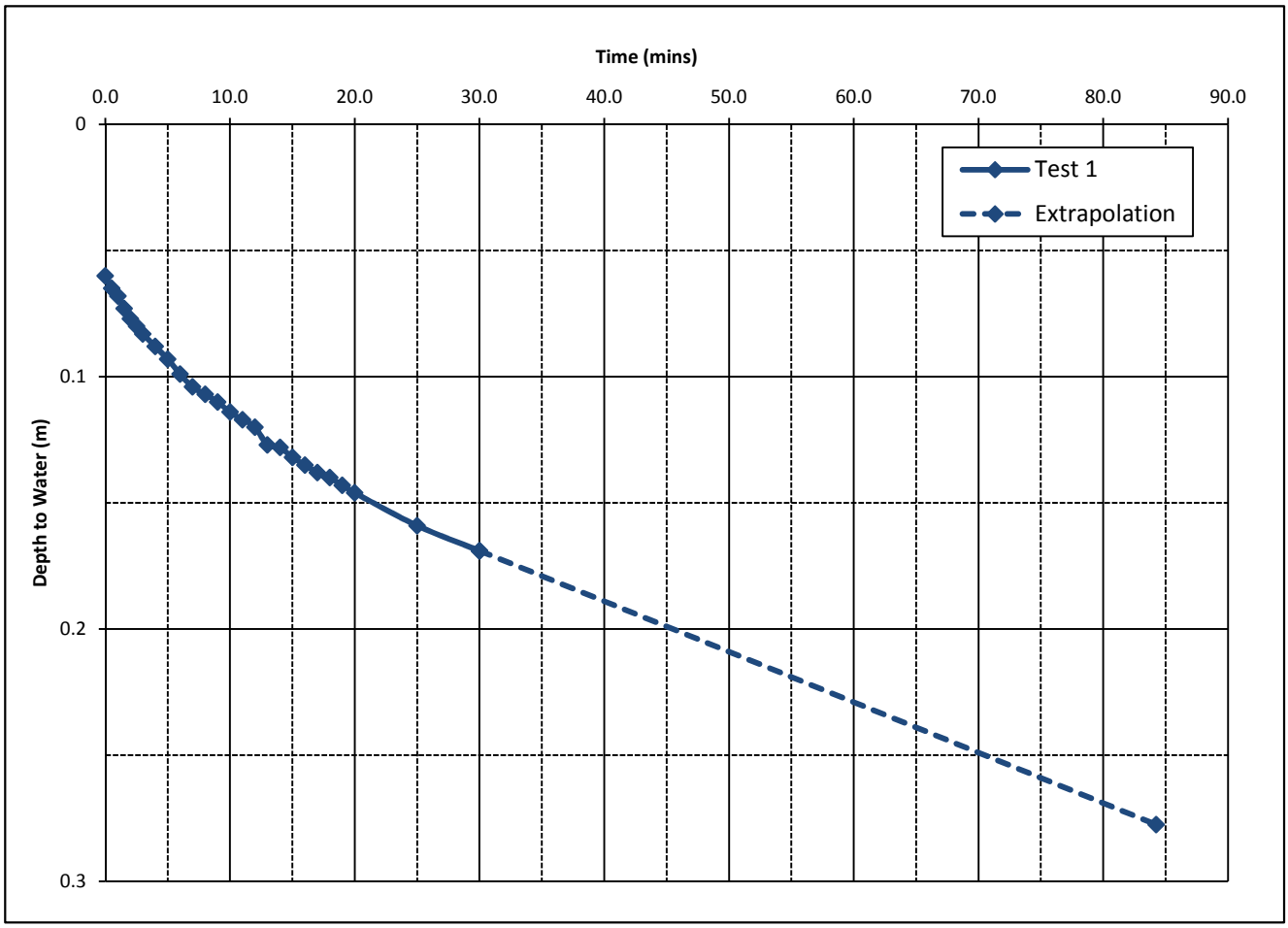
Date of Test: 26/09/2018

Length (m): 0.30 **Width (m):** 0.30 **Depth (m):** 0.35

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.15	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.26	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	69.1	N/A	N/A
Soil Infiltration Rate (m/s)	**1.19E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**1.19E-05**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP18**
Prepared By:	JB	Date:	25/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

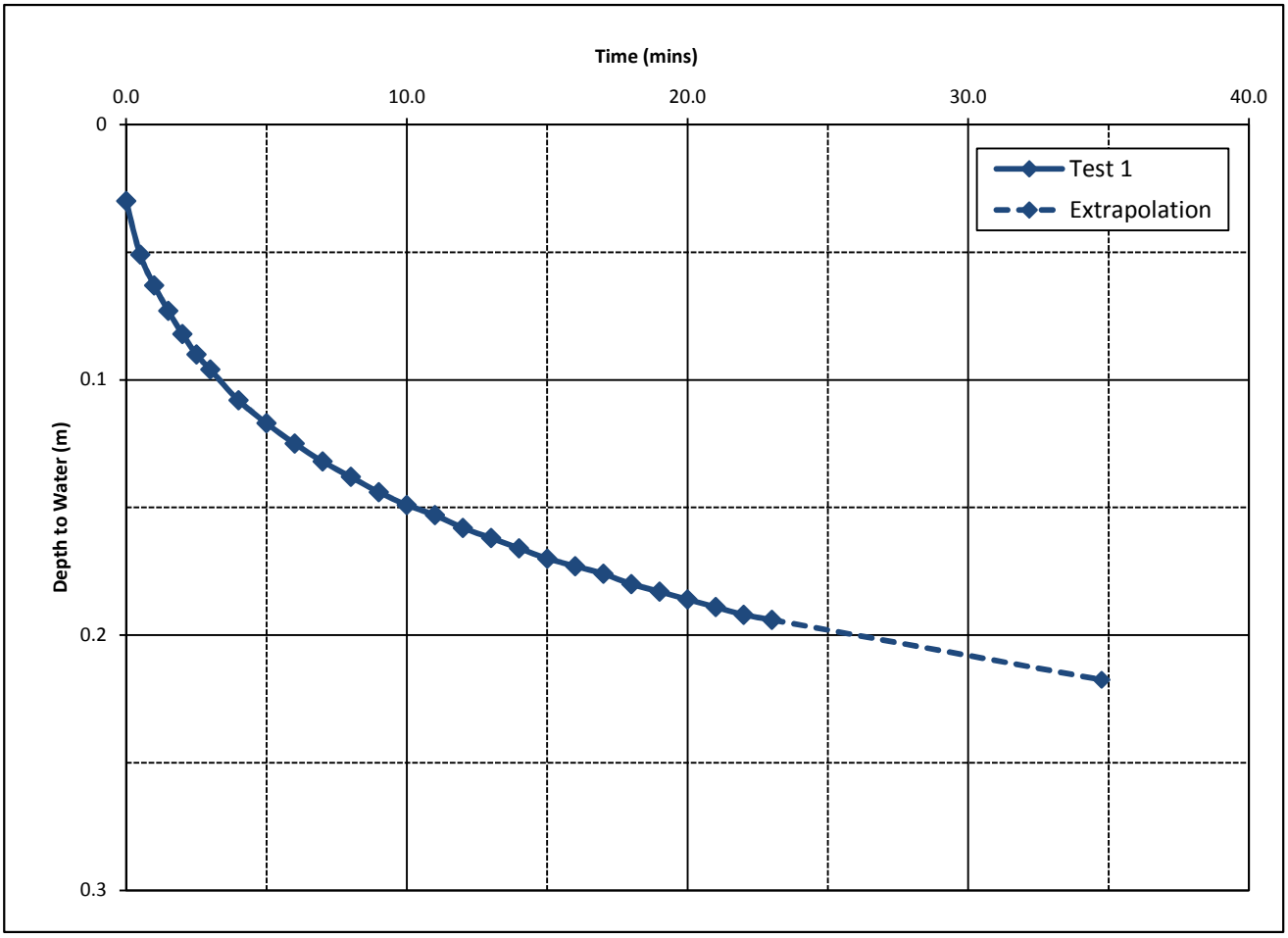
Date of Test: 25/09/2018

Length (m): 0.30 **Width (m):** 0.30 **Depth (m):** 0.28

Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.13	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.24	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	32.0	N/A	N/A
Soil Infiltration Rate (m/s)	**2.44E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**2.44E-05**



Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road
Bishop Sutton
BS39 5XP
Tel: 01275 333 036
www.integrale.uk.com

Job No:	1997	**Soil Infiltration Rate Test**			
		BRE 365 (2007) Soakaway Design			
Job Name:	Little Crow, Scunthorpe			Hole:	**TP21**
Prepared By:	TF	Date:	27/09/2018	Sheet:	1 of 1
Checked By:	DRAFT	Date:	DRAFT		

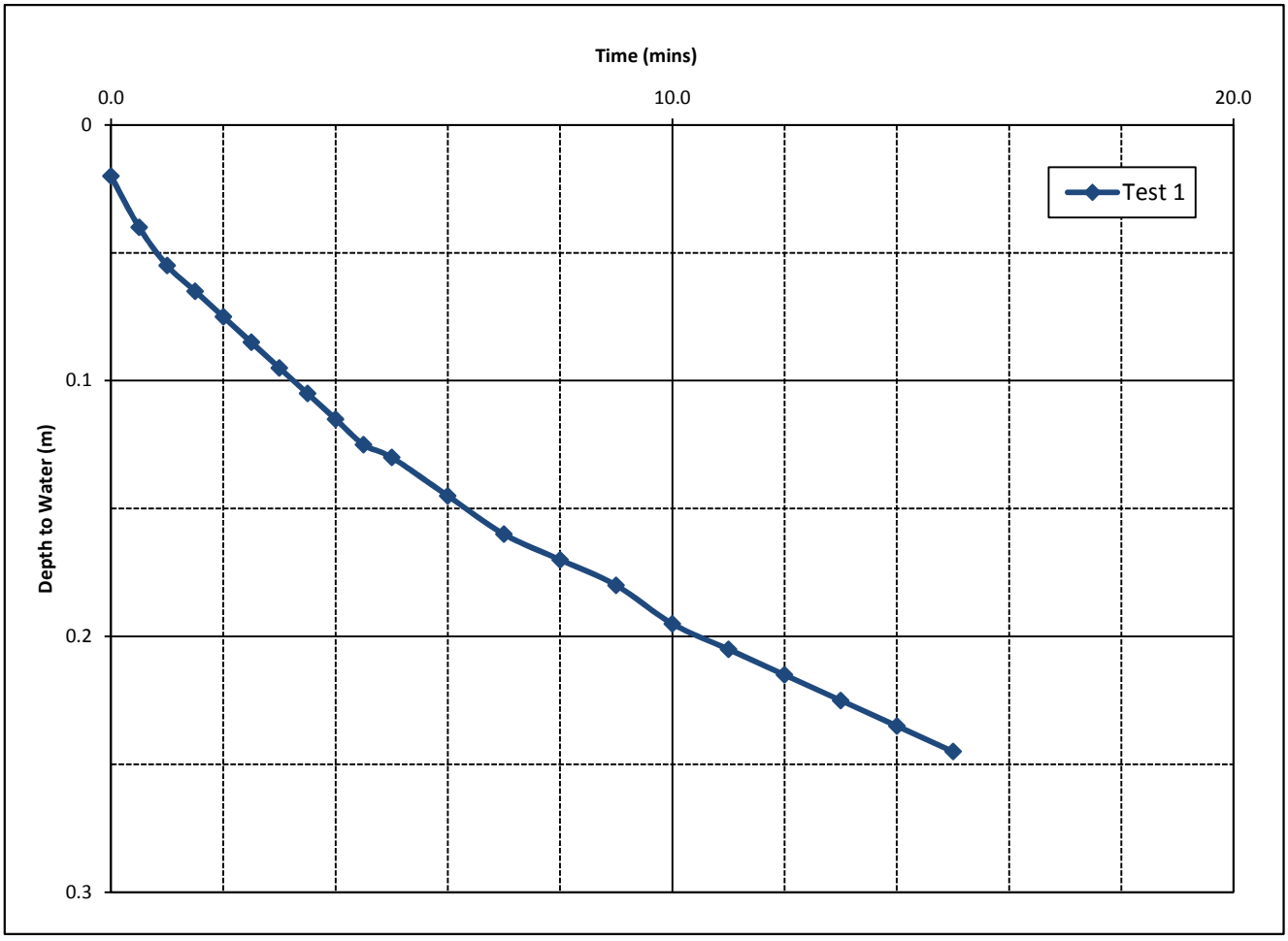
Date of Test: **27/09/2018**

Length (m): **0.30** **Width (m):** **0.30** **Depth (m):** **0.32**

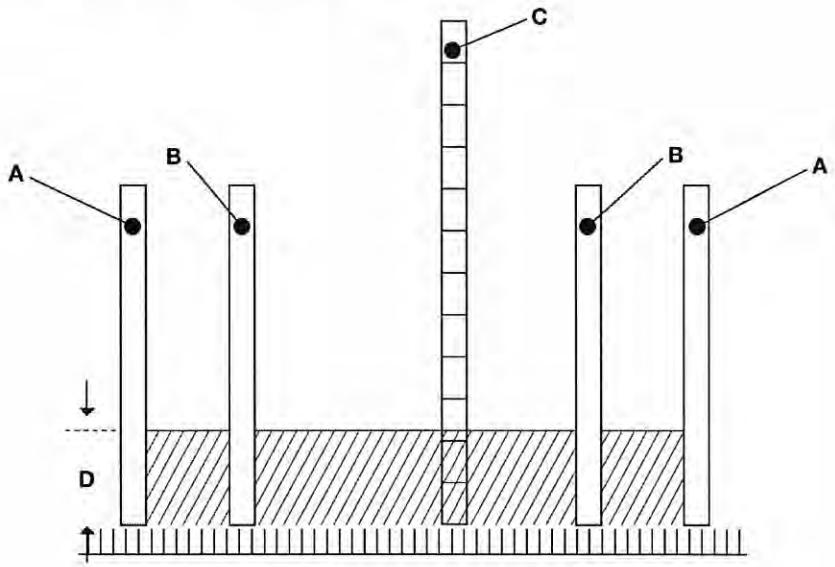
Remarks:

	Test 1	Test 2	Test 3
Effective Storage Depth$_{75\text{-}25\%}$ (m)	0.15	N/A	N/A
A = Surface Area$_{50\%}$ (m^2)	0.27	N/A	N/A
V = Effective Storage Volume$_{75\text{-}25\%}$ (m^3)	0.01	N/A	N/A
t = Time$_{75\text{-}25\%}$ (mins)	12.0	N/A	N/A
Soil Infiltration Rate (m/s)	**6.94E-05**	N/A	N/A

Soil Infiltration Rate (m/s)	**6.94E-05**



C5 Double-ring Infiltrometer (permeability)



A outer cylinder

B inner cylinder

C scale

D water level

Specification

C5.1 A sectional drawing of the apparatus is shown in the diagram above. Its component parts are specified below.

C5.2 The outer cylinder has an inner diameter 500 ± 25 mm.

C5.3 The inner cylinder has an inner diameter 300 ± 25 mm.

C5.4 A graduated scale is used to measure water depth.

C5.5 If sealing material is necessary, silicone rubber or closed-cell foam may be used.

C5.6 Heavy weights may be used to improve the seal.

After setting up on the test surface, the time taken for the water to fall by 20 mm from an initial ponding depth of 30 (±1) mm is measured. If a fall of 20mm has not been recorded after 30 minutes, the fall in water level is recorded at that time. The test is undertaken at five different locations on the surface.

The infiltration rate is calculated as follows:

$$IR = (F \times C) / t$$

Where:

IR is the infiltration rate;

F is the fall of water level (mm);

C is any required temperature correction factor;

t is the measurement period in minutes.

Intégrale Limited
Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

DUAL RING INFILTROMETER TEST

Project:			TEST No:
Little Crow, Scunthorpe			
Job No:	Date of Test:		**TP2**
1997	25/09/18		

Prepared By:	Date:
JB	03/10/18
Checked By:	Date:
DRAFT	DRAFT

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
0.0	0.140	-
0.33	0.170	30.0
0.5	0.200	60.0
0.75	0.220	80.0
1.0	0.240	100.0
1.16	0.250	110.0
1.33	0.260 (GL - DRY)	120.0

Change in Water Level (mm):	Measurement Period (mins):
20	0.22

Infiltration Rate (m/s) **1.50E-03**

Method:

IR = (F x C) / t

IR = Infiltration Rate
F = Fall of water level (mm)
C = Any required temperature correction factor
t = Time taken in minutes to fall 20mm

Notes:

Assumed no temperature correction factor required;

If water level has not dropped 20mm in 30mins, the water level is recorded at that time, and test finished.

Intégrale Limited
Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

DUAL RING INFILTROMETER TEST

Project:			TEST No:
Little Crow, Scunthorpe			
Job No:	Date of Test:		**TP5A**
1997	26/09/18		

Prepared By:	Date:
JB	03/10/18
Checked By:	Date:
DRAFT	DRAFT

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
0.0	0.140	-
0.5	0.145	5.0
1.0	0.148	8.0
1.5	0.150	10.0
2.0	0.152	12.0
2.5	0.155	15.0
3.0	0.157	17.0
4.0	0.160	20.0
5.0	0.163	23.0
6.0	0.166	26.0
7.0	0.169	29.0
8.0	0.172	32.0
9.0	0.176	36.0
10.0	0.179	39.0

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
11.0	0.181	41.0
12.0	0.184	44.0
13.0	0.187	47.0
14.0	0.190	50.0
15.0	0.192	52.0
16.0	0.194	54.0
17.0	0.197	57.0
18.0	0.200	60.0
19.0	0.202	62.0
20.0	0.205	65.0
25.0	0.218	78.0
30.0	0.230	90.0

Change in Water Level (mm):	Measurement Period (mins):
20	4.00

Infiltration Rate (m/s) **8.33E-05**

Method:

IR = (F x C) / t

IR = Infiltration Rate
F = Fall of water level (mm)
C = Any required temperature correction factor
t = Time taken in minutes to fall 20mm

Notes:

Assumed no temperature correction factor required;

If water level has not dropped 20mm in 30mins, the water level is recorded at that time, and test finished.

Intégrale Limited
Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

DUAL RING INFILTROMETER TEST

Project:			TEST No:
Little Crow, Scunthorpe			
Job No:	Date of Test:		**TP11**
1997	25/09/18		

Prepared By:	Date:
JB	11/10/18
Checked By:	Date:
DRAFT	DRAFT

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
0.0	0.100	-
0.25	0.110	10.0
0.5	0.120	20.0
1.0	0.125	25.0
1.5	0.130	30.0
2.0	0.135	35.0
3.0	0.140	40.0
4.0	0.147	47.0
5.0	0.152	52.0
6.0	0.157	57.0
7.0	0.162	62.0
8.0	0.167	67.0
9.0	0.172	72.0
10.0	0.176	76.0

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
11.0	0.180	80.0
12.0	0.184	84.0
13.0	0.188	88.0
14.0	0.192	92.0
15.0	0.196	96.0
16.0	0.200	100.0
17.0	0.204	104.0
18.0	0.208	108.0
19.0	0.212	112.0
20.0	0.217	117.0
21.0	0.221	121.0
22.0	0.225	125.0

Change in Water Level (mm):	Measurement Period (mins):
20	0.50

Infiltration Rate (m/s) **6.67E-04**

Method:

IR = (F x C) / t

IR = Infiltration Rate
F = Fall of water level (mm)
C = Any required temperature correction factor
t = Time taken in minutes to fall 20mm

Notes:

Assumed no temperature correction factor required;

If water level has not dropped 20mm in 30mins, the water level is recorded at that time, and test finished.

Intégrale Limited
Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

DUAL RING INFILTROMETER TEST

Project:			TEST No:
Little Crow, Scunthorpe			
Job No:	Date of Test:		**TP15**
1997	25/09/18		

Prepared By:	Date:
JB	11/10/18
Checked By:	Date:
DRAFT	DRAFT

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
0.0	0.300	-
0.083	0.350 (GL - DRY)	50.0

Change in Water Level (mm):	Measurement Period (mins):
20	0.033

Infiltration Rate (m/s) **1.00E-02**

Method:

IR = (F x C) / t

IR = Infiltration Rate
F = Fall of water level (mm)
C = Any required temperature correction factor
t = Time taken in minutes to fall 20mm

Notes:

Assumed no temperature correction factor required;

If water level has not dropped 20mm in 30mins, the water level is recorded at that time, and test finished.

Intégrale Limited
Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

DUAL RING INFILTROMETER TEST

Project:			TEST No:
Little Crow, Scunthorpe			
Job No:	Date of Test:		**TP16**
1997	27/09/18		

Prepared By:	Date:
JB	11/10/18
Checked By:	Date:
DRAFT	DRAFT

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
0.0	0.260	-
0.50	0.270	10.0
1.0		
1.5	0.275	15.0
2.0	0.280	20.0
3.0	0.285	25.0
4.0	0.290	30.0
5.0	0.295	35.0
6.0	0.300	40.0
7.0		
8.0	0.310	50.0
9.0		
10.0		
11.0	0.320	60.0

Time (min)	Depth to Water (m)	Drop in Water Level (mm)
12.0	0.325	65.0

Change in Water Level (mm):	Measurement Period (mins):
20	0.50

Infiltration Rate (m/s) 6.67E-04

Method:

IR = (F x C) / t

IR = Infiltration Rate
F = Fall of water level (mm)
C = Any required temperature correction factor
t = Time taken in minutes to fall 20mm

Notes:

Assumed no temperature correction factor required;

If water level has not dropped 20mm in 30mins, the water level is recorded at that time, and test finished.

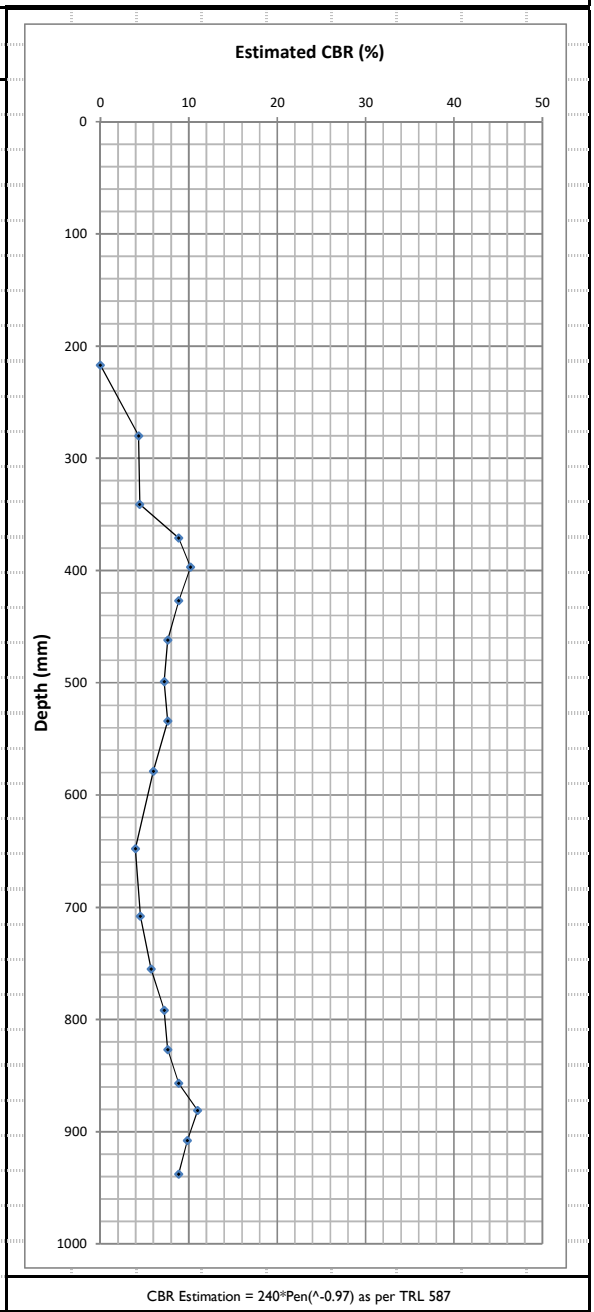
Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park,
Wick Road,
Bishop Sutton,
Somerset,
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

TRL Dynamic Cone Penetration (DCP) Test

Job No:	1997				
Job Name:	Little Crow, Scunthorpe			Hole:	TRL 1
Prepared By:	JB	Test Date:	24/09/2018	Top Depth (mm):	0
Checked By:	KB	Date:	11/02/2019	Initial Ruler Depth	217

Blows	Depth (mm)	Pen/Blow (mm)	Est CBR (%)	Blows	Depth (mm)	Pen/Blow (mm)	Est CBR (%)
0	217	-	0.0				
1	280	63	4.3				
2	341	61	4.5				
3	371	30	8.9				
4	397	26	10.2				
5	427	30	8.9				
6	462	35	7.6				
7	499	37	7.2				
8	534	35	7.6				
9	579	45	6.0				
10	648	69	3.9				
11	708	60	4.5				
12	755	47	5.7				
13	792	37	7.2				
14	827	35	7.6				
15	857	30	8.9				
16	881	24	11.0				
17	908	27	9.8				
18	938	30	8.9				



CBR Estimation = 240*Pen(^-0.97) as per TRL 587

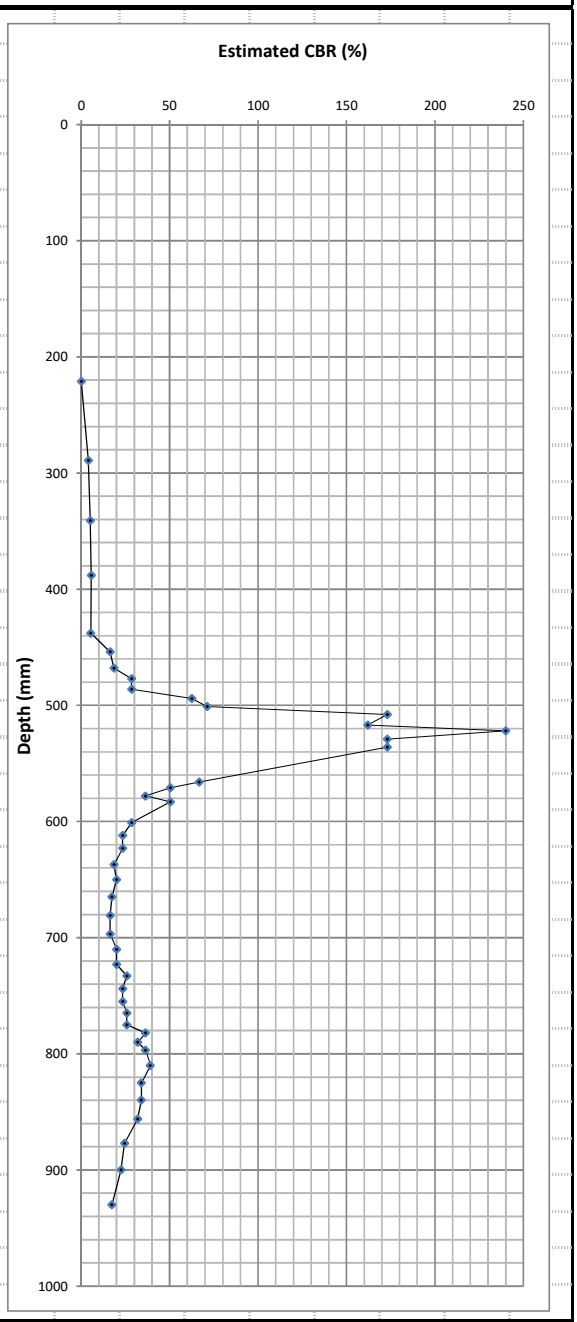
Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park,
Wick Road,
Bishop Sutton,
Somerset,
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

TRL Dynamic Cone Penetration (DCP) Test

Job No:	1997				
Job Name:	Little Crow, Scunthorpe			Hole:	TRL DCP 2
Prepared By:	JB	Test Date:	24/09/2018	Top Depth (mm):	0
Checked By:	KB	Date:	11/02/2019	Initial Ruler Depth	221

Blows	Depth (mm)	Pen/Blow (mm)	Est CBR (%)	Blows	Depth (mm)	Pen/Blow (mm)	Est CBR (%)
0	221	-	0.0	66	782	7	36.3
1	289	68	4.0	67	790	8	31.9
2	341	52	5.2	68	797	7	36.3
3	388	47	5.7	70	810	7	39.1
4	438	50	5.4	72	825	8	34.0
5	454	16	16.3	74	840	8	34.0
6	468	14	18.6	76	856	8	31.9
7	477	9	28.5	78	877	11	24.5
8	486	9	28.5	80	900	12	22.5
10	494	4	62.5	82	930	15	17.4
12	501	4	71.2				
17	508	1	173.2				
23	517	2	162.0				
28	522	1	240.0				
33	529	1	173.2				
38	536	1	173.2				
46	566	4	66.6				
47	571	5	50.4				
48	578	7	36.3				
49	583	5	50.4				
51	601	9	28.5				
52	612	11	23.4				
53	623	11	23.4				
54	637	14	18.6				
55	650	13	19.9				
56	665	15	17.4				
57	681	16	16.3				
58	697	16	16.3				
59	710	13	19.9				
60	723	13	19.9				
61	733	10	25.7				
62	744	11	23.4				
63	755	11	23.4				
64	765	10	25.7				
65	775	10	25.7				



CBR Estimation = 240*Pen(^-0.97) as per TRL 587

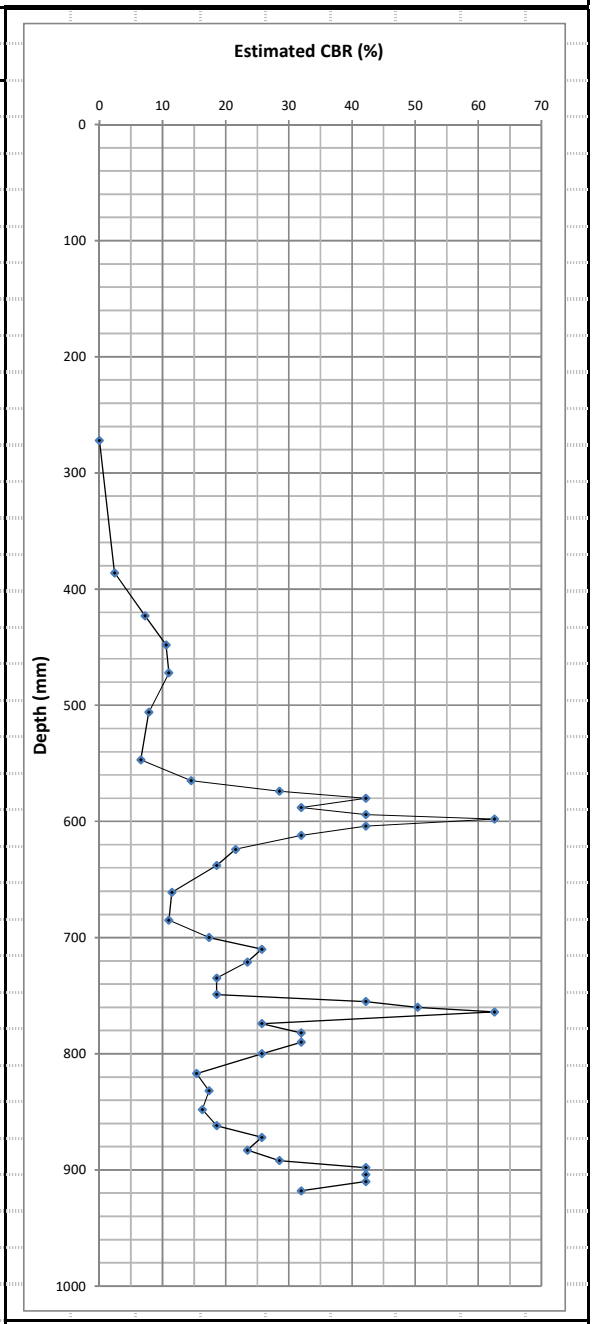
Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park,
Wick Road,
Bishop Sutton,
Somerset,
BS39 5XP
Tel: +44 (0) 1275 333 036
email: info@integrale.uk.com

TRL Dynamic Cone Penetration (DCP) Test

Job No:	1997				
Job Name:	Little Crow, Scunthorpe			Hole:	TRL DCP 3
Prepared By:	JB	Test Date:	24/09/2018	Top Depth (mm):	0
Checked By:	KB	Date:	11/02/2019	Initial Ruler Depth	272

Blows	Depth (mm)	Pen/Blow (mm)	Est CBR (%)	Blows	Depth (mm)	Pen/Blow (mm)	Est CBR (%)
0	272	-	0.0	36	872	10	25.7
1	386	114	2.4	37	883	11	23.4
2	423	37	7.2	38	892	9	28.5
3	448	25	10.6	39	898	6	42.2
4	472	24	11.0	40	904	6	42.2
5	506	34	7.8	41	910	6	42.2
6	547	41	6.5	42	918	8	31.9
7	565	18	14.5				
8	574	9	28.5				
9	580	6	42.2				
10	588	8	31.9				
11	594	6	42.2				
12	598	4	62.5				
13	604	6	42.2				
14	612	8	31.9				
15	624	12	21.5				
16	638	14	18.6				
17	661	23	11.5				
18	685	24	11.0				
19	700	15	17.4				
20	710	10	25.7				
21	721	11	23.4				
22	735	14	18.6				
23	749	14	18.6				
24	755	6	42.2				
25	760	5	50.4				
26	764	4	62.5				
28	774	10	25.7				
29	782	8	31.9				
30	790	8	31.9				
31	800	10	25.7				
32	817	17	15.4				
33	832	15	17.4				
34	848	16	16.3				
35	862	14	18.6				



CBR Estimation = 240*Pen(^-0.97) as per TRL 587

Intégrale

Appendix G

Gas & Groundwater Monitoring

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

STANDARD METHODOLOGIES FOR STANDPIPE INSTALLATIONS, SAMPLING and MONITORING FOR GAS AND GROUNDWATER

Standpipe Installations in Trial Pits

Simple 30-50mm diameter plastic standpipes are installed in trial pits during backfilling. These consist of slotted pipe throughout the buried length to within 0.5m of the ground surface, with unslotted pipe above. These are capped off with removable stop-ends above ground level. They provide a useful guide to soil gas conditions within the backfilled trial pit, however some soil gas will be lost by dispersal within the loose backfill at the surface of the pit. They are commonly used for monitoring standing groundwater levels which would develop within excavations, however careful consideration has to be given to the possible infiltration of rainfall and throughflow into the sump created by the excavated pit.

Standpipe Installations in Boreholes

Simple standpipes to measure the hydrostatic head of groundwater are formed in boreholes using 50mm diameter pipe. The details of individual installations are provided on borehole records. Typically the lower length is formed in slotted pipe, with the upper 1m unslotted. The annulus between the riser pipe and the borehole wall is filled with clean granular material. Details of any bentonite seals or grouting are given on the borehole records. A removable gas tap is fitted where gas monitoring is required and standpipes typically have a metal access cover concreted in at ground level.

Standpipe piezometers are formed by using a Casagrande type piezometer tip at the base of the pipe, set in a granular response zone of sand or pea gravel. The response zone is isolated from the strata above and below by placing 500mm thick bentonite seals. The remaining annulus above the bentonite seal is filled with a cement bentonite grout or similar.

Groundwater Monitoring & Sampling

Details of return monitoring visits are included in this appendix. Groundwater standing levels are measured by inserting an electrically operated dip meter into the standpipe and recording the level to 2 decimal places, relative to existing ground level. Where groundwater levels are critical to calculation of hydraulic gradients or flow directions, the measurement is taken to 3 decimal places and to a marked point on the standpipe cover. That point is then surveyed and levelled to provide accurate calculations.

Groundwater samples are recovered using either Waterra valves and sample tubing or by manually lifting water from the standpipe using a bailer. For contamination analyses, the boreholes are initially purged by removing up to 3 borehole volumes of water, allowing the rest level to redevelop and taking a sufficient sample into custom containers. If groundwater does not recover sufficiently, the purged water may be used as the sample.

Gas Monitoring

Monitoring is usually completed in standpipes prior to groundwater measurements, using portable instruments. Details are given on the monitoring tables, and typically using a PhoCheck Tiger photoionisation detector to measure volatile organic compounds in ppm and a GA5000 Gas meter to measure oxygen, carbon dioxide and methane, both by % Lower Explosive Limit and % Volume. Atmospheric pressure and temperature are also recorded. Measurements are taken immediately on opening the gas valve and the highest to lowest levels recorded. If levels fluctuate, then this is recorded, with the maximum reading and a more typical or rest level given.

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset, BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

Site	Little Crow, Scunthorpe
Client	INRG Solar Ltd
Date	Friday, October 05, 2018

Job No.	1997
Monitored By	JB
Visit No	1

Weather	Mild and overcast, strong breeze
Air Temperature	17.3°C

Atmospheric Pressure (mbar)	1010
Ground Conditions	Dry

Position ID	Time Elapsed (secs)	Gas Flow (l/hr)	%LEL	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	VOC (ppm)	Depth to Product (mbgl)	Depth to Water (mbgl)	Product Thickness (mm)	Well Depth (mbgl)
TP5	0	0.2	2.0	0.1	11.8	9.2	0.3	-	1.73	-	1.90
	30	0.3									
	60	0.3									
Comments: CO2 immediate increase to 11.8% before decrease to 1.4% within 45 secs, 0.6% after 70 secs. Well depth to cover level: 2.05m.											
TP5A	0	0.1	0.0	0.0	2.8	20.0	0.1	-	0.68	-	1.64
	30	0.2									
	60	0.2									
Comments: CO2 immediate increase to 2.8% followed by steady decrease to 0.6% after 1min. Well depth to cover level: 1.79m.											
TP6	0	0.1	2.0	0.1	3.8	19.1	0.1	-	1.75 (wet strata)	-	1.76
	30	0.2									
	60	0.2									
Comments: CO2 decrease to 2.9% by 30 secs. Well depth to cover level: 2.06m.											
TP7	0	0.1	2.0	0.1	3.2	19.0	0.1	-	DRY	-	1.81
	30	0.2									
	60	0.2									
Comments: CO2 decreased to 1.0% after 1min. Well depth to cover level: 2.06m.											
TP9	0	0.1	2.0	0.1	4.9	13.8	0.1	-	DRY	-	1.74
	30	0.1									
	60	0.1									
Comments: CO2 stable throughout. O2 declined to 13.8% by 1min. Well depth to cover level: 2.00m.											
TP10	0	0.1	0.0	0.0	2.5	18.8	0.0	-	DRY	-	1.84
	30	0.1									
	60	0.1									
Comments: Well depth to cover level: 2.06m.											

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset, BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

Site	Little Crow, Scunthorpe
Client	INRG Solar Ltd
Date	Wednesday, November 14, 2018

Job No.	1997
Monitored By	JB
Visit No	2

Weather	Cloudy with some sunny spells
Air Temperature	11.2°C

Atmospheric Pressure (mbar)	1014
Ground Conditions	Moist

Position ID	Time Elapsed (secs)	Gas Flow (l/hr)	%LEL	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	VOC (ppm)	Depth to Product (mbgl)	Depth to Water (mbgl)	Product Thickness (mm)	Well Depth (mbgl)
TP5	0	-	NR	NR	NR	NR	NR	NR	NR	NR	NR
	30	-									
	60	-									
Comments: Monitoring location lost.											
TP5A	0	0.1	2	0.1	6.1	19.4	0.1	-	0.65	-	1.62
	30	0.2									
	60	0.3									
Comments: Monitored on 14/11/18.											
TP6	0	0.1	0	0.0	1.7	20.5	0.1	-	1.44	-	1.78
	30	0.3									
	60	0.3									
Comments: Monitored on 16/11/18 - Misty, cool, light breeze; 1018 mbar.											
TP7	0	-	NR	NR	NR	NR	NR	NR	NR	NR	NR
	30	-									
	60	-									
Comments: End cap on ground next to the standpipe, not monitored this visit.											
TP9	0	0.2	2	0.1	2.5	19.6	0.1	-	DRY	-	1.73
	30	0.3									
	60	0.2									
Comments: Monitored on 15/11/18 - Cloudy with some sunny spells, 1014 mbar.											
TP10	0	0.1	0	0.0	2.2	20.1	0.0	-	DRY	-	1.83
	30	0.2									
	60	0.2									
Comments: Monitored on 14/11/18.											

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset, BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

Site	Little Crow, Scunthorpe
Client	INRG Solar Ltd
Date	Friday, November 16, 2018

Job No.	1997
Monitored By	JB
Visit No	2

Weather	Overcast, misty, cool with a light breeze
Air Temperature	11.3°C

Atmospheric Pressure (mbar)	1022
Ground Conditions	Moist

Position ID	Time Elapsed (secs)	Gas Flow (l/hr)	%LEL	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	VOC (ppm)	Depth to Product (mbgl)	Depth to Water (mbgl)	Product Thickness (mm)	Well Depth (mbgl)
WS1	0	0.0	0	0.0	0.7	21.1	0.0	-	2.49	-	2.98
	30	0.1									
	60	0.1									
Comments: Cover at Ground Level.											
WS2	0	0.1	0	0.0	0.4	21.3	0.0	-	2.42	-	2.94
	30	0.2									
	60	0.2									
Comments: Cover at Ground Level.											
WS3	0	0.1	0	0.0	1.0	20.5	0.0	-	DRY	-	1.99
	30	0.1									
	60	0.2									
Comments: Cover at Ground Level.											
WS5	0	0.1	0	0.0	3.7	18.8	0.0	-	1.20	-	1.42
	30	0.3									
	60	0.3									
Comments: Well depth to Cover Level: 1.51m.											
WS7	0	0.0	0	0.0	1.4	20.2	0.1	-	0.95	-	1.48
	30	0.1									
	60	0.1									
Comments: Well depth to Cover Level: 1.59m.											
WS8	0	0.0	0	0.0	0.8	20.9	0.1	-	2.58	-	2.68
	30	0.1									
	60	0.1									
Comments: Cover at Ground Level.											
WS9	0	0.1	0	0.0	0.3	2.1	0.0	-	2.53	-	2.66
	30	0.2									
	60	0.2									
Comments: Cover at Ground Level.											

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client: Integrale
Site: Scunthorpe
Date: 05/12/2018
Quote No:
Visit No: 1 **of** 1
Operator: IS **Project Manager:** Dan Stodgell

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				WELL AND WATER DATA		Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (mb)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
WS1	ND	ND	ND	ND	0.7	0.7	ND	ND	ND	ND	20.1	20.3	ND	NR	0.0	0.0	-0.03	30	1.39	2.99	
WS2	ND	ND	ND	ND	0.5	0.5	ND	ND	ND	ND	20.4	20.4	ND	NR	0.0	0.0	-0.01	30	2.01	2.94	
WS3	ND	ND	ND	ND	1.5	1.5	ND	ND	ND	ND	18.0	18.0	ND	NR	0.0	0.0	-0.03	30	1.56	2.00	
WS5	ND	ND	ND	ND	3.8	3.8	ND	ND	ND	ND	17.3	17.3	ND	NR	0.0	0.0	-0.01	30	1.04	1.43	
WS7	ND	ND	ND	ND	2.7	2.7	ND	ND	ND	ND	18.9	18.9	2.4	NR	1.2	0.2	2.31	90	0.56	1.48	
WS8	ND	ND	ND	ND	4.5	4.5	7	1	ND	ND	2.1	2.1	2.1	NR	0.0	0.0	-0.08	30	2.54	2.70	
WS9	ND	ND	ND	ND	10.6	10.6	2	ND	ND	ND	1.0	1.0	2.8	NR	0.0	0.0	-0.05	30	2.45	2.68	
Max	**ND**	**ND**	**ND**	**ND**	**10.6**	**10.6**	**7**	**1**	**ND**	**ND**	**20.4**	**20.4**	**NR**	**ND**	**1.2**	**0.2**	**2**	**90**	**2.54**	**2.99**	
Min	**ND**	**ND**	**ND**	**ND**	**0.5**	**0.5**	**ND**	**ND**	**ND**	**ND**	**1.0**	**1.0**	**NR**	**0.0**	**0.0**	**0.0**	**-0.1**	**30**	**0.56**	**1.43**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:		Dry		Moist	X	Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy	X	Overcast		
Precipitation:		None		Slight		Moderate	X	Heavy		
Time monitoring performed:			08:15	Start			10:50	End		
Barometric pressure (mbar):			1011	Start			1015	End		
Pressure trend (Daily):				Falling	X	Steady		Rising		
Source:	wunderground.com									
Air Temperature (Deg. C):			6	Before			8	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: 12519
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +100/-50 l/hour
Differential Pressure: (+/-) 1000 Pa
Date of last calibration: 21/11/2018
Date of next calibration: 22/05/2018

Ambient air check: **CH_4** 0.0 **CO_2** 0.0 **O_2** 20.6

Ground Gas and Groundwater Monitoring Record Sheet

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS: Gas/Dips/PID
Client: Integrale
Site: Scunthorpe
Date: 07/12/2018

Quote No:
Visit No: 1 **of** 1
Operator: P. Murphy **Project Manager:** Phil Sanders

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				WELL AND WATER DATA		Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
TP5A	ND	ND	ND	ND	0.8	0.3	ND	ND	ND	ND	21.6	21.9	1.1	ND	0	0	0.09	60	0.29	1.64	
TP6	ND	ND	ND	ND	0.4	0.3	ND	ND	ND	ND	21.3	21.6	0	ND	0.1	0.1	0.07	60	1.00	1.74	
TP7	ND	ND	ND	ND	1.8	1.8	ND	ND	ND	ND	19.9	19.9	0	ND	0	0	0.09	60	1.77	1.78	Wet mud at base
TP9	ND	ND	ND	ND	1.9	1.4	ND	ND	ND	ND	19.0	19.2	0	ND	0	0	0.05	60	Dry	1.71	
TP10	ND	ND	ND	ND	2.1	2.1	ND	ND	ND	ND	19.9	19.9	0	ND	0	0	0.03	60	Dry	1.79	
WS1	ND	ND	ND	ND	0.6	0.6	ND	ND	ND	ND	21.4	21.4	0.6	ND	0	0	-0.02	60	1.26	3	
WS2	ND	ND	ND	ND	0.4	0.4	ND	ND	ND	ND	21.4	21.4	0.5	ND	0	0	-0.03	60	1.85	2.99	
WS3	ND	ND	ND	ND	0.8	0.8	ND	ND	ND	ND	19.5	19.5	0.3	ND	0.1	0.1	0.03	60	1.18	2	
WS5	ND	ND	ND	ND	3	3	ND	ND	ND	ND	18.4	18.4	0	ND	0	0	-0.05	60	0.88	1.43	
WS7	ND	ND	ND	ND	2.6	2.5	ND	ND	ND	ND	18.4	20.3	0.1	ND	0	0	0.02	60	0.31	1.46	
WS8	ND	ND	ND	ND	3.5	3.3	ND	ND	ND	ND	8.8	8.8	0.3	ND	0	0	-0.09	60	2.51	2.71	
WS9	ND	ND	ND	ND	7.7	7.7	ND	ND	ND	ND	8	8	0.3	ND	0	0	0.03	60	2.39	2.67	
Max	**ND**	**ND**	**ND**	**ND**	**7.7**	**7.7**	**ND**	**ND**	**ND**	**ND**	**21.6**	**21.9**	**NR**	**ND**	**0.1**	**0.1**	**0**	**60**	**2.51**	**3.00**	
Min	**ND**	**ND**	**ND**	**ND**	**0.4**	**0.3**	**ND**	**ND**	**ND**	**ND**	**8.0**	**8.0**	**NR**	**ND**	**0.0**	**0.0**	**-0.1**	**60**	**DRY**	**1.43**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:		Dry		Moist	X	Wet		Snow		Frozen
Wind:		Calm		Light	X	Moderate		Strong		
Cloud cover:		None	X	Slight		Cloudy		Overcast		
Precipitation:		None	X	Slight		Moderate		Heavy		
Time monitoring performed:			11:00	Start			14:00	End		
Barometric pressure (mbar):			991	Start			993	End		
Pressure trend (Daily):				Falling		Steady	X	Rising		
Source:	timeanddate.com									
Air Temperature (Deg. C):			10	Before			7	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000 - G505418
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +100/-50 l/hour
Differential Pressure: (+/-) 1000 Pa
Date of last calibration: 24/10/2018
Date of next calibration: 24/04/2019

Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset, BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

Site	Little Crow, Scunthorpe
Client	INRG Solar Ltd
Date	Friday, March 08, 2019

Job No.	1997
Monitored By	JB
Visit No	4

Weather	Cool and overcast
Air Temperature	8.0°C

Atmospheric Pressure (mbar)	999-1004
Ground Conditions	Damp

Position ID	Time Elapsed (secs)	Gas Flow (l/hr)	%LEL	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	VOC (ppm)	Depth to Product (mbgl)	Depth to Water (mbgl)	Product Thickness (mm)	Well Depth (mbgl)
TP5	0	-	NR	NR	NR	NR	NR	NR	NR	NR	NR
	30	-									
	60	-									
Comments: Monitoring position lost.											
TP5A	0	0.0	0.0	0.0	0.4	20.5	-	-	0.25	-	1.62
	30	0.0									
	60	0.0									
Comments:											
TP6	0	0.1	0.0	0.0	0.1	20.7	-	-	0.87	-	1.75
	30	0.1									
	60	0.1									
Comments:											
TP7	0	0.1	0.0	0.0	1.6	19.1	-	-	DRY	-	1.72
	30	0.1									
	60	0.1									
Comments:											
TP9	0	0.1	0.0	0.0	2.5	17.8	-	-	DRY	-	1.74
	30	0.1									
	60	0.1									
Comments:											
TP10	0	-	NR	NR	NR	NR	NR	NR	0.72	NR	1.81
	30	-									
	60	-									
Comments: Monitoring position damaged.											

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset, BS39
5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

Site	Little Crow, Scunthorpe
Client	INRG Solar Ltd
Date	Friday, March 08, 2019

Job No.	1997
Monitored By	JB
Visit No	4

Weather	Cool and overcast
Air Temperature	8.0°C

Atmospheric Pressure (mbar)	999-1004
Ground Conditions	Damp

Position ID	Time Elapsed (secs)	Gas Flow (l/hr)	%LEL	Methane (%/vol)	Carbon Dioxide (%/vol)	Oxygen (%/vol)	VOC (ppm)	Depth to Product (mbgl)	Depth to Water (mbgl)	Product Thickness (mm)	Well Depth (mbgl)
WS1	0	0.1	0	0.0	0.6	20.3	-	-	1.37	-	2.99
	30	0.2									
	60	0.2									
Comments: Cover at Ground Level.											
WS2	0	0	0	0.0	0.4	20.3	-	-	1.73	-	2.94
	30	0.1									
	60	0.1									
Comments: Cover at Ground Level.											
WS3	0	0.1	0	0.0	2.0	18.6	-	-	1.83	-	1.99
	30	0.2									
	60	0.1									
Comments: Cover at Ground Level.											
WS5	0	0.1	0	0.0	4.0	18.8	-	-	0.95	-	1.44
	30	0.1									
	60	0.1									
Comments: Well depth to Cover Level: 1.51m.											
WS7	0	0.1	0	0.0	1.2	20.6	-	-	0.2	-	1.5
	30	0.1									
	60	0.1									
Comments: Well depth to Cover Level: 1.59m.											
WS8	0	0.1	0	0.0	1.7	19.4	-	-	2	-	2.7
	30	0.2									
	60	0.2									
Comments: Cover at Ground Level.											
WS9	0	0.1	2	0.1	15.1	0.4	-	-	1.89	-	2.66
	30	0.2									
	60	0.2									
Comments: Cover at Ground Level.											

Intégrale

Appendix H

Results of Geotechnical Laboratory Testing

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

STANDARD METHODOLOGY FOR GEOTECHNICAL SAMPLING

Soil samples are recovered from trial pits or borehole samples using a stainless steel trowel and immediately placed into airtight plastic tubs or bags, as appropriate for the testing. If required the soil samples may be wrapped in cling film, particularly in suspected desiccated soils. Samples are labelled with the site name, investigation location and depth and placed into either cool boxes or large bulk bags for transit from site. An analytical schedule is drawn up in line with the actual ground conditions proven, proposed site use and likely design parameters.

Samples are sent to a specialist testing laboratory. Testing is completed in line with BS1377 as far as possible and details of the test method and UKAS accreditation are provided by the laboratory on the results sheets in a separate appendix.

Transmittal Note

South West Geotechnical Ltd
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Job No:	10687	**Date Received:**	02/10/18
Job Name:	Little Crow, Scunthorpe	**Date Sent:**	17/10/18
Client Name:	Integrale	**Transmittal Number:**	T3906
Client Job No:	1997	**Senders Initials:**	NWW
Client Address	Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Bristol, BS39 5XP		

Ref.	Test Detail	No. of Tests / Report No.
A1	BS1377: Part 2: 1990: Clause 3 - Moisture Content - UKAS Accredited	3
A5	BS1377: Part 2: 1990: Clause 4 & 5 - Atterberg Limits - UKAS Accredited	3
A9	BS1377: Part 2: 1990: Clause 9.2 / 9.3 - Particle Size Distribution - UKAS Accredited	8
A10	BS1377: Part 2: 1990: Clause 9.4 - Sedimentation by Pipette - UKAS Accredited	8

Approved Signatories:

Nick Worthington-Williams (Laboratory Technical Manager), Dan Ayre (Deputy Quality Manager)

David Trowbridge (Senior Technician)

8260
Accredited to
ISO/IEC
17025:2005

Summary of Classification Test Results

SOUTH WEST GEOTECHNICAL

Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Project No.	Project Name
10687	Little Crow, Scunthorpe
Client Job No.	**Client**
1997	Integrale

UKAS TESTING 8260 Accredited to ISO/IEC 17025:2005

Hole No.	Sample				Soil Description	*mc* Cl.3.2	Passing 425µm	LL	PL Cl5.3	PI Cl5.4	Particle density	Remarks
	Type	Top	Base	Ref		%	%	%	%	%	Mg/m3	
TP01	D	1.80		-	Yellowish brown mottled reddish brown and grey CLAY	36	100 - Natural	92	30	62	-	
TP04	D	2.30		-	Greenish grey silty CLAY	32	100 - Natural	61	24	37	-	
TP08	D	0.80		-	Yellowish brown and greenish grey slightly gravelly slightly sandy silty CLAY	15	95 - Sieved	54	22	32	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	

Preparation Clauses: Particle Density (BS1377:Part 1: 1990: CL7.4.4) Atterberg Limits (BS1377:Part 1: 1990: CL7.4.3) Moisture Content (BS1377: Part 1: 1990: CL7.3.3 & 7.4.2)

Key

Atterberg Limits BS1377-2:1990
4pt cone (CL.4.3) unless :
1pt - single point test (CL.4.4)
4.2.3 - Natural
4.2.4 - Sieved
Moisture Content (mc) %

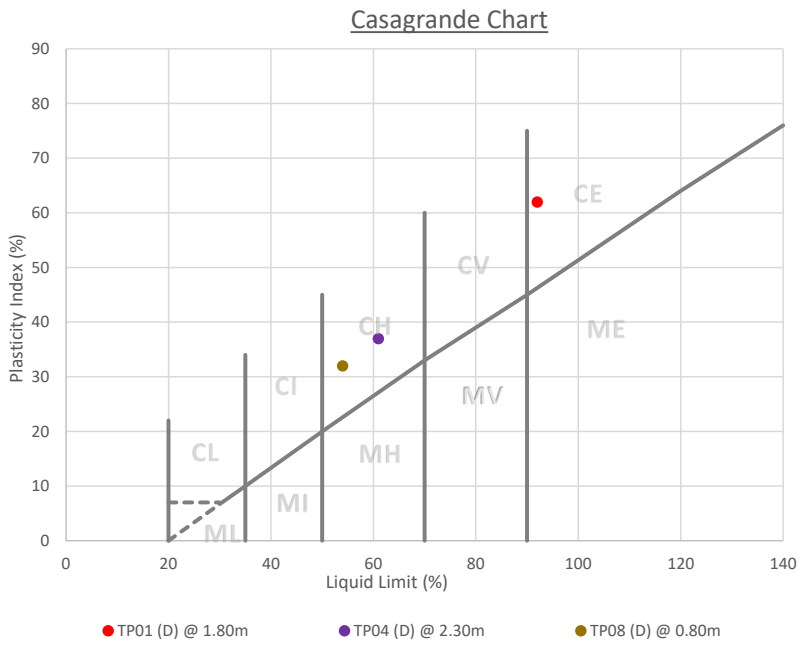
Particle density BS1377-2:1990
sp - small pyknometer CL.8.3
gj - gas jar CL.8.2

Date	Approved By	Page No.	1
17/10/2018	David Trowbridge - Senior Tech	KL001R Index Summary	

Graphical Summary of Atterberg Test Results

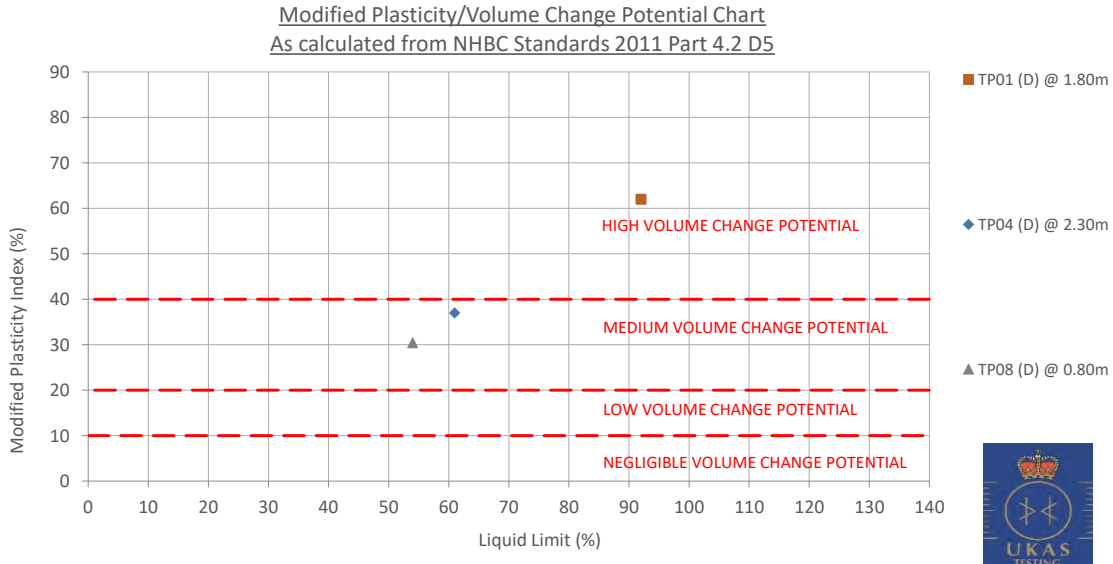
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Project No.	Project Name
10687	Little Crow, Scunthorpe
Client Job No.	**Client**
1997	Integrale



Sample ID	Plasticity Index (%)	Modified Plasticity Index (%)
TP01 (D) @ 1.80m	62	62
TP04 (D) @ 2.30m	37	37
TP08 (D) @ 0.80m	32	30
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

The Modified Plasticity Index (I'p) is defined as the Plasticity Index (Ip) of the soil multiplied by the percentage of particles less than 425µm.
ie. I'p x % less than 425um/100%



KL001a Index Graphical Summary	Approved By	Date	Page No.
	David Trowbridge - Senior Technician	17/10/2018 15:44	1

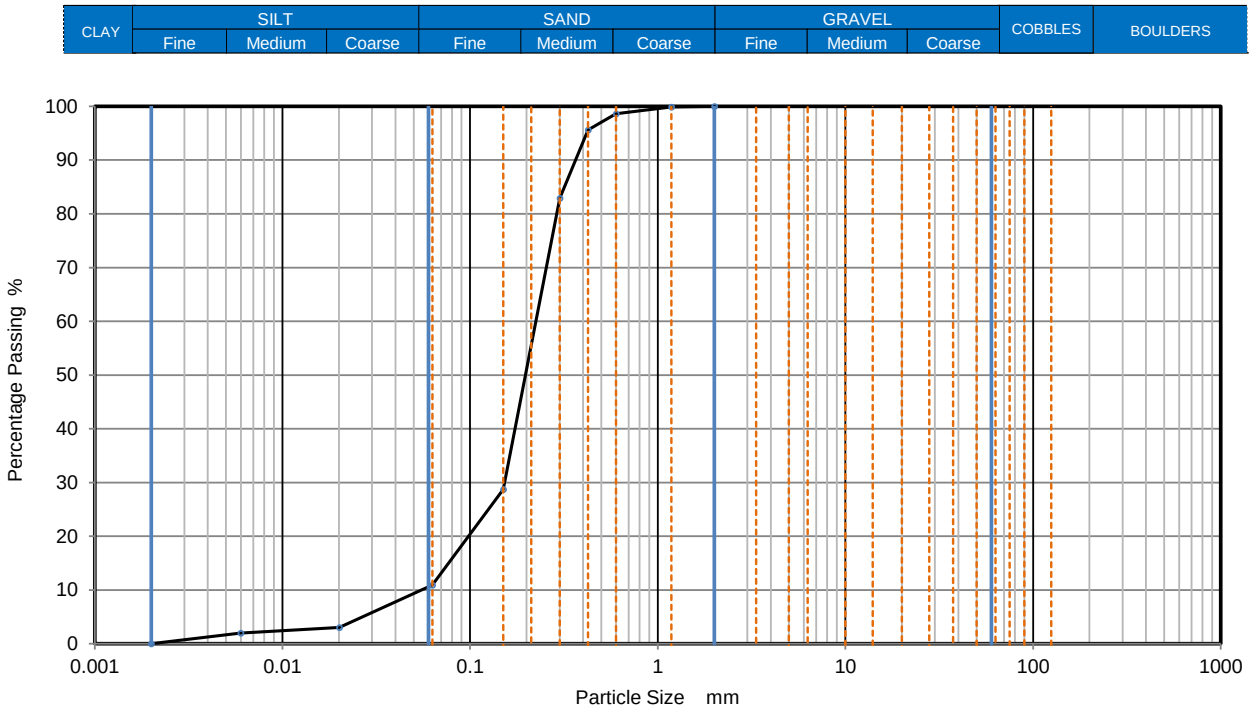
8260
Accredited to ISO/IEC 17025:2005

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP02				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Dark brown silty SAND			Depth, m	0.20 -
Client Job No.	1997	Specimen Depth	0.20 m	Sample Type	ES
Client	Integrale				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	3
75	-	0.0060	2
63	-	0.0020	0
50	-	Particle density (assumed)	
37.5	-	2.65	Mg/m3
20	-		
14	-		
10	-		
5	-		
2	100		
1.18	100		
0.6	99		
0.425	96		
0.3	83		
0.15	29		
0.063	11		

Dry Mass of sample, g	209

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	89
Silt	11
Clay	0

Grading Analysis		
D100	mm	2
D60	mm	0.224
D30	mm	0.152
D10	mm	0.055
Uniformity Coefficient		4.1
Curvature Coefficient		1.9

Sedimentation pre-teatment
N/A

Remarks

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	1	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

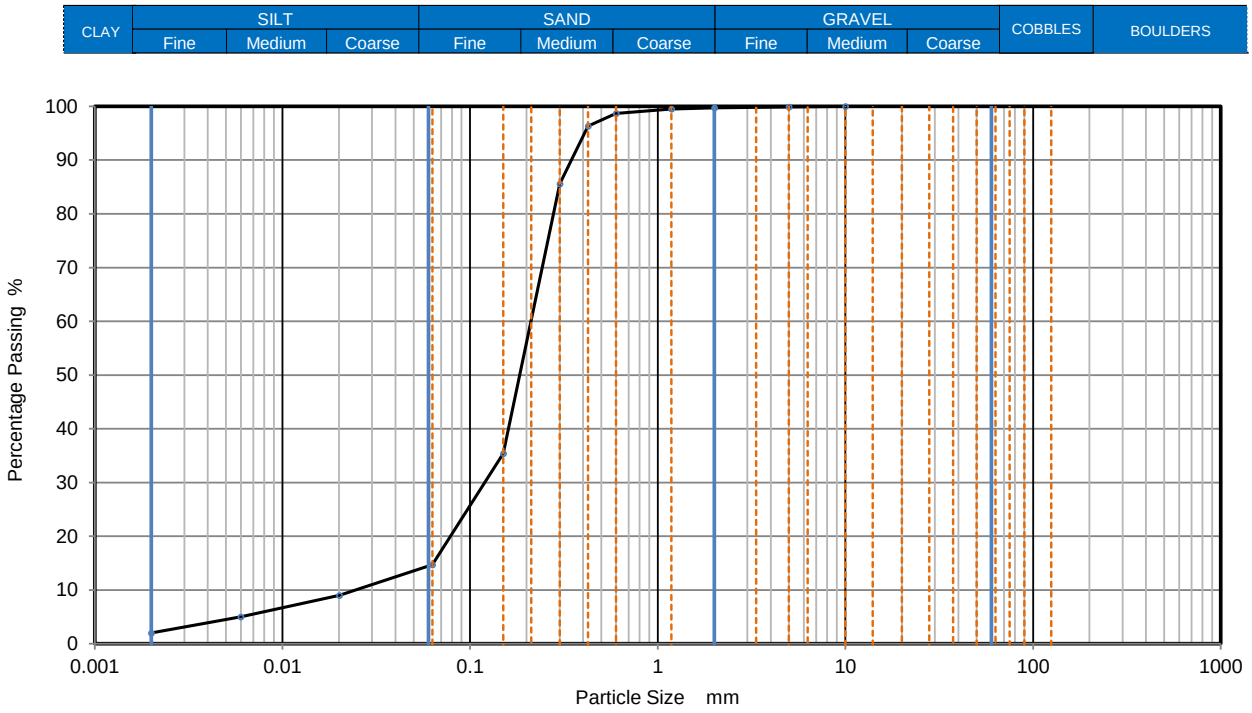
8260
Accredited to ISO/IEC 17025:2005

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP04				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Dark brown slightly clayey silty SAND			Depth, m	0.30 -
Client Job No.	1997	Specimen Depth	0.30 m	Sample Type	ES
Client	Integrale				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	9
75	-	0.0060	5
63	-	0.0020	2
50	-	Particle density (assumed)	
37.5	-	2.65	Mg/m3
20	-		
14	-		
10	100		
5	100		
2	100		
1.18	100		
0.6	99		
0.425	96		
0.3	86		
0.15	35		
0.063	15		

Dry Mass of sample, g	279

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	85
Silt	12
Clay	2

Grading Analysis		
D100	mm	10
D60	mm	0.211
D30	mm	0.12
D10	mm	0.0241
Uniformity Coefficient		8.7
Curvature Coefficient		2.8

Sedimentation pre-teatment
N/A

Remarks
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	2	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

8260
Accredited to ISO/IEC 17025:2005

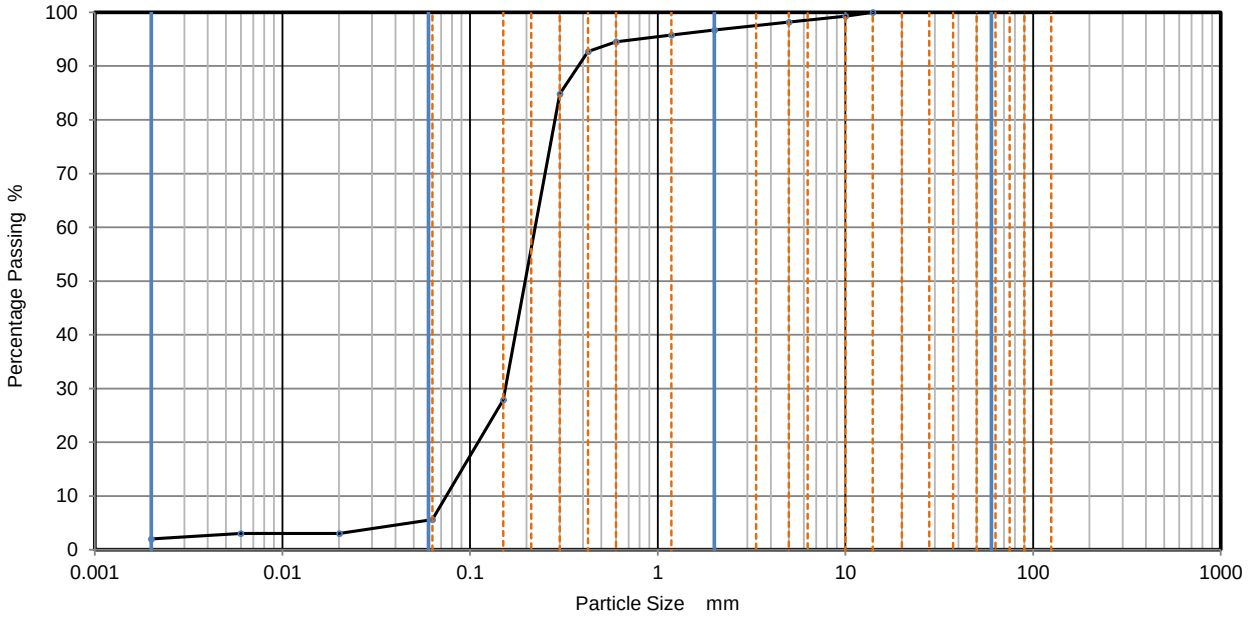
Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP09				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Yellowish brown slightly clayey slightly silty slightly gravelly SAND			Depth, m	0.80 -
Client Job No.	1997	Specimen Depth	0.80 m	Sample Type	D
Client	Integrale				

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	3
75	-	0.0060	3
63	-	0.0020	2
50	-	Particle density (assumed)	
37.5	-	2.65	Mg/m3
20	-		
14	100		
10	99		
5	98		
2	97		
1.18	96		
0.6	95		
0.425	93		
0.3	85		
0.15	28		
0.063	6		

Dry Mass of sample, g	263

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	91
Silt	3
Clay	2

Grading Analysis		
D100	mm	14
D60	mm	0.222
D30	mm	0.154
D10	mm	0.0747
Uniformity Coefficient		3
Curvature Coefficient		1.4

Sedimentation pre-teatment
N/A

Remarks
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	3	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

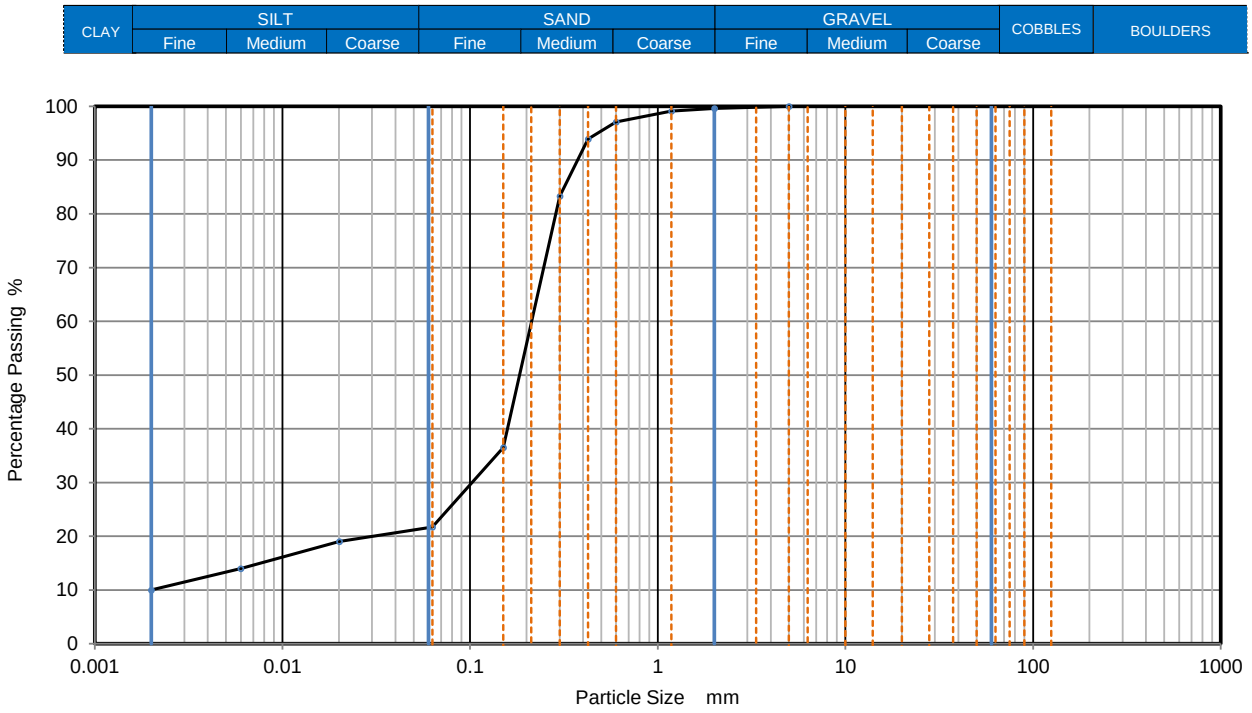
8260
Accredited to ISO/IEC 17025:2005

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP10				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Yellowish brown clayey silty SAND			Depth, m	0.50 -
Client Job No.	1997	Specimen Depth	0.50 m	Sample Type	D
Client	Integrale				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	19
75	-	0.0060	14
63	-	0.0020	10
50	-	Particle density (assumed)	
37.5	-	2.65	Mg/m3
20	-		
14	-		
10	-		
5	100		
2	100		
1.18	99		
0.6	97		
0.425	94		
0.3	83		
0.15	37		
0.063	22		

Dry Mass of sample, g	249

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	78
Silt	12
Clay	10

Grading Analysis		
D100	mm	5
D60	mm	0.212
D30	mm	0.102
D10	mm	0.00222
Uniformity Coefficient		96
Curvature Coefficient		22

Sedimentation pre-teatment
N/A

Remarks

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	4	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

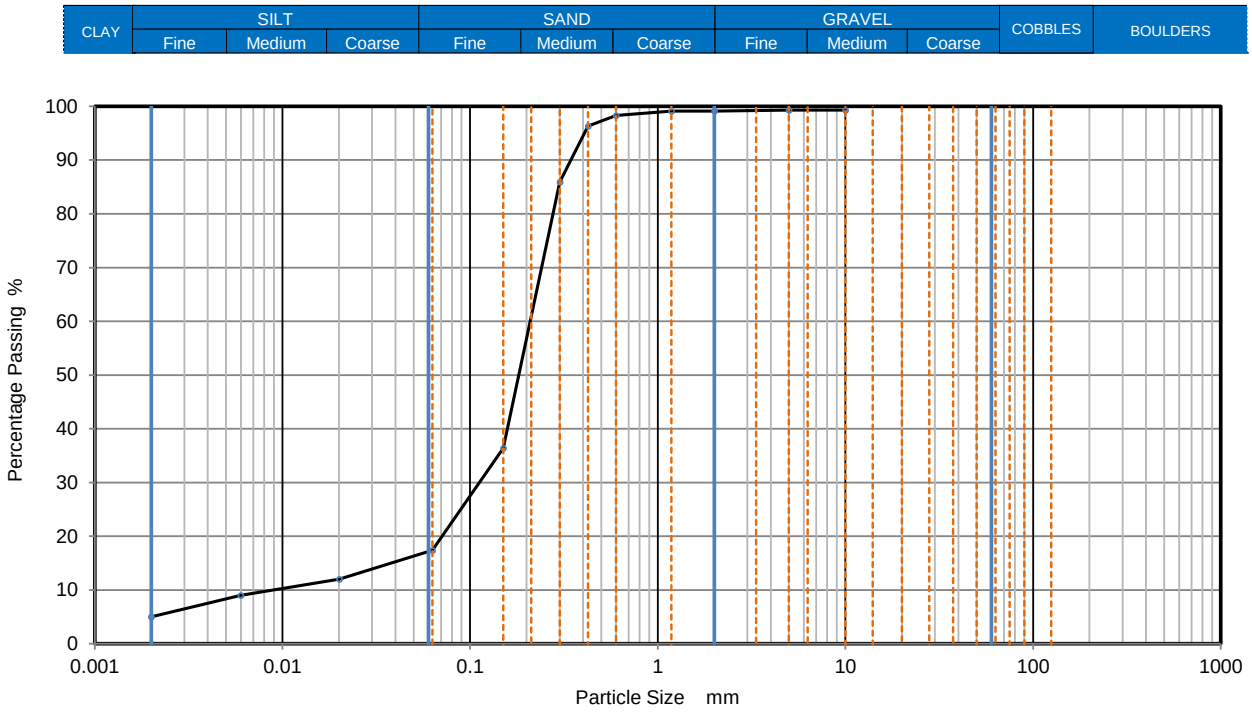
8260
Accredited to ISO/IEC 17025:2005

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP11				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Dark brown slightly clayey silty SAND			Depth, m	0.20 -
Client Job No.	1997	Specimen Depth	0.20 m	Sample Type	ES
Client	Integrale				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	12
75	-	0.0060	9
63	-	0.0020	5
50	-	Particle density (assumed)	
37.5	-	2.65	Mg/m3
20	-		
14	-		
10	99		
5	99		
2	99		
1.18	99		
0.6	98		
0.425	96		
0.3	86		
0.15	36		
0.063	17		

Dry Mass of sample, g	225

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	82
Silt	13
Clay	5

Grading Analysis		
D100	mm	
D60	mm	0.209
D30	mm	0.112
D10	mm	0.00982
Uniformity Coefficient		21
Curvature Coefficient		6.1

Sedimentation pre-teatment
N/A

Remarks

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	5	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

8260
Accredited to ISO/IEC 17025:2005

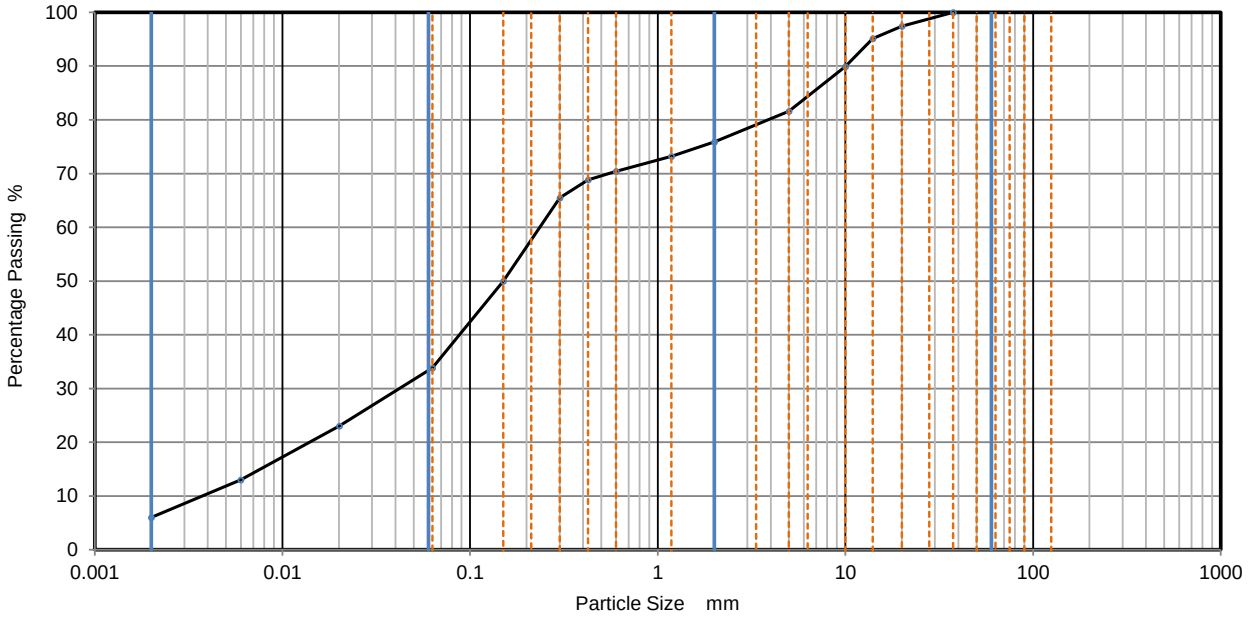
Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP16				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Dark brown slightly clayey slightly silty SAND			Depth, m	0.20 -
Client Job No.	1997	Specimen Depth	0.20 m	Sample Type	ES
Client	Integrale				

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	23
75	-	0.0060	13
63	-	0.0020	6
50	-	Particle density (assumed)	
37.5	100	2.65	Mg/m3
20	97		
14	95		
10	90		
5	82		
2	76		
1.18	73		
0.6	70		
0.425	69		
0.3	66		
0.15	50		
0.063	34		

Dry Mass of sample, g	477

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	42
Silt	28
Clay	6

Grading Analysis		
D100	mm	37.5
D60	mm	0.235
D30	mm	0.0416
D10	mm	0.0036
Uniformity Coefficient		65
Curvature Coefficient		2

Sedimentation pre-teatment
N/A

Remarks
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	6	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

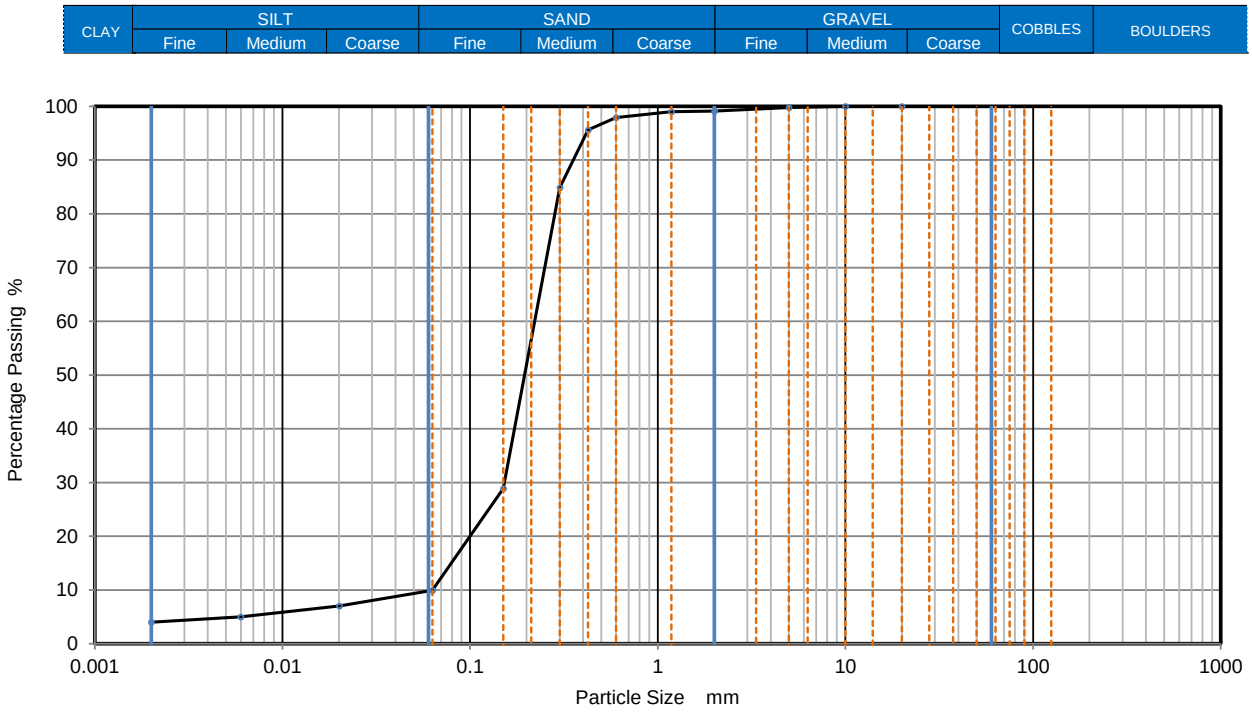
8260
Accredited to
ISO/IEC
17025:2005

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP19				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Yellowish brown slightly clayey silty SAND			Depth, m	0.20 -
Client Job No.	1997	Specimen Depth	0.20 m	Sample Type	ES
Client	Integrale				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	7
75	-	0.0060	5
63	-	0.0020	4
50	-	Particle density (assumed)	
37.5	-	2.65	Mg/m3
20	100		
14	-		
10	100		
5	100		
2	99		
1.18	99		
0.6	98		
0.425	96		
0.3	85		
0.15	29		
0.063	10		

Dry Mass of sample, g	242

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	89
Silt	6
Clay	4

Grading Analysis		
D100	mm	
D60	mm	0.22
D30	mm	0.152
D10	mm	0.0632
Uniformity Coefficient		3.5
Curvature Coefficient		1.7

Sedimentation pre-teatment
N/A

Remarks

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	7	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

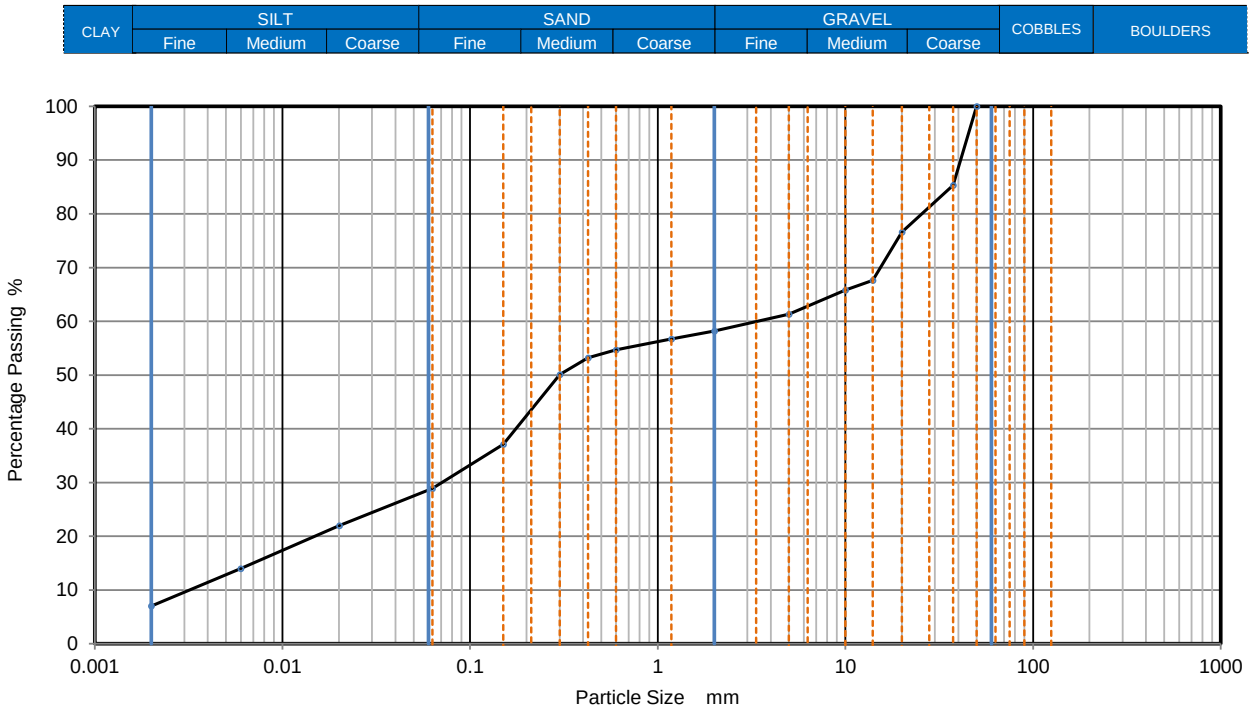
8260
Accredited to ISO/IEC 17025:2005

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

Particle Size Distribution

BS1377:Part 2:1990, clauses 9.2 and 9.4

Project No.	10687				
Borehole/Pit No.	TP20				
Project Name	Little Crow, Scunthorpe			Sample No.	-
Soil Description	Yellowish brown clayey very silty very sandy GRAVEL			Depth, m	0.40 -
Client Job No.	1997	Specimen Depth	0.40 m	Sample Type	D
Client	Integrale				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	-	0.0201	22
75	-	0.0060	14
63	-	0.0020	7
50	100	Particle density (assumed) 2.65 Mg/m3	
37.5	85		
20	77		
14	68		
10	66		
5	61		
2	58		
1.18	57		
0.6	55		
0.425	53		
0.3	50		
0.15	37		
0.063	29		

Dry Mass of sample, g	492

Sample Proportions	% dry mass
Very coarse	0
Gravel	42
Sand	29
Silt	22
Clay	7

Grading Analysis		
D100	mm	50
D60	mm	3.43
D30	mm	0.0707
D10	mm	0.00301
Uniformity Coefficient		1100
Curvature Coefficient		0.48

Sedimentation pre-teatment
N/A

Remarks

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

Page No.	8	Date	Approved
Sheet ID: KL002R PSD		17/10/2018 15:44	David Trowbridge - Senior Tech

8260
Accredited to ISO/IEC 17025:2005

Intégrale

Appendix I

Results of Contamination Analyses

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

STANDARD METHODOLOGY FOR CONTAMINATION SAMPLING & SCHEDULING

Soil samples for contamination analyses are recovered from trial pits or borehole samples using a stainless steel trowel and immediately placed into airtight amber glass jars, vials, or plastic tubs, as appropriate for the testing. These samples are labelled with the site name, investigation location and depth and placed into cool boxes for transit from site. Groundwater samples recovered during subsequent monitoring visits are similarly treated.

An analytical schedule is drawn up in line with the desk study findings, guidance given in CLR 8 and any relevant industry information, the actual ground conditions proven and proposed site use.

Samples are sent via overnight courier to the specialist testing laboratory. Testing is scheduled for MCERTS accredited analyses as far as possible and details of the test method are provided by the laboratory on the results sheets in a separate appendix. A standard turnaround of 10 working days is adopted unless otherwise agreed with the client at the time of instruction.

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton, Somerset,
BS39 5XP, United Kingdom

Tel: 01275 333036
www.integrale.uk.com

BRIEFING NOTE - SOIL CONTAMINANT GUIDELINE VALUES

Integrale Limited has produced a suite of generic Soil Guideline Values to enable quantitative assessment of risks to human health for various Conceptual Models. The CLEA v1.06 model was used to generate a robust database of guideline values for preliminary quantitative risk assessments. Integrale believe that CLEA v1.06 can be used with caution to derive Generic and Site Specific Assessment Criteria. All CLEA v1.06 assessments have been based on the series of reports published by DEFRA and the Environment Agency (EA), including Science report(s): SC050021/SR2, /SR3, /SR4 and /SR7.

Generic Assessment Criteria (GAC) have been generated for:

- Metals and semi-metals: arsenic, beryllium, cadmium, chromium, copper, mercury, nickel, selenium, vanadium and zinc. The previously published CLEA 2002 SGV for lead has been retained.
- Aliphatic TPH (C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44).
  Aromatic TPH's (C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35 and C35-C44).
- Priority PAHs: Naphthalene, Benzo(a)pyrene, Fluorene, Dibenzo(a,h)anthracene.
- Dioxins, furans and dioxin-like PCBs
- Benzene, toluene, ethylbenzene, xylenes.
- Cyanide, phenol.
- Chlorinated solvents: 1,2 dichloroethane, tetrachloroethanes, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene, vinyl chloride.

Default library values provided within CLEA v1.06 have been used where available. The contaminant library physio-chemical data has been updated where necessary. All new physio-chemical and toxicological data has been obtained from Soil Guideline Value (SGV) & TOX reports, EA and DEFRA published Science Reports and LQM CIEH where possible; otherwise, data has been sourced from other accredited sources.

Generic AC have been calculated for generic land uses, based on CLEA default building types, receptor types and characteristics, age classes, exposure pathways and averaging periods, and site characteristics.

Integrale have calculated generic AC's for typical housing with homegrown produce and without homegrown produce, primary school's and commercial end uses, using CLEA v1.06 default sandy loam soils, with an organic matter content of 6% and a pH value of 7.0.

Evaluation of health risks from petroleum hydrocarbons has been based on the US Total Petroleum Hydrocarbon Working Group (TPHCWG) approach, extensively used in the UK, as developed in 'The UK Approach for Evaluating Human Health Risks From Petroleum Hydrocarbons in Soils, EA 2005' and 'Principals for Evaluating the Human Health Risks for Petroleum Hydrocarbons in Soils, EA 2003'. The TPHCWG method uses a combination of indicator compounds (surrogates) and 13 petroleum hydrocarbon fractions, representing a range of aliphatic and aromatic TPH's. The indicator compounds represent the most toxic contaminants and those found most frequently at petroleum-hydrocarbon contaminated sites. Priority is given to the assessment of non-threshold indicator compounds likely to be present, including benzene and individual Polyaromatic Hydrocarbons.

Integrale also employ ICRCL 59/83 target values for phytotoxic contaminants boron, copper and zinc as well as Water Regulations Advisory Scheme (WRAS) guidance for the selection of materials for water supply pipes to be laid in contaminated land.

Defra Category 4 Screening Levels are also listed and referred to where appropriate within the planning regime.

May 2015

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	18-30111-1		
Initial Date of Issue:	08-Oct-2018		
Client	Integrale Limited		
Client Address:	Fieldworks Office Unit 7 Westway Farm Business P Wick Road Bishops Sutton BS39 5XP		
Contact(s):	Tom Foll		
Project	1997 Little Crow, Scunthorpe		
Quotation No.:	Q15-03791	**Date Received:**	02-Oct-2018
Order No.:	1997/0490	**Date Instructed:**	02-Oct-2018
No. of Samples:	12		
Turnaround (Wkdays):	5	**Results Due:**	08-Oct-2018
Date Approved:	08-Oct-2018		
Approved By:			
Details:	Robert Monk, Technical Manager		

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited				Chemtest Job No.:	18-30111	18-30111	18-30111	18-30111
Quotation No.: Q15-03791				Chemtest Sample ID.:	698939	698941	698942	698944
				Client Sample ID.:	ES1	ES1	ES1	ES1
				Sample Location:	TP6	TP10	TP15	TP20
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.3	0.1	0.2	0.2
				Date Sampled:	26-Sep-2018	25-Sep-2018	25-Sep-2018	27-Sep-2018
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
pH	U	1010		N/A	7.1	6.6	8.0	8.1
Sulphate	U	1220	mg/l	1.0	1.5	66	13	7.2
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Sulphide	U	1325	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	mg/l	15	29	79	110	87
Arsenic (Dissolved)	U	1450	µg/l	1.0	4.9	< 1.0	3.0	2.0
Boron (Dissolved)	U	1450	µg/l	20	< 20	< 20	20	< 20
Barium (Dissolved)	U	1450	µg/l	5.0	5.6	38	5.9	< 5.0
Beryllium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	< 0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	1.2	< 1.0	< 1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1.0	2.6	3.6	2.2	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	2.3	1.7	1.9	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0	12	1.3	2.1	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (Dissolved)	U	1450	µg/l	1.0	5.8	< 1.0	3.0	1.5
Zinc (Dissolved)	U	1450	µg/l	1.0	9.4	7.4	6.6	2.3
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20	< 20
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited				**Chemtest Job No.:**	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111
Quotation No.: Q15-03791				**Chemtest Sample ID.:**	698934	698935	698936	698937	698938	698939	698940	698941	698942
				Client Sample ID.:	D2	D4	D2	D3	ES1	ES1	ES1	ES1	ES1
				Sample Location:	TP1	TP2	TP15	TP22	TP1	TP6	TP9	TP10	TP15
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.5	1.2	0.5	1.0	0.2	0.3	0.2	0.1	0.2
				Date Sampled:	25-Sep-2018	25-Sep-2018	25-Sep-2018	26-Sep-2018	25-Sep-2018	26-Sep-2018	26-Sep-2018	25-Sep-2018	25-Sep-2018
				Asbestos Lab:									
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A									
Asbestos Identification	U	2192	%	0.001									
Moisture	N	2030	%	0.020	6.6	23	16	7.9	8.9	9.7	19	14	18
pH	U	2010		N/A	7.2	5.4	8.2	8.5	7.0	7.3	6.6	6.8	7.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40					< 0.40	< 0.40	1.2	0.79	1.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.079	0.093	0.083	0.053					
Total Sulphur	U	2175	%	0.010	< 0.010	0.10	0.091	0.046					
Sulphur (Elemental)	U	2180	mg/kg	1.0					1.5	1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	U	2300	mg/kg	0.50					2.0	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50					< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Total)	U	2430	%	0.010					0.020	0.039	0.12	0.13	0.10
Sulphate (Acid Soluble)	U	2430	%	0.010	0.031	0.061	0.21	0.081					
Arsenic	U	2450	mg/kg	1.0					10	8.8	15	17	36
Barium	U	2450	mg/kg	10					12	13	19	110	64
Beryllium	U	2450	mg/kg	1.0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	U	2450	mg/kg	0.10					0.12	0.12	0.26	0.16	0.31
Chromium	U	2450	mg/kg	1.0					9.9	9.3	12	24	28
Copper	U	2450	mg/kg	0.50					6.4	4.8	16	13	20
Mercury	U	2450	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50					7.9	5.5	8.7	14	25
Lead	U	2450	mg/kg	0.50					31	22	63	54	62
Selenium	U	2450	mg/kg	0.20					< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0					21	18	29	37	68
Zinc	U	2450	mg/kg	0.50					48	34	77	82	110
Chromium (Trivalent)	N	2490	mg/kg	1.0					9.9	9.3	12	24	28
Chromium (Hexavalent)	N	2490	mg/kg	0.50					< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40					1.7	1.9	6.6	2.8	4.1
Total TPH >C6-C40	U	2670	mg/kg	10									
Naphthalene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10					0.28	< 0.10	0.26	0.12	< 0.10
Pyrene	U	2700	mg/kg	0.10					0.26	< 0.10	0.23	0.14	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited			**Chemtest Job No.:**		18-30111	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111	18-30111
Quotation No.: Q15-03791			**Chemtest Sample ID.:**		698934	698935	698936	698937	698938	698939	698940	698941	698942
			Client Sample ID.:		D2	D4	D2	D3	ES1	ES1	ES1	ES1	ES1
			Sample Location:		TP1	TP2	TP15	TP22	TP1	TP6	TP9	TP10	TP15
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	1.2	0.5	1.0	0.2	0.3	0.2	0.1	0.2
			Date Sampled:		25-Sep-2018	25-Sep-2018	25-Sep-2018	26-Sep-2018	25-Sep-2018	26-Sep-2018	26-Sep-2018	25-Sep-2018	25-Sep-2018
			Asbestos Lab:										
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Benzo[a]pyrene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10					< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0					< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.30					< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited					**Chemtest Job No.:**	18-30111	18-30111	18-30111
Quotation No.: Q15-03791					**Chemtest Sample ID.:**	698943	698944	698945
					Client Sample ID.:	ES1	ES1	ES3
					Sample Location:	TP17	TP20	TP21
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.1	0.2	1.0
					Date Sampled:	26-Sep-2018	27-Sep-2018	27-Sep-2018
					Asbestos Lab:			COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A				-
Asbestos Identification	U	2192	%	0.001				No Asbestos Detected
Moisture	N	2030	%	0.020		11	13	27
pH	U	2010		N/A		8.2	8.2	6.6
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		1.3	1.2	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010				
Total Sulphur	U	2175	%	0.010				
Sulphur (Elemental)	U	2180	mg/kg	1.0		< 1.0	< 1.0	3.7
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		< 0.50	< 0.50	2.8
Sulphate (Total)	U	2430	%	0.010		0.079	0.062	0.17
Sulphate (Acid Soluble)	U	2430	%	0.010				
Arsenic	U	2450	mg/kg	1.0		41	22	32
Barium	U	2450	mg/kg	10		47	37	140
Beryllium	U	2450	mg/kg	1.0		< 1.0	< 1.0	3.8
Cadmium	U	2450	mg/kg	0.10		0.29	0.33	0.34
Chromium	U	2450	mg/kg	1.0		26	17	110
Copper	U	2450	mg/kg	0.50		13	8.1	15
Mercury	U	2450	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50		23	15	120
Lead	U	2450	mg/kg	0.50		41	34	52
Selenium	U	2450	mg/kg	0.20		< 0.20	< 0.20	0.40
Vanadium	U	2450	mg/kg	5.0		54	31	340
Zinc	U	2450	mg/kg	0.50		81	60	350
Chromium (Trivalent)	N	2490	mg/kg	1.0		26	17	110
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40		3.1	2.8	4.0
Total TPH >C6-C40	U	2670	mg/kg	10				< 10
Naphthalene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10

Exceeds GAC Value
Exceeds WRAS Value
Exceeds Phytotoxic Value

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited			**Chemtest Job No.:**		18-30111	18-30111	18-30111	
Quotation No.: Q15-03791			**Chemtest Sample ID.:**		698943	698944	698945	Exceeds GAC Value
			Client Sample ID.:		ES1	ES1	ES3	Exceeds WRAS Value
			Sample Location:		TP17	TP20	TP21	Exceeds Phytotoxic Value
			Sample Type:		SOIL	SOIL	SOIL	
			Top Depth (m):		0.1	0.2	1.0	
			Date Sampled:		26-Sep-2018	27-Sep-2018	27-Sep-2018	
			Asbestos Lab:				COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	

Chemtest
The right chemistry to deliver results

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl-pphenylenediamine.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GC FID detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.

Test Methods

SOP	Title	Parameters included	Method summary
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Chemtest
The right chemistry to deliver results

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	18-36430-1
Initial Date of Issue:	27-Nov-2018
Client	Integrale Limited
Client Address:	Wick Road Bishop Sutton Bristol Avon BS39 5XP
Contact(s):	Joseph Begaj
Project	1997 Little Crow, Scunthorpe

Quotation No.:		**Date Received:**	21-Nov-2018
Order No.:	1997/0599	**Date Instructed:**	21-Nov-2018
No. of Samples:	2		
Turnaround (Wkdays):	5	**Results Due:**	27-Nov-2018
Date Approved:	27-Nov-2018		

Approved By:

[redacted]

Details: Martin Dyer, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited					**Chemtest Job No.:**	18-36430	18-36430
Quotation No.:					**Chemtest Sample ID.:**	728122	728123
					Client Sample ID.:	ES2	ES3
					Sample Location:	WS9	WS9
					Sample Type:	SOIL	SOIL
					Top Depth (m):	1.25	1.75
					Date Sampled:	15-Nov-2018	15-Nov-2018
					Asbestos Lab:	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A		-	
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected	
Moisture	N	2030	%	0.020		28	26
pH	U	2010		N/A		6.3	5.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		0.61	0.73
Sulphur (Elemental)	U	2180	mg/kg	1.0		200	2100
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		50	38
Sulphate (Total)	U	2430	%	0.010		0.36	0.95
Arsenic	U	2450	mg/kg	1.0		48	81
Barium	U	2450	mg/kg	10		74	35
Beryllium	U	2450	mg/kg	1.0		2.6	2.6
Cadmium	U	2450	mg/kg	0.10		< 0.10	< 0.10
Chromium	U	2450	mg/kg	1.0		93	170
Copper	U	2450	mg/kg	0.50		7.7	8.8
Mercury	U	2450	mg/kg	0.10		< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50		110	82
Lead	U	2450	mg/kg	0.50		35	32
Selenium	U	2450	mg/kg	0.20		0.45	0.49
Vanadium	U	2450	mg/kg	5.0		350	420
Zinc	U	2450	mg/kg	0.50		230	230
Chromium (Trivalent)	N	2490	mg/kg	1.0		93	170
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50
Organic Matter	U	2625	%	0.40		9.2	10
Total TPH >C6-C40	U	2670	mg/kg	10		< 10	53
Naphthalene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10

Exceeds GAC Value
Exceeds WRAS Value
Exceeds Phytotoxic Value

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1997 Little Crow, Scunthorpe

Client: Integrale Limited					**Chemtest Job No.:**	18-36430	18-36430
Quotation No.:					**Chemtest Sample ID.:**	728122	728123
					Client Sample ID.:	ES2	ES3
					Sample Location:	WS9	WS9
					Sample Type:	SOIL	SOIL
					Top Depth (m):	1.25	1.75
					Date Sampled:	15-Nov-2018	15-Nov-2018
					Asbestos Lab:	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0		< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.30		< 0.30	< 0.30

Exceeds GAC Value
Exceeds WRAS Value
Exceeds Phytotoxic Value

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Chemtest
The right chemistry to deliver results

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix J

Proposed Redevelopment

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

LITTLE CROW SOLAR PARK - **WORKS PLAN**

KEY: WORKS PLAN

- ORDER LIMITS
- WORK NO. 1 GROUND MOUNTED SOLAR PANELS
- WORK NO. 2A BATTERY ENERGY STORAGE SYSTEM OR WORK NO. 3 ECOLOGICAL CORRIDOR
- WORK NO. 2B BATTERY ENERGY STORAGE SYSTEM OR WORK NO. 1 GROUND MOUNTED SOLAR PANELS
- WORK NO. 3 ECOLOGICAL CORRIDOR
- WORK NO. 4 SUBSTATION BUILDING
- WORK NO. 5 UPGRADE TO MAIN ACCESS TRACK
- WORK NO. 6 PERIMETER DEVELOPMENT BUFFER
- WORK NO. 7 TEMPORARY CONSTRUCTION AND DECOMMISSIONING COMPOUND
- AREA EXCLUDED FROM ORDER LIMITS

DOCUMENT REFERENCE NUMBER: 2.8 LC DRW

APFP REG NO. 5(2)(j)(i) & 5(2)(j)(ii)

N W E S 0 50 150 250m

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | www.pegasusgroup.co.uk | TEAM/DRAWN BY: RIT | APPROVED BY: GR | DATE: 09/11/2020 | SCALE: 1:2500 @ A0 | DRWG: **P17-0718**_28 SHEET NO: __ REV: J | CLIENT: **INRG SOLAR (LITTLE CROW) LTD.** |

Pegasus Design