NORTH LINCOLNSHIRE
GREEN
ENERGY PARK

Planning Act 2008

Infrastructure Planning (Applications Prescribed Forms and Procedure) Regulations 2009

APFP Regulation 5(2)(a)

Infrastructure (Environmental Impact Assessment) Regulations 2017

North Lincolnshire Green Energy Park

Volume 6

Environmental Statement
6.2.8 Chapter 8 - Ground Conditions, Contamination and Hydrogeology

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Acronyms and Abbreviations

Name	Description
ACC	Air Cooled Condensers
AGI	Above Ground Installation
BAT	Best Available Techniques
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Society
BMVL	Best and Most Versatile Land
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
C4SL	Category 4 Screening Levels
CBMP	Concrete Block Manufacturing Plant
CBR	California Bearing Ratio tests
CDM	Construction Design and Management
CHP	Combined Heat and Power
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research and Information Association
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide

Name	Description
CoCP	Code of Construction Practice
CSM	Conceptual Site Model
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DHN	District Heat Network
DHPWN	District Heat and Private Wire Network
dML	deemed Marine Licence
DoW:CoP	Definition of Waste: Code of Practice
DQRA	Detailed Quantitative Risk Assessment
EIA	Environmental Impact Assessment
EMFs	Electric and Magnetic Fields
EPA	Environmental Protection Act
EPH	Extractable Petroleum Hydrocarbons
EPR	Environmental Permitting Regulations
EQS	Environmental Quality Standard
ERF	Energy Recovery Facility
ERM	Environmental Resources Management
ES	Environmental Statement
EU	European Union
EV	Electric Vehicle
FGTr	Flue Gas Treatment residue
GAC	Generic Assessment Criteria
GQRA	General Quantitative Risk Assessment
H_2	Hydrogen
HRA	Habitat Regulations Assessment
HSE	Health and Safety Executive
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive
IPC	Integrated Pollution Control
IPPC	Integrated Pollution and Prevention Control
LDF	Local Development Framework
LQM	Land Quality Management
M bgl	Metres below ground level
MCA	Mineral Consultation Area
MCAA	Marine and Coastal Access Act

Name	Description
MMO	Marine Management Organisation
MSA	Mineral Safeguarding Area
MWh_e	Electrical generation in megawatt-hours (electric)
MWh_{th}	Heat generation in megawatt-hours (thermal)
NLGEP	North Lincolnshire Green Energy Park
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PA	Planning Act
PAC	Potential Area of Concern
PAH	Polycyclic Aromatics Hydrocarbons
PCB	Polychlorinated Biphenyls
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PNEC	Predicted No-Effect Concentration
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PRF	Plastic Recycling Facility
PV	Photovoltaic
PWN	Private Wire Network
QRA	Qualitative Risk Assessment
RDF	Refuse Derived Fuel
RHTF	Residue Handling and Treatment Facility
S21	Solar 21
S4UL	Suitable 4 Use Levels
SAC	Special Area of Conservation
SGV	Soil Guideline Value
SI	Site Investigation
SOCC	Statement of Community Consultation
SoS	Secretary of State
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SVOCs	Semi-Volatile Organic Compounds
TCPA	Town and Country Planning Act
TPH	Total Petroleum Hydrocarbons

Name	Description
UK	United Kingdom
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
WHO DWS	World Health Authority Drinking Water Standard
WMP	Waste Management Plan

1. INTRODUCTION

1.1.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the Project, as described in Chapter 3: Project Description and Alternatives (**Document Reference 6.2.3**), on geology, hydrogeology, and land contamination (considering effects to and from any existing contamination and also any potential to cause contamination). The assessment considers:

- The present day and future baseline geological and hydrogeological conditions during construction and at commencement of operations;
- The likely nature of any existing sources of contamination which may be present at the Application Land;
- The effects of construction of the Project on geology, environmental ground conditions and groundwater;
- The effects of operation of the Project on geology, environmental ground conditions and groundwater; and
- The effects of decommissioning of the Project on geology, environmental ground conditions and groundwater.

1.1.1.2 Some of the potential impacts and effects relating to hydrogeology, such as discharge to surface water and flood risk, are also addressed within Chapter 9: Water Resources and Flood Risk (**Document Reference 6.2.9**).

2. POLICY CONTEXT, LEGISLATION, GUIDANCE AND STANDARDS

2.1.1.1 A review of the legislative and policy context that is relevant to the Project is presented in Chapter 2: Policy and Legislative Context (**Document Reference 6.2.2**).

2.1.1.2 The following key legislation is of direct relevance to the assessment of the effects of the Project during construction and operation on land quality, including geology, hydrogeology, and contaminated land.

2.1.2 Contaminated Land

The Environmental Protection Act 1990 and Part 2A (the Contaminated Land Regime)

2.1.2.2 Current legislation relating to contaminated land in the UK is contained within Part 2a of the Environmental Protection Act (EPA), including the Contaminated Land (England) Regulations 2006 (amended 2012).

2.1.2.3 Under the Part 2A regime contaminated land is defined as:

> *'any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of the substances in, on, or under the land, that:*
>
> *significant harm is being caused or there is a significant possibility of such harm being caused: or*
>
> *significant pollution of controlled waters is being or there is a significant possibility of such pollution being caused.'*

2.1.2.4 As such it must be determined that substances are continuing to enter controlled waters and/or are likely to enter controlled waters where controlled waters are defined as territorial waters which extend seawards for three miles, coastal waters, inland freshwaters, and groundwater excluding the unsaturated zone. The assessment of risk arising from contamination should be undertaken on current and proposed use.

The Water Act 2003

2.1.2.5 The Water Act 2003 amended the EPA to say that a site could be determined as contaminated land if it was causing or could cause significant pollution of controlled waters.

Water Resources Act 1991

2.1.2.6 The Water Resources Act 1991 provides statutory protection for controlled waters and makes it an offence to discharge to controlled waters without the permission or consent of the regulators of the area.

The Environmental Permitting Regulations (England and Wales) Regulations 2016

2.1.2.7 The EPR provides legislation for the permitting of activities which have the potential to cause harm to human health or the environment. Under the EPR It is an offence to cause or knowingly permit a groundwater activity unless authorised by a permit or registered as exempt, where a groundwater activity is defined as:

a. the discharge of a pollutant that results in the direct input of that pollutant to groundwater;

b. the discharge of a pollutant in circumstances that might lead to an indirect input of that pollutant to groundwater;

c. any other discharge that might lead to the direct or indirect input of a pollutant to groundwater;

d. an activity in respect of which a notice under paragraph 10 has been served and has taken effect;

e. an activity that might lead to a discharge mentioned in paragraph (a), (b) or (c), where that activity is carried on as part of the operation of a regulated facility of another class.’

2.1.2.8 On surrender of an Environmental Permit, the applicant must show that the necessary measures have been taken:

a. ‘to avoid a pollution risk resulting from the operation of the regulated facility and, in the case of a permit authorising the carrying on of a flood risk activity (in whole or in part), to avoid any of the risks specified in sub-paragraph (3), and

b. to return the site of the regulated facility to a satisfactory state, having regard to the state of the site before the facility was put into operation.’

2.1.3 Planning Regime

National Policy Statement

2.1.3.2 As outlined in Chapter 2, the relevant National Policy Statements provide the primary basis for decisions by the Secretary of State on Nationally Significant Infrastructure Projects.

2.1.3.3 The National Policy Statements (NPSs) set out national policy on applications for energy infrastructure (EN-1), renewable energy infrastructure (EN-3); and the electricity transmission and distribution network (EN-5). These policy statements require that developments should be subject to project level assessments, including a requirement for Environmental Impact Assessment (EIA), to address location specific effects. The NPSs set out assessment principles associated with pollution control and geological conservation.

2.1.3.4 Paragraph 4.10.3, NPS EN-1 states:

> *‘In considering an application for development consent, the IPC should focus on whether the development itself is an acceptable*

> *use of the land, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves. The IPC should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, including those on land drainage, water abstraction and biodiversity, will be properly applied and enforced by the relevant regulator. It should act to compliment but seek to duplicate them.'*

Revised National Planning Policy Framework (2021)

2.1.3.5 Government planning policy on land contamination aims to prevent new contaminated land from being created and promotes a risk-based approach to addressing historical contamination. With regards to historical contamination regulatory intervention is held in reserve for land that meets the legal definition of "contaminated land" and poses an unacceptable risk that cannot be dealt with through any other means, including through planning.

2.1.3.6 Under the National Planning Policy Framework (2021) the key sections relevant to the future of the site are as follows:

- 184…. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.
- 183…Planning policies and decisions should also ensure that:
  - a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
  - after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
  - adequate site investigation information, prepared by a competent person, is presented.

Local Planning Policy

2.1.3.7 Local planning policy in this area relevant to land quality includes:

- Planning for Renewable Energy Development (Policy 5, soil and hydrology), Supplementary Planning Document, North Lincolnshire Council November 2011;
- North Lincolnshire Council Local Development Framework: Core Strategy (North Lincolnshire Council 2011a) – adopted June 2011 (Chapter 11, Environment and Resources);
- Saved Policies of North Lincolnshire Local Plan (Local Development Frameworks Government Office for Yorkshire and The Humber, 207) – adopted May 2003, saved September 2007; and

- A new Local Plan is being prepared to replace the current North Lincolnshire Local Plan. Adoption of the plan is likely to occur in 2022.

3. CONSULTATION

3.1.1.1 Table 1 and Table 2 below respectively present excerpts from the scoping opinion received from the Planning Inspectorate and consultation responses on the PEIR specific to the Ground Conditions, Contamination, and Hydrogeology assessment. The tables describe how each response has been addressed, and, as appropriate where more information can be found in the ES.

Table 1: Scoping Consultation Responses

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
4.4.1	Proposed to be scoped out: Areas of land outside of the Project's order limits.	Section 9.5 of the Scoping Report defines the spatial scope of the ground conditions and hydrogeology assessment as "land within the existing industrial estate, greenfield land, brownfield mixed-use land, the disused rail spur, an area operated by RMS Ports included use of an existing wharf"; and continues by stating "Areas outside of these are associated with the existing industrial estate and will not be included within this assessment". The definition of the spatial scope of the assessment is insufficient and does not clearly allow for an understanding of the extent of the study area. Furthermore, insufficient evidence has been provided that supports the assumption that no area outside of the spatial scope of the study area would be impacted by the Project. As such, the Inspectorate does not agree that areas outside the stated spatial scope of the assessment to be scoped out of future assessments and the ES. See comments in ID 4.4.6 and 4.4.8 below for further details on the spatial extent of potential impacts and the spatial scope of the assessment.	Information on the spatial scope is provided in this ES.	Section 5

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
4.4.2	Proposed to be scoped out: Operational impacts	The Inspectorate does not consider sufficient information has been provided in the Scoping Report that demonstrates no significant effects on ground conditions and hydrogeology would arise during the operation of the Project. On this basis, the Inspectorate does not agree that this matter can be scoped out of the ES.	Detailed description of the operational processes of the Project including diagrams, and details of physical protective measures, to prevent the uncontrolled release of chemicals to soil and groundwater, e.g. bunding to tanks, to be included in the ES, along with a Conceptual Site Model (CSM) to illustrate all (or lack of) pathways between the Project and ground.	Details of operational processes are provided in Chapter 3 (**Document Reference 6.2.3**). The CSM is provided in Figure 8.
4.4.3	Geological data	Scoping Report Paragraph 9.3.1.7 states that detailed geological data has been provided within the Ian Farmer Associates (IFA) (2018) report. If this report is to be used to underpin the ground conditions and hydrogeology assessment within the ES, then the report should be included within, or appended to, the ES.	The IFA report was appended to the scoping report, PIER. The IFA report and additional third-party reports that have become available and are appended to this ES. The ERM Site Investigation (SI) report is appended to this ES.	Appendix C and E
4.4.4	Baseline	Section 9.3 of the Scoping Report states that the Project is situated on potentially contaminated land with a high groundwater table adjacent to a river. On this basis, it may be prudent for the ES to include information on the groundwater table throughout the Project and groundwater flow regime to aid to provide a description of potential pollution pathway locations. Furthermore, the ES should state the location of any ground investigation undertaken (or proposed), including the location of the boreholes.	Third party information and the ERM Site Investigation report has been appended to this ES.	Appendix C and E

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
4.4.5	Source of contamination	Considering the nature of the Project including associated development, the ES should make it clear how Refuse Derived Fuel (RDF), and the other potential contaminants to be used and/ or produced within the Application Land will be transported, stored, handled, and disposed of, to ensure no potential onsite contamination/ pollution event occurs.	Operational processes including waste handling and measures to mitigate the potential uncontrolled release of pollutants to soil and groundwater are provided in this ES.	Chapter 3 (**Document Reference 6.2.3**)
4.4.6	Spatial scope of the ES	The ES should provide a concise definition of the spatial scope of the assessment which is supported by evidence that the spatial scope extends to cover all potential impacts likely to arise. Effort should be made to agree the spatial scope of the assessment with the relevant statutory bodies.	A definition of the spatial scope of the assessment is provided in the ES	Provided in Section 5.
4.4.7	Cumulative effects	Scoping Report Paragraph 9.7.1.6 states that as ground conditions and contamination are confined within the Project footprint, no cumulative effects will occur. If this approach is to be followed, the ES must provide evidence that shows no pollution pathways, or contamination, will impact areas outside of the Project, and that other projects would not result in pollution pathways or contamination impacts that have potential to combine with those released from the Project. If this cannot be evidenced, then an assessment of cumulative effects should be included within the ES.	CSM for the project is included in this ES.	Provided in Figure 8.
4.4.9	Soil	Information regarding the Agricultural Land Classification for land within the Application Land should be provided within the ES. The ES should also state the area of Best and Most Versatile Land (BMVL) that is to be lost due to the Project and demonstrate how effects on BMVL have been minimised, including an assessment of likely significant effects on agricultural land, where relevant.	Majority of the Project covers land classified as 'Very Good', which is classified as best and most versatile. An assessment of likely significant effects on agricultural land, where relevant, has been included in the Socio-Economic assessment within this ES.	Chapter 14 (**Document Reference 6.2.14**)

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
N/A	Assessment approach	Environment Agency response. We have reviewed Chapter 9 in respect of the approach to land contamination and this is satisfactory.	No action required.	Details on approach are provided in Section 5
N/A	Assessment approach	North Lincolnshire Council response. I can confirm this department finds the approach acceptable and would advise that as a minimum a desk based preliminary risk assessment and proposals for intrusive ground investigation be submitted in support of any forthcoming application.	A desk-based preliminary risk assessment and intrusive ground investigation have been undertaken to inform the assessment, as well as the collection of additional third-party site investigation reports in or near the Order Limits.	See Section 6, Appendix C, D and Appendix E

3.1.1.2 Table 2 below sets out the key stakeholder comments from the pre-application statutory consultation specific to this ground conditions and contaminated land. The table describes how each response has been or will be addressed by the Project. Responses have been included when they are directly relevant to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the Infrastructure EIA Regulations 2017), have required a technical clarification and / or further impact assessment. The full set of responses is contained in the Consultation Report (**Document Reference: 7.1 Appendix I-1**).

3.1.1.3 The consultee types for the purposes of statutory consultation under the 2008 Act are as follows:

- s42(a) is with prescribed consultees;
- s42(b) is with local authorities;
- s44 is with consultees with an interest in land; and
- s47 is with the local community.

Table 2: Pre-application Consultation Responses

Consultee type	Consultee	Comments	Response / Action	Reference within this document
S42(a)	Environment Agency	The approach outlined in this chapter (9) to assess risks to water resources appears satisfactory. The report mentions that a groundwater abstraction may be required for the project. We would advise you to consult with us at an early stage about this if you intend to abstract more than 20 cubic metres of water per day from a surface water source e.g. a stream or from underground strata (via borehole or well) for any particular purpose as you will need an abstraction licence. There is no guarantee that a licence will be granted as this is dependent on available water resources and existing protected rights.	This is noted. However, groundwater abstraction is no longer being considered.	N / A
S42(a)	Environment Agency	The approach outlined in this chapter to assess risks to the water environment appears satisfactory with additional work planned in relation to establishing the land contamination situation.	An environmental site investigation to determine baseline conditions and potential impacts from the development with respect to the environment has been undertaken and full soil and groundwater results are available in Chapter 8: Ground Conditions, Contamination and Hydrology **(Document Reference 6.2.8).**	Appendix D and Appendix E
S42(b)	North Lincolnshire Council	Section 6.6 of the report refers to a Ground Investigation Report of the RMS Ports Site (Ian Farmer Associates, 2018), which gives a baseline of the current conditions within and around the site. This report has been included in Appendix C. In total, six boreholes were drilled within the area, with ten soil samples, one groundwater sample and four soil leachate samples scheduled for chemical analysis. Only two boreholes (BH3 and BH6) were installed to monitor gas. Four rounds of ground gas analysis was carried out at the monitoring well standpipes. Gas Screening Values	This is noted. Site Investigation and Ground Investigation works have since been progressed. Weekly ground gas monitoring at 5 locations is being undertaken for a period of 8 weeks. Site Investigation works have been undertaken and the report is included in Appendix E of Chapter 8: Ground Conditions, Contamination and Hydrogeology of the Environmental Statement (**Document Reference 6.2.8).** Eight rounds of ground gas monitoring have been undertaken across five locations. Two of the wells to the north	Appendix E

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		were calculated, and gas protection measures of Characteristic Situation 3 were concluded. However, the report states that 'Gas sampling rounds were not undertaken in compliance with guidelines (CIRIA Document C659), reducing confidence in the results. Ian Farmer Associates (1998) Limited recommended that a continued programme of monitoring be carried out to comply more closely with these guidelines before final design is undertaken' The EHO agrees that the monitoring has not been undertaken in accordance with British Standards and that the number of wells are inadequate to assess the full gas risk to future occupiers. A revised Phase 1 has been undertaken and submitted as part of Appendix D (Phase One Environmental Site Assessment, ERM (2021) Date: 5 January 2021 Project No.: 0483091), based on the conclusions from the EIA Scoping Request that was previously submitted in November 2020. Details of the proposed Phase II Intrusive investigation (SI), have been provided in Appendix E. The final conclusions of the Preliminary Environmental Report were: "A review of the baseline conditions within the study area has identified that the bulk of the Order Limits poses a low risk to human health or controlled waters either during construction or operation. "There are a number of small areas of potential contaminant sources identified, at the northern end of the Application Land (Flixborough Industrial Estate, historical tank farm) and the construction laydown area at Dragonby (historical and potentially current landfill).	of Stather Road (northern end of the Glandford House Complex and at the former Belwin House) are categorised as CGS 1 (very low). Each characteristic situation relates to a typical scope of protective measures required for the identified level of risk (see CIRIA C665, NHBC March 2007 and BS 8485:2015 for scope of risk management measures likely to be required), ranging from1 (very low) to 6 (very high). The remaining three wells are on agricultural land, one of which is categorised as CGS1, one CGG 2, and one as CGG2 or 3 due to an elevated flow rate being recorded during one round. Due to access issues and underground obstructions, no gas monitoring wells could be installed in the wharf area.	

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		However, embedded mitigation e.g. CoCP and WMP will reduce any effects during construction to negligible significance. “There is currently limited soil or groundwater data. Therefore, an SI has been designed to confirm these conclusions and will be undertaken to inform the development of the preliminary and detailed design, and as part of the Tier 2 assessment that will further inform the need for further mitigation if required.” I can confirm the EHO finds the approach acceptable and awaits the submission of a robust and detailed Site Investigation.		
S42(b)	North Lincolnshire Council - EHO	I can confirm this department finds the approach acceptable and awaits the submissions of a robust and detailed site investigation.	Ground gas monitoring is undertaken as part of the Site Investigation, as set out in Chapter 8: Ground Conditions, Contamination and Hydrogeology of the Environmental Statement **(Document Reference 6.2.8).**	Appendix D and Appendix E
S44	AB Agri	The majority of the information provided in terms of ground conditions is desk based, and as such, we cannot ascertain if there are any transboundary issues and risks which may affect AB Agri’s site. Part of AB Agri’s land is included in the proposed DCO boundary and the immediate vicinity is being used for a number of potentially contaminative uses including warehouses and bulk storage tanks. We require clarity with a greater degree of ground investigation and necessary mitigation to control risks from impacted soils, groundwater and ground gas.	The environmental site investigation to determine baseline conditions and potential impacts from the development with respect to the environment was undertaken in August/September 2021. Weekly ground gas monitoring was also undertaken at five locations for a period of 8 weeks. Soil and groundwater results indicate that there is no significant risk to human health or controlled waters due to construction or operation of the Project. Eight rounds of ground gas monitoring have been undertaken across five locations. Two of the wells to the north of Stather Road (northern end of the Glandford House Complex and at the former Bellwin House) are categorised as CGS 1	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			(very low). Two of the wells to the north of Stather Road (northern end of the Glandford House Complex and at the former Bellwin House) are categorised as Characteristic Gas Situation (CGS) 1 (very low). Each characteristic situation relates to a typical scope of protective measures required for the identified level of risk (see CIRIA C665, NHBC March 2007 and BS 8485:2015 for scope of risk management measures likely to be required), ranging from1 (very low) to 6 (very high). The remaining three wells are on agricultural land, one of which is categorised as CGS 1, one CGG 2, and one as CGG 2 or 3 due to an elevated flow rate being recorded during one round. Due to access issues and underground obstructions, no gas monitoring wells could be installed in the wharf area.	
S47	#S44.8	During the construction phase, we note that dust from the construction of the ERF and the new road will require mitigation. However, there is no mention of whether the construction of the scheme will result in contaminated dust being deposited in the wider area (including #S44.8). We therefore request that mitigation measures to control construction dust is shared with us, and that the assessment should address whether additional measures may be required should there be contaminated land that will be disturbed as part of the construction works.	Significant ground investigation work has been undertaken across the whole site with a view to identify any potential contamination. As set out in this chapter, a Construction Environmental Management Plan (CEMP) will be developed for the Project, secured through a requirement of the DCO and will provide embedded mitigation measures to prevent the release of contamination and therefore negating any effects. This will be developed in accordance with the Code of Construction Practice (CoCP) provided in Annex 7 of the Environmental Statement (**Document Reference 6.3.7**).	Construction Environmental Management Plan, Code of Construction Plan: Appendix A - Outline Dust Management Plan

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			Indeed, an Outline Dust Management Plan is included in Appendix A of the CoCP (**Document Reference 6.3.**7), which sets out proposed measures for managing, monitoring, inspecting and auditing dust from the construction of the Project. The CoCP (**Document Reference 6.3.7**) also states that typical Project activities that will enquire environmental monitoring during construction includes earthworks and excavations, with monitoring for potential contamination to be present in excavated soils.	
S47	Local Community	Seems very good, just make sure nature and the waterways around are not contaminated/moved on	We have assessed impacts on ground conditions, contamination and hydrogeology in Chapter 8: Ground Conditions, Contamination and Hydrogeology of the Environmental Statement (**Document Reference 6.2.8)**. Following mitigation, we do not expect any significant effects on ground conditions or contamination of hydrogeology during either the construction or the operation of the Project.	N / A

4. ASSESSMENT PARAMETERS

4.1.1.1 The parameters of the Project used for the basis of assessment include the construction, operation and decommissioning effects, on a reasonable worst-case basis as set out in Chapter 3 – Project Description and Alternatives (**Document Reference 6.2.3**). The key assessment parameters relevant to this chapter are:

- The bunker hall will have a maximum depth of 10m bgl;
- Construction work on the railway reinstatement land will not involve excavation below the current ballast;
- Any excavations on the Northern DHPWN Land and the Southern DHPWN Land would be for buried utilities infrastructure only and therefore will involve shallow excavation only; and
- Any excavations for landscaping and green infrastructure development (including SuDS and flood defences) will be shallow and located in areas not identified to be potential areas of concern in relation to land contamination.

5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

5.1 Study Area

5.1.1.1 The layout of the Project and Study Area are presented in Figure 1 (Appendix A). The Energy Park Land is a subsection of the Application Land containing the core elements of the Project with the majority of developments being located at the northern end. The nature of the Project is such that there will be no excavation to a large part of the Application Land, however, the study area has been extended beyond the Order Limits to the north and south of the Application Land to give confidence that all land within 500m of proposed excavated ground is included in the assessment.

5.1.1.2 It is assumed that deep excavation of the Northern and Southern DHPWN Land and the Railway Reinstatement Land will not be undertaken during construction and no operational facilities are proposed on these areas, therefore in these areas, the study area is not extended beyond the order limits.

5.2 Assessment Methodology

5.2.1.1 The UK takes a risk-based approach to dealing with land contamination. In line with the framework for risk assessment and management, set out in the UK government web-based guidance Land Contamination: Risk Management[1].this assessment follows a tiered approach where:

- Tier 1 – Preliminary qualitative risk assessment (QRA);
- Tier 2 – Generic quantitative risk assessment (GQRA); and
- Tier 3 – Detailed quantitative risk assessment (DQRA).

5.2.1.2 For this ES a progressive methodology from a Tier 1 qualitative assessment to a Tier 2 GQRA has been undertaken. Data for this assessment has been taken from the following sources:

- Envirocheck report: 269869084_1_1, dated 01 December 2020 (included in Appendix B);
- Report on Ground Investigation carried out at ERF Plant, Stather Road, Flixborough, Scunthorpe, DN15 8SE, Ian Farmer Associates, October 2018 (included in Appendix C);
- North Lincolnshire Green Energy Park Phase I Environmental Site Assessment, ERM, January 2021 (included in Appendix D);
- BGS Geology of Britain Viewer;
- BGS Maps Portal; and
- 'MAGIC' online database.

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(1) https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks

- North Lincolnshire Green Energy Park Phase II Site Investigation, ERM, November 2021 (included in Appendix E);
- Humberside Materials Laboratory, Chemical Analysis Summary Sheet, Rainham Steel, Sampled 03/10/2018 – file reference 0839/4666/G;
- Stather Road, Flixborough, Brichar Ltd – report name/date unknown; and
- Geo-Environmental Assessment, Former Glanford House, Stather Road, DeltaSimons, November 2020.

5.2.1.3 A Tier 2 GQRA assessment, including site investigation (SI), was undertaken in August/September 2021 on the Application Land and Southern DHPWN Land. The SI targeted areas where potentially contaminated sources were identified during the Phase 1 site assessment, as well as to obtain baseline soil and groundwater data. The details of the SI are presented in Appendix E. Access could not be gained to the Railway Reinstatement Land and therefore no intrusive work was undertaken in this area. There were no potential areas of concern (PACs) identified on the Northern DHPWN Land. It was assumed that construction work on the Northern DHPWN Land would only be shallow to allow for the laydown of cables/utilities. Therefore no locations on the Northern DHPWN Land were included.

5.2.1.4 In order to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences, a source-pathway-receptor methodology has been adopted, with the underlying principle that the identification of pollutant linkages consists of the following three elements:

- A source hazard (a substance or situation that has the potential to cause harm or pollution);
- A pathway (a means by which the hazard moves along); and
- A receptor/target (an entity that is vulnerable to the potential adverse effects of the hazard).

5.2.1.5 The land contamination may be a hazard but does not constitute a risk unless all three elements are present and therefore a pollutant linkage exists. In assessing the potential for contamination to cause a significant effect, the extent and nature of the potential source or sources of contamination must be assessed, any pathways present must be identified, and sensitive receptors or resources identified and appraised. This will result in the determination of their value and sensitivity to contamination related impacts.

5.2.1.6 The sensitivity of potential receptors can be described qualitatively according to the categories presented in Table 3.

Table 3: Receptor sensitivity

Sensitivity	Receptor
Very High	Human health: onsite residential developments Controlled waters (groundwater): Source Protection Zone (inner zone) Ecology: Site of international importance e.g. SAC, SPA or Ramsar sites

Sensitivity	Receptor
High	Human health: offsite residential developments, onsite construction workers Controlled waters (groundwater): Principal aquifer, Source Protection Zone (outer zone, total catchment) Controlled waters (surface water): High ecological status Ecology: Site of national importance e.g. SSSI
Medium	Human health: onsite commercial developments Controlled waters (groundwater): Secondary A aquifer Controlled waters (surface water): Good or moderate ecological status. Ecology: Site of regional/local importance e.g. Local nature reserve
Low	Human health: transient or limited access, off site commercial development Controlled waters (groundwater) Secondary B aquifer or unproductive Controlled waters (surface water): Poor ecological status Ecology: No designation

5.2.1.7 Table 4 presents the magnitude of impact on the receptors with regards to contaminated land from potential sources of contamination due to the Project.

Table 4: Magnitude of impact

Impact magnitude	Description	Example
Large	Results in loss of attribute and/or likely to cause exceedance of statutory objectives and/or breach of legislation.	Likely significant human health impact, contamination of a Principal aquifer, or loss or isolation of strategic mineral resource.
Medium	Results in impact on integrity of attribute/or loss of part of attribute, and/or possibly cause exceedance of statutory objectives and/or breach of legislation.	Reduction in the value of a feature, moderate human health impact, loss or isolation of regional/local mineral resource.
Small	Results in minor impacts on receptor	Measurable change in receptor, but of limited size/proportion.
Negligible[2]	Results in no change or impact on receptor	No significant loss in quality of receptor

5.2.1.8 For each PAC, the significance of effect is determined by assessing the potential magnitude of impact on the receptors against the sensitivity of the receptor. Table 5 presents the matrix showing the significance of effects. Moderate or major effects are considered significant in EIA terms.

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[2] Impacts of negligible magnitude will not lead to likely significant effects

Table 5: Significance of Effect

Receptor Sensitivity	Magnitude of Impact			
	Negligible	**Small**	**Medium**	**Large**
Very High	Negligible - Not significant	Moderate adverse – significant	Major adverse – significant	Major adverse - significant
High	Negligible - Not significant	Moderate adverse – significant	Moderate adverse – significant	Major adverse - significant
Moderate	Negligible - Not significant	Minor adverse – not significant	Moderate adverse – significant	Moderate adverse – significant
Low	Negligible - Not significant	Negligible - Not significant	Minor adverse – not significant	Minor adverse – not significant

5.3 Assumptions and limitations

5.3.1.1 During the site investigation access to some areas of the site were restricted. Therefore, assessment of these areas is based on third party data, or information obtained from the nearby areas.

5.3.1.2 The site investigation was undertaken in August/September 2021 with ground gas monitoring currently ongoing. It should be noted that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic or tidal changes.

5.3.1.3 The findings and interpretation of any further intrusive works and assessment required to support the discharge of DCO requirements (e.g. Remediation Strategy) will be incorporated into the Construction Environmental Management Plan (CEMP) to ensure that an appropriate level of mitigation is provided. An outline Remediation Strategy is provided as an appendix to the Code of Construction Practice (CoCP) (**Document Reference 6.3.7 Annex 7**).

6. BASELINE AND RECEPTORS

6.1 Geology

6.1.1.1 The geology underlying the Application Land is summarised in Table 6 based on the British Geological Survey (BGS) digital mapping[3] and 1982 BGS drift map, Sheet 89, Brigg 1:50,000. Figure 2 presents the regional superficial deposits while Figure 3 presents the regional bedrock geology based on the BGS mapping.

Table 6: Geological Summary

Area	Superficial Deposits	Bedrock Geology
The Energy Park Land	Alluvium (sand, silt and clay), overlying the Vale of York Glacial Lake Deposits (sand and gravel)	The majority is underlain by Mercia Mudstone Formation. The eastern side is underlain by the Penarth Group (mudstone)
Railway Reinstatement Land	Blown sand overlying the Vale of York Glacial Lake Deposits (sand and gravel). At the far east of the Order Limits, no superficial deposits are indicated, and bedrock (Scunthorpe Mudstone Formation and Frodingham Ironstone Member) is anticipated to be near surface	The eastern end is underlain by the Scunthorpe Mudstone Formation (mudstone and ironstone) with the central and eastern sections underlain by the Frodingham Ironstone Member.
The Northern DHPWN Land	Blown sand overlying the Vale of York Glacial Lake Deposits (sand and gravel). At the far east of the Order Limits, no superficial deposits are indicated, and bedrock (Scunthorpe Mudstone Formation and Frodingham Ironstone Member) is anticipated to be near surface	The western end is underlain by the Penarth Mudstone, with the Scunthorpe Mudstone Formation (mudstone and limestone) underlying the central section. The eastern side is underlain by the Frodingham Ironstone Member.
The Southern DHPWN lLand	Predominantly Warp (clay and silt) overlying the Vale of York Glacial Lake Deposits (sand and gravel).	Mercia Mudstone Formation

6.1.1.2 The alluvium is described as unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta. Blown sand is described as sand that has been transported by wind, or sand consisting predominantly of wind-borne particles. Warp (clay and silt), is described as alluvium deposited by artificial flooding.

6.1.1.3 The alluvial deposits, including the Warp, are identified as being in the region of 3 to 17m thickness (BGS borehole SE81SE21) and the blown sands are identified as being approximately 1.5m in thickness (BGS borehole SE81SE87).

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[3] [redacted]

6.1.1.4 The bedrock deposits are listed as extending deeper than 30m across the site.

Energy Park Land – Site Specific Information

6.1.1.5 Figure 5 presents the ERM site investigation locations and the approximate location of third-party site investigations in or near the Order Limits for the Energy Park Land.

6.1.1.6 The ERM site investigation undertaken in August/September 2021 found that the wharf area is underlain by Made Ground consisting of medium sand containing concrete and slag cobbles. Due to the size of the cobbles, boreholes could not be advanced beyond 0.65m bgl and were therefore terminated within the Made Ground.

6.1.1.7 Outside of the wharf area, but still at the northern end of the Energy Park Land Made Ground was found to extend up to 2.2m bgl, consisting of sandy gravelly clay or gravelly sand containing slag, concrete, brick, and sandstone cobbles. The Made Ground overlies a silty or sandy clay or sandy silt layer containing rootlets and decomposed vegetation matter. At two locations a specific peat layer (up to 0.7m thickness) was identified. Boreholes here were advanced to a maximum depth of 5.45m bgl.

6.1.1.8 At the north-eastern corner of the Energy Park Land (proposed location of the Gas AGI) where the land is agricultural the geological sequence was found to consist of top soil (organic gravelly clay) overlying gravelly or clayey sand. The borehole here was advanced to 5m bgl.

6.1.1.9 Geological logs from the southern end of the Energy Park Land (currently agricultural) describe the geological sequence as topsoil, consisting generally of silty or sandy clay overlying a peat layer of varying thickness (0.6 – 4.6m thickness) which in turn overlies medium sand. The boreholes were advanced to a maximum depth of 5.5m bgl.

6.1.1.10 The observed geological sequence at the proposed Energy Recovery Facility (ERF) on Stather Road, from the Report on Ground Investigation carried out by Ian Farmer Associates (1998) Limited, is in line with the Alluvium and Mercia Mudstone identified by the BGS. Five boreholes up to 30m bgl were advanced. Bedrock, consisting of Mercia Mudstone, was encountered at depths of between 20.1 and 21.9m bgl.

6.1.1.11 The observed geological sequence at the former Glanford House site, Stather Road (eastern side of the proposed ERF) identifies Mercia Mudstone at approximately 22m bgl. Shallow geology is identified as Made Ground (generally comprising concrete or macadam underlain by gravelly sand/gravelly clay with brick, flint, clinker and limestone) overlying Alluvium described as very soft to firm clay with decayed rootlets. At depth the alluvium was identified as clayey pseudo-fibrous peat and variable sands and gravels. This is consistent with the Alluvium identified by the BGS.

Southern DHPWN Land – Site Specific Information

6.1.1.12 Figure 6 presents the ERM site investigation locations for the site investigation undertaken on the Southern DHPWN Land.

6.1.1.13 The ERM site investigation showed that topsoil was found to generally consist of organic sandy or silty clay with rootlets or vegetated top cover with sand. At the southern end of the DHPWN Land this was underlain by orange or brown sand containing some clay over sometimes silty sand.

6.1.1.14 In the central and northern area of the Southern DHPWN Land the topsoil was underlain by orange or brown clayey or silty sand with intervening layers of grey sand at some locations. This overlies peaty silty clay or silty sand with peat, overlying a brownish grey or grey silty sand or sand. Boreholes were advanced to a maximum depth of 5m bgl.

6.1.1.15 No site-specific information is available for the Railway Reinstatement Land or the Northern DHPWN Land. Access could not be gained to the Railway Reinstatement Land and therefore no intrusive work was undertaken in this area during the 2021 SI. There were no PACs identified on the northern DHPWN Land. It was assumed that construction work on the Northern DHPWN Land would only be shallow to allow for the laydown of cables/utilities. Therefore no locations on the Northern DHPWN Land were included.

6.2 Hydrogeology

6.2.1.1 Table 7 presents the aquifer classification based on the Environment Agency digital mapping.

Table 7: Aquifer Classification

Geology	Aquifer Classification	Description
Alluvium	Secondary A Aquifer	Permeable layers that can support local water supplies, and may form an important source of base flow to rivers
Warp	Secondary A Aquifer	
Blown Sands	Secondary A Aquifer	
Mercia Mudstone	Secondary B Aquifer	Lower permeability layers that may store and yield limited amounts of groundwater through characteristics such as thin cracks (called fissures) and openings or eroded layers
Penarth Mudstone	Secondary B Aquifer	
Scunthorpe Mudstone Formation	Secondary Undifferentiated Aquifer	Secondary undifferentiated are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.
Frodingham Ironstone Member	Secondary A Aquifer	Permeable layers that can support local water supplies, and may form an important source of base flow to rivers

6.2.1.2 Groundwater abstractions at five locations are known to be present within 1km of the Order Limits, the nearest being an abstraction from the Blown Sands, immediately east of the Southern DHPWN Land, for Spray irrigation (at Brumby Common West, Scunthorpe). The locations of the groundwater abstractions are presented in Figure 4. The site does not lie within a groundwater Source Protection Zone (SPZ) of any type.

6.2.1.3 The groundwater resources within the Order Limits are within the Lower Trent Erewash – Secondary Combined groundwater body, which is within the Trent Lower Erewash – Secondary Combined Operational Catchment, and the Grimsby Ancholme Frodingham Ironstone Unit, which is within the Grimsby Ancholme Frodingham Ironstone Unit Operational Catchment. These groundwater bodies are included on Figure 4. Both these groundwater bodies are within the Humber Groundwater Management Catchment, within the Humber River Basin District as classified under the Water Framework Directive (WFD). The Lower Trent Erewash-Secondary Combined groundwater body and the Grimsby Ancholme Frodingham Ironstone Unit have been classified[4] by the Environment Agency as having ‘Good’ quantitative status and ‘Good’ chemical quality in 2019 under the WFD.

6.2.1.4 Due to the topography of the surrounding area and the proximity of the River Trent adjacent to the west, regional groundwater flow is inferred to be towards the west, however, due to the tidal nature of the River Trent, groundwater elevations near to the river may also be tidally influenced.

Energy Park Land – Site Specific Information

6.2.1.5 During the ERM site investigation groundwater was only encountered at MW8 during drilling. No groundwater strikes were noted at any other locations advanced on the Energy Park Land during drilling.

6.2.1.6 Five monitoring wells were installed to 5m bgl during the ERM site investigation at the northern end of the Energy Park Land. Groundwater elevations recorded during monitoring indicated that the groundwater encountered was likely to be perched water rather than a continuous groundwater body. Depth to resting groundwater levels was between 0.8 and 2.45m bgl.

6.2.1.7 Depth to groundwater, at Stather Road at the northern end of the Energy Park Land, as recorded by Ian Farmers Associates (1998) Ltd, was c.12m bgl rising to c.6.5m bgl 20 minutes after installation, and recorded at the top of the sand layers. On subsequent visits, the depth to water ranged between 1.65m bgl and 2.08m bgl, suggesting the groundwater in this area may be confined and the potentiometric head was broadly equivalent of the level of the River Trent.

6.2.1.8 Groundwater strikes were only noted in two of the twelve shallow (3m bgl) boreholes advanced at the former Glanford House site at 2.1 and 2.6m bgl. Groundwater was encountered at all three deeper (25m bgl) wells between 6 – 12m bgl and rose in all cases to between 4.55 and 10.10m bgl, supporting the theory that groundwater within the Alluvium may be confined.

6.2.1.9 Based on the ground investigation undertaken to date within or near the Order Limits, it can be assumed that the true groundwater body is within

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[4] Environment Agency (2022) Catchment Planning

the sand layer underlying and confined by the clay/peat alluvium and overlying the Mercia Mudstone.

Southern DHPWN Land

6.2.1.10 During the ERM site investigation on the Southern DHPWN Land groundwater was not encountered at any of the locations advanced.

6.2.1.11 No site-specific information is available for the Railway Reinstatement Land or the Northern DHPWN Land.

6.2.1.12 Based on the above, ERM considers the groundwater to be of **medium** vulnerability and **low to medium** sensitivity, being more sensitive on the western side of the Order Limits due to its proximity to the River Trent.

6.3 Hydrology

6.3.1.1 The nearest surface water feature is the River Trent which is located adjacent to the western boundary. The River Trent, in the vicinity of the site, is within the Humber Estuary SSSI, SAC and Ramsar site.

6.3.1.2 Several other minor watercourses/field drains are present within the Order Limits and surrounding the site (<250m). The table below summarises the most significant watercourses within the Order Limits. Groundwater flow which may supply baseflow to surface waters is likely to be westwards across the Application Land towards the River Trent. With the exception of the River Trent, surface watercourses outside the Order Limits are likely to be up hydraulic gradient of areas to be excavated during construction (Energy Park Land) and are therefore not included in the assessment. Further details of these other surface watercourses are presented in Chapter 9: Water Resources and Flood Risk (**Document Reference 6.2.9**).

Table 8: Summary of Site Hydrology

Feature	Location	Flow Direction	Comments
River Trent (Humber Upper)	Adjacent to the western boundary	S to N	Water quality information for the Humber Upper has an overall waterbody classification as Moderate in 2019 under the WFD. Within the Humber Estuary SSSI, SAC and Ramsar site.
Burton and Flixborough Drain (and associated field drains)	Within the northern portion of the site	Unknown, likely S to N	Water quality not rated by Environment Agency. Discharges to the River Trent c.1.4km N of the site.
Lysaght's Drain (and associated field drains)	Within the southern portion of the site	Unknown, likely E to W	Water quality not rated by the Environment Agency.
Winterton Beck	c.20m north of railway spur	Unknown, likely S to N	Water quality not rated by the Environment Agency.

6.3.1.3 There are 25 licensed water abstractions in hydraulic connection of the Project, with seven locations present within the Order Limits (see also Chapter 9, Section 6, **Document Reference 6.2.9**). All abstractions are for agricultural/spray irrigation, with the exception of one which is located approximately 90m north of the Order Limits (west of Flixborough) for general farming and domestic use. The locations of these abstractions are presented in Figure 4.

6.3.1.4 UK Government digital flood mapping indicates that the majority of the site (adjacent to Flixborough Industrial Estate) is located within an area that has a high probability of flooding (Flood Zone 3 – area that benefits from flood defences). Further details of flood risk are presented in Chapter: 9 Water Resources and Flood Risk (**Document Reference 6.2.9**).

6.3.1.5 Based on the above, ERM considers surface water at the site to be of **high** vulnerability and of **high** sensitivity.

6.4 Mining and Mineral Resources

6.4.1.1 The adopted 2003 Local North Lincolnshire Plan does not refer to any Mineral Safeguarding Area (MSA) or Mineral Consultation Area (MCA) within the Order Limits. The 2003 Local North Lincolnshire Plan is due to be replaced by the emerging North Lincolnshire Local Plan (once adopted) which will run to 2037. This is currently at the Publication Draft stage.

6.5 Site History

6.5.1.1 The history of the site has primarily been determined by reference to historical mapping dating from c.1854 to 2020. These maps were obtained by ERM as part of a Landmark Envirocheck report (ref. 269869084_1_1 01/12/2020). Where available, other sources (such as the Environment Agency public registers and other publicly available records) have also been reviewed.

6.5.1.2 Full details of the site history and off-site history (up to 1km) are presented in the North Lincolnshire Green Energy Park Phase I Environmental Site Assessment, ERM, January 2021 (Appendix D).

6.5.1.3 Table 9 presents a summary of the onsite history. In summary, the above sources indicate that the majority of the Application Land has comprised undeveloped/agricultural land to present day, with some development associated with Flixborough Wharf and Flixborough Industrial Estate in addition to the construction of railways and road infrastructure. A tank farm has been identified at the northern end of the Energy Park Land, and a former and potential landfill/waste management facility is located within the eastern extent of the Order Limits (Railway Reinstatement Land), at least some of which appears to have been capped and reverted to agricultural land, however, the Envirocheck indicates that there may be an operational registered landfill in this area.

6.5.1.4 Off site, the Trent, Frodingham and Lindsey Ironworks were established to the southeast of the Northern DHPWN Land by 1907. Opencast mining (ironstone quarry) is shown to the east of the Order Limits, in the vicinity of the Railway Reinstatement Land and Northern DHPWN Land. A steelworks is shown to the east of the Application Land.

Table 9: Summary of Onsite History

Area	Date	Description
Energy Park Land	1854-1907	Depicted as undeveloped/agricultural land with field drains.
	1938-1946	Construction of Flixborough Wharf on the western side of the Energy Park Land along the River Trent.
	1946	A tank farm is present in the centre of the Energy Park Land (the northern end of the ERF and Energy Park) adjacent to Flixborough Industrial Estate.
	1989-1995	Tanks are no longer present in the centre of the Energy Park Land. Warehouse buildings are now shown to be present here adjacent to the boundary with Flixborough Industrial Estate (the northern end of the Energy Park Land). Unspecified work is shown on the southwestern side of the Energy Park Land.
	1999-2020	Minor expansion of the warehousing at the northern end of the Energy Park Land.
Railway Reinstatement Land	1908	The North Lindsey Light Railway is shown running north-south along the eastern boundary.
	1950-1969	Construction of the railway line (mineral railway) associated with the adjacent Steel Works and ironstone quarry.
	1971-1987	A refuse tip is shown to the south of the quarry railway line.
	1989-1995	Slight expansion in the size of the refuse tip.
	1999-2020	By c.2020 the refuse tip is no longer identified on mapping.
Northern DHPWN Land	1886-2020	Road infrastructure associated with Scunthorpe is shown from 1886 onwards.
Southern DHPWN Land	1886-1991	A ‘Mineral Railway’ and ‘Barnsley to Barnetby Railway’ are shown running east to west across the Southern DHPWN Land.
	1989-1995	Construction of the A1077 and M181 roads at the Southern DHPWN.

6.6 Site Specific Information

Energy Park Land

6.6.1.2 Ten boreholes and one trial pit were advanced on the Energy Park Land as part of the ERM site investigation undertaken in August/September 2021. The locations are presented on Figure 5. The trial pit was halted at 0.45m bgl due to refusal on a concrete slab. The boreholes were advanced to a maximum depth of 5.45m bgl.

6.6.1.3 In the wharf area, two of the boreholes (MW6 and WS104) could not be advanced below 0.65m bgl due to refusal on concrete cobbles. The third borehole (WS105) could not be drilled due to onsite activities. Shallow soils samples were submitted from MW6 and WS104 but there is limited information in this area on ground conditions.

6.6.1.4 A minimum of one sample from each location was submitted for analysis including twelve soil samples from the northern end of the Energy Park Land and eight samples from the central and southern end of the Energy Park Land. Samples were scheduled for analysis including VOCs, SVOCs, TPH, metals, pesticides and herbicides and asbestos and were conservatively screened against generic assessment criteria (GAC) assuming a residential with plant up take end use to allow for the fact that crops are grown on a large part of the land.

6.6.1.5 The soil results showed minor concentrations metals, TPH, VOCs and SVOCs were detected, but, with the exception of beryllium, nickel and chloromethane not at levels likely to impact Human Health based on a residential end use with plant uptake.

6.6.1.6 Beryllium concentrations above the GAC for a residential with plant uptake end use were recorded at eight locations across the northern and central area of the Energy Park Land. The main risk driver for beryllium is the indoor inhalation of fugitive dust in a residential setting, which is not a current or likely future pathway. The beryllium concentrations are below the GAC for a commercial end use. Therefore, the beryllium concentrations are not considered to present a significant risk to Human Health based on the current or likely future land use.

6.6.1.7 The concentration of nickel at MW6 in the wharf area exceeded the residential with plant uptake end use GAC. The main risk drivers for nickel are soil ingestion, consumption of home-grown vegetables or indoor inhalation of fugitive dust in a residential setting. None of these are currently or likely to be a future pathway. The nickel concentration is below the GAC for a commercial end use. Therefore, the nickel concentration is not considered to present a significant risk to Human Health.

6.6.1.8 The concentration of chloromethane at two locations (MW7 and WS21) was found to exceed the GAC for a residential with plant uptake end use. The main risk driver is indoor vapour inhalation in a residential setting which is not a current or likely future pathway on this site. The chloromethane concentration is below the GAC for a commercial end use (including indoor vapour inhalation). Therefore, the chloromethane concentration is not considered to present a significant risk to Human Health.

6.6.1.9 Less than 0.001% asbestos (anthophylite and Chrysotile) was detected within the Made Ground at WS104 and MW6, both on the wharf area. Asbestos was not detected at any other location.

6.6.1.10 Five shallow groundwater samples (<5m bgl) were submitted for analysis of VOCs, SVOCs, PAHs, metals, herbicides and pesticides from MW0, MW1, MW5, MW7 and MW8. Results were screened against the UK Freshwater Environmental Quality Standard (EQS) to assess the potential risk to the River Trent. Where no UK EQS was available a suitable alternative was used. There were no detections of VOCs, herbicides or pesticides recorded.

6.6.1.11 Barium exceeded its screening criteria in four of the five samples with the highest concentration being detected at MW1 away from the industrial areas and may therefore be indicative of background concentrations. There is no UK EQS for barium, so the value used is based on the PNEC[5] information provided in the ECHA REACH Registration Brief profile. The concentrations recorded are less than 5 times the EQS and are therefore unlikely to present a risk to the River Trent when other factors such as retardation or dilution are taken into account.

6.6.1.12 TPH was detected at one location only (MW8); Aliphatic C21-C35 and Aromatic C12-C16 and C16-C21. There is no UK EQS for TPH fractions and so they have been assessed against the WHO Drinking Water Standard (DWS). There is a minor exceedance of C16-C21 (100ug/l compared against the WHO DWS of 90ug/l) which is unlikely to present a risk to the River Trent.

6.6.1.13 There are a number of exceedances of SVOCS, predominantly PAHs, with the highest concentrations being recorded at MW8, approximately 650m east of the River Trent located in an agricultural area on the edge of Flixborough Industrial Estate. Groundwater strikes were not encountered in any of the locations advanced across the Energy Park Land and resting groundwater elevations indicate water within the monitoring wells is representative of a discontinuous perched water body. Information from third party Sis indicates that the true groundwater body is likely to be lower (approximately 12m bgl). It is therefore likely that there is no pathway between MW8 and the River Trent. In addition, concentrations at monitoring wells between MW8 and the River Trent are generally one to two orders of magnitude lower. Concentrations at MW8 are therefore not considered likely to present a significant risk to the River Trent. PAH concentrations within the soil at MW8 did not indicate a likely source of groundwater contamination.

6.6.1.14 Detected groundwater ammoniacal nitrogen concentrations range from 90ug/l (MW8) to 31,700ug/l (MW0), with four of the five locations exceeding the EQS. The ammoniacal nitrogen EQS used is based on the WFD classification of good for the River Trent. In 2019 the River Trent in the vicinity of the site was classified as having poor quality in relation to ammoniacal nitrogen, most likely due to agriculture and rural land management.

6.6.1.15 Ground gas monitoring is currently ongoing at the five monitoring well locations. Monitoring will be undertaken weekly for eight monitoring rounds. The first round of monitoring indicated that the methane and carbon dioxide concentrations at MW1 (proposed location of the polymer plant) were indicative of a Characteristic Situation 3 which may require gas protection measures.

6.6.1.16 A Ground Investigation was carried out by Ian Farmer Associates Limited (1998) for a proposed ERF immediately north of Stather Road, at the

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[5] Predicted no effect concentration

southern end of the Flixborough Industrial Estate to determine the suitability of the site to support the construction of the plant. Six boreholes were advanced across the area of the proposed ERF with ten soil samples, one groundwater sample and four soil leachate samples scheduled for chemical analysis (metals, EPH, PAH, pH, total cyanide, soil organic matter, sulphate, sulphur and asbestos):

- The results were screened against Suitable 4 Use Levels (S4ULs), determined by LQM and CIEH, or CLEA SGVs published in Environment Agency Science Reports SC050021/SR3, and SC050021 and DEFRA C4SL (Category 4 Screening Levels) for lead, in accordance with current legislation and guidance.
- Only Nickel was detected above the Generic Assessment Criteria (GAC) in one location (BH2 at 0.5m below ground level (bgl)) at 1200mg/kg. A mean value test was applied to the results and determined the '*elevated contaminant is unlikely to present a significant risk to human health in relation to the proposed site end use and requires no further consideration'*.
- Leachate analysis of the soils was carried out to determine risks to controlled waters '*A sample of Made Ground from BH4 at 1.0mbgl indicated leachable values for arsenic, copper and lead above the water supply regulations but the content of these metals in the soil from this sample was low and below residential with gardens usage[sic]. In light of this the risk to the River Trent is considered to be a low risk'*.

6.6.1.17 Three rounds of ground gas analysis were also carried out at the monitoring well standpipes. Gas Screening Values were calculated, and gas protection measures of Characteristic Situation 3 were calculated, however, the gas sampling rounds were not undertaken in compliance with guidelines *(CIRIA Document C659*), reducing confidence in the results. Ian Farmer Associates (1998) Limited recommended:

> *'that a continued programme of monitoring be carried out to comply more closely with these guidelines before final design is undertaken'.*

6.6.1.18 A Geo-Environmental Ground Investigation was carried out by DeltaSimons (2020) at the former Glanford House site to inform potential purchasers of the land with regard to ground conditions. Twelve shallow boreholes (maximum depth 3m bgl), and three deep (maximum depth 25m bgl) were advanced. Monitoring wells were installed at two shallow and one deep borehole location.

6.6.1.19 Soils were tested for a range of contaminants including TPH, VOCs, SVOCs, PCBs, PAHs and metals. The results showed that concentrations within the soil were unlikely to present a risk to human health.

6.6.1.20 The two shallow monitoring wells were found to be dry, but groundwater samples were taken from the deeper well on two occasions and tested for metals, TPH, VOCs, SVOCs, pH, sulphate, PFAS. Four soil samples were submitted for soil leachate testing of metals, PAH, TPH, BTEX, Metals.

6.6.1.21 An exceedance of chromium III, copper and nickel were recorded above the WFD EQS within the deeper well on one occasion and an exceedance of the chromium III, copper and lead WFD EQS were noted in one soil leachate sample. Based on the site history, and of the surrounding area, concentrations within the groundwater were thought to have originated off site but are unlikely to present a significant risk to the River Trent.

6.6.1.22 Three rounds of ground gas monitoring were undertaken at the two shallow and single deep well. Results from the deeper well indicated elevated methane and carbon dioxide concentration, most likely from the organic peat deposits as concentration were not identified in shallow wells installed in the Made Ground. The site is therefore classified as a Characteristic Situation 1 (CS1) or CS2, with further monitoring recommended prior to any development.

6.6.1.23 Laboratory certificates have been provided for seven soils samples taken from presumed shallow trial pits (maximum depth 0.4m bgl) at the Rainham Steel site, at the southern end of the proposed ERF. Analysis is for TPH, PAHs and asbestos. Minor concentrations of PAHS (<1mg/kg) and TPH (<48mg/kg) have been identified but not at concentrations likely to impact human health. No asbestos was identified.

Southern DHPWN Land

6.6.1.24 Six boreholes were drilled along the southern DHPWN Land as part of the ERM site investigation undertaken in August/September 2021. The locations of the boreholes are presented on Figure 6. Boreholes were advanced to a maximum depth of 5.5m bgl.

6.6.1.25 Six soil samples were submitted for analysis of which including VOCs, metals SVOCs, pesticides and herbicides and asbestos. Minor concentrations of metals, VOCs and SVOCs were detected, but not at levels likely to impact Human Health based on a residential end use with plant uptake.

6.7 Public database review

6.7.1.1 Information on regulated processes and pollution incidents that may indicate a potential for land contamination has been collated from the Envirocheck Landmark report and is presented in Figure 7;

- Three historical IPPC permits/permit variation registered within the Order Limits (all now assumed to be obsolete).
- Two superseded IPC permits/permit revocations registered within the Order Limits (all now assumed to be obsolete).
- Two Local Authority Pollution Prevention and Control permits registered within the Order Limits.
- A currently operational (as far as known) registered landfill site is reported within the Order Limits, at the railway reinstatement land near the Dragonby sidings, located at Dragonby Landfill and licensed to Sita Products & Services Ltd (dated 1997). The site was previously licensed to Drinkwater Sabey Ltd (two licences dated 1992 and 1995) for the

disposal of a mixture of wastes including but not limited to contaminated rubbish/bags, fats, waxes, greases, paint waste, pulverised fuel ash, bitumen and waste treated timber. A second registered landfill site is located at Glebe Pit, along the eastern boundary of the Northern DHPWN Land, registered to Onward Holdings Ltd (dated 1978) for non-hazardous construction and excavation wastes, recorded as site dormant.

- Two historical landfills are reported to be located within the Order Limits at the Railway Reinstatement Land near the Dragonby sidings. The first is registered to Onwards Holdings Ltd at Bessemer Way Landfill, first input date August 2000. No further information supplied. The second is registered to Drinkwater Sabey Ltd at Dragonby Landfill, first input date July 1990 and last input date April 1994 for Inert and Industrial Wastes. A further eleven historical landfill sites are reported within 1km of the Order Limits.
- One BGS Recorded Landfill site is reported to be adjacent to the east of the Order Limits at the eastern extent of the Northern DHPWN land, registered to Hornsby and Goodwyn at Dawes Lane.
- Two Licensed Waste Management Facilities (Landfill Boundaries) are registered within the Order Limits at the Railway Reinstatement Land near the Dragonby siding: Conesby Quarry Phase I for ‘Other Landfill Sites Taking Special Waste’ issued March 1988; and Conesby Quarry Landfill Epr/Bv0627il for ‘Waste Landfilling; >10 T/D with Capacity >25,000T Excluding Inert Waste’ effective March 2016. A further Licensed Waste Management Facility (Landfill Boundaries) is located within the Order Limits, registered at the Dragonby Landfill but listed as closed. A further two are registered c.765m southeast and c.961m southeast at Crosby North Landfill both for ‘Waste Landfilling; >10 T/D with Capacity >25,000T Excluding Inert Waste’.
- One surrendered Licensed Waste Management Facility (Locations) is present within the Order Limits. The surrendered on-site licence relates to land/premises at Stather Road for composting. The nearest currently issued licence relates to Normanby Road c.189m northwest for Household, Commercial and Industrial Waste Landfills.

6.8 Flixborough Disaster

6.8.1.1 On 1 June 1974, an explosion in a cyclohexane plant at Nypro UK (a chemical plant) occurred at the Flixborough industrial estate, resulting in the deaths of 28 people, with 36 people seriously injured. At the time of the disaster, Nypro UK produced the chemical caprolactam, used in the production of nylon, from cyclohexanone. Cyclohexanone was produced by partially oxidising hot liquid. The HSE website[6] summarises the incident: “During the late afternoon on 1 June 1974 a 20-inch bypass system ruptured, which may have been caused by a fire on a nearby 8-inch pipe. This resulted in the escape of a large quantity of cyclohexane. The cyclohexane formed a flammable mixture and subsequently found a source

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[6] Flixborough (Nypro UK) Explosion 1st June 1974 (hse.gov.uk)

of ignition. At about 16:53 hours there was a massive vapour cloud explosion which caused extensive damage and started numerous fires on the site." Fall-out from the explosion is a potential source of historical contamination.

6.9 Summary of Potential Sources

6.9.1.1 Current potential sources of contamination based on historical mapping, current land use and the Project are identified as:

- Former tank farm at the northern end of the area of the Energy Park Land;
- Railway/railway sidings, a possible current and two historical landfills at the Railway Reinstatement Land near the Dragonby sidings;
- Fallout from the explosion that occurred on the Flixborough Industrial Estate to the north of the Energy Park Land;
- Flixborough Industrial Estate to the north of the Energy Park Land; and
- Made Ground fill at Flixborough Wharf at the western side of the Energy Park Land.

6.10 Summary of Potential Pathways

6.10.1.1 The potential pathways through which a contaminant source could plausibly be exposed to one of the receptors identified at the site are listed below:

Human Health:

- Migration of gases / vapours by diffusion and along pressure gradients and subsequent inhalation;
- Direct/dermal contact with contaminated soils and/or groundwater;
- Ingestion of contaminated soils and groundwater;
- Inhalation of particles in windblown dusts; and
- Inhalation of groundwater derived vapours.

Controlled Waters:

- Vertical migration of mobile substances;
- Dissolution of contaminants in percolating rainwaters to shallow groundwater;
- Lateral migration of shallow groundwater to nearby surface waters;
- Migration of water via preferentially permeable subsurface structures (drainage runs etc.); and
- Surface water runoff.

Property

- Direct contact with contaminated soil and/or groundwater.

6.11 Summary of Potential Receptors

6.11.1.1 Table 10 presents the potential receptors from onsite sources of contamination.

Table 10: Potential Receptors

Receptor	Description
Human beings	Human health receptors are likely to be an adult member of the regular workforce of the Project. This is likely to include male and female workers between the ages of 18 and 65. In addition to the regular workforce, construction workers will be present onsite undertaking intrusive works during construction. The closest residential properties to the site are at Scunthorpe (immediately south of the flood management area) or Flixborough Village to the north of the Railway Reinstatement Land.
Ecological systems	There are no onsite designated ecological systems; however, the River Trent is included within the Humber Estuary SSSI, SAC and Ramsar site. Further details of ecology are presented in Chapter 10, Ecology and Nature Conservation (**Document Reference 6.2.10**).
Property - crops/livestock	It is likely that some of the land will continue to be agricultural during and following construction of the Project. However, the main areas with potential historical sources (northern end of the Energy Park Land or the eastern laydown area) will not be used for agricultural purposes.
Property - buildings	The closest residential properties to the site are at Scunthorpe (immediately south of the flood management area) or Flixborough Village to the north of the Railway Reinstatement Land.
Property – domestically grown produce	There will be no domestically grown produce on site.
Controlled waters - groundwater	The underlying superficial deposits (Alluvium, Warp and Blown Sands) are designated as Secondary A aquifer units. The underlying Mercia Mudstone and Penarth Mudstone are designated as Secondary B aquifer units, the Scunthorpe Mudstone Member is designated a Secondary Undifferentiated Aquifer and the Frodingham Ironstone Member is classified as a Secondary A Aquifer. Groundwater is likely to provide a baseflow to surface waters rather than a sensitive resource in its own right.
Controlled waters – surface water	The nearest surface water feature is the River Trent which is located adjacent to the western boundary. Several other minor watercourses/field drains are present within the Order Limits and surrounding the site (<250m). The River Trent is included within the Humber Estuary SSSI, SAC and Ramsar Site.

7. MITIGATION

7.1.1.1 This section describes the mitigation measures considered in the assessment to date as reported in this ES. This includes mitigation that is integral to the design of the Project and good practice mitigation measures that the Project is committed to adopting. All mitigation measures committed to by the Project are described in this ES and the significance of the residual environmental effects report takes into account adoption of these measures. All mitigation measures are for work that occurs within the Order Limits across the whole of the Application Land.

7.2 Construction

7.2.1.1 As part of the Project, any onsite contamination that poses a plausible risk to any of the receptors will need to be mitigated or remediated such that potential risks to identified receptors are minimised to a standard suitable for the proposed end use of the site. In implementing any such measures, it will be necessary to prevent potential pollution of the environment occurring, either through disturbance of land contamination or through the introduction of potential contaminative materials during construction.

7.2.1.2 For any structures that require piling, there will be a requirement to avoid creating flow paths between potentially contaminated soils and/or groundwater in the underlying strata, both during construction and operation. Piling options will be fully defined on conclusion of the scheme specific ground investigation.

7.2.1.3 A Construction Environmental Management Plan (CEMP) will be developed for the Project, and is secured through requirement 4 of the draft DCO (**Document Reference 2.1**) and will provide embedded mitigation measures to prevent the release of contamination and therefore negating any effects. The CEMP will be developed in accordance with the Code of Construction Practice (CoCP) provided in Annex 7 to the ES (**Document Reference 6.3.7**). The CEMP will be adhered to by the Contractor and will include clauses in relation to ground conditions as follows:

- Full compliance with Construction Design and Management (CDM) Regulations and other Health and Safety legislation will apply throughout any works on site (including any pre-development works);
- If contamination that has not been previously identified is encountered on site, measures will be put in place to provide suitable mitigation. This may include additional site investigation, regulatory dialogue, and remediation measures (see also outline Remediation Strategy appendix of the CoCP in Annex 7 to the ES, **Document Reference 6.3.7**);
- Any impacted material, if stored onsite, will be covered to prevent mobilisation of contamination due to infiltration, and to prevent the release of windborne particles or vapour;
- Materials used during construction, including chemicals, fuels and oils, will be stored using secondary containment appropriate to the level of risk, to prevent accidental spills/releases to ground;

- A spill response plan will be developed a part of the CEMP and will be in place to minimise impacts to soils, groundwater or surface water from accidental spills/releases (an outline Spill Response Plan is provided as an appendix to the CoCP in Annex 7 to the ES **Document Reference 6.3.7**); and
- The water environment will be protected through the management of earthworks and materials arising, particularly in areas of potential contamination.

7.2.1.4 A construction Waste Management Plan (WMP) will be developed as a component plan to the CEMP, as a requirement of the draft DCO, in accordance with the *Non-statutory guidance for site waste management plans* (Defra, April 2008) and in consultation with the Environment Agency and the Local Planning Authority. An outline Waste Management Plan is provided as an appendix to the CoCP (see Annex 7 to the ES, **Document Reference 6.3.7**). Further details of waste management are presented in Chapter 15, Waste (**Document Reference 6.2.15**). The plan will identify:

- Responsibilities for waste management;
- The waste category and quantities of materials generated;
- Measures to minimise waste generation;
- Opportunities for recycling and/or re-use;
- Proposed treatment and disposal routes; and
- Licensing requirements.

7.2.1.5 The WMP will include an audit programme to be undertaken to demonstrate compliance with statutory requirements.

7.2.1.6 The disposal of waste, including any surplus spoil, is expected to be managed so far as is reasonably practicable to maximise the environmental and development benefits from the use of surplus material and reduce any adverse environmental effects of disposal. To achieve this the *CL:AIRE Definition of Waste: Development Industry Code of Practice* (DoW:CoP) will be employed, allowing the movement and reuse of excavated materials between sites.

7.2.1.7 Low concentrations of asbestos have been identified at two locations in the Made Ground in the wharf area. An Asbestos Management Plan as a component plan to the CEMP will be produced that will include appropriate precautions to be taken if materials containing asbestos are encountered. An outline Asbestos Management Plan is provided as an appendix to the CoCP at Annex 7 of the ES (**Document Reference 6.3.7**). The contractor will observe the exposure limits and measurement methods for asbestos, set out in Health and Safety Executive (HSE) guidance document, *Asbestos: The analysts' guide for sampling, analysis and clearance procedures* (HSG 248) and will comply with HSE guidance document *Asbestos: The licensed contractors' guide* (HSG 247), in so far as these are applicable to the construction works.

7.3 Operation

7.3.1.1 Operational materials, including chemicals, fuels and oils (acetylene, lubricating oils, distillate fuels, or other fuels), will be stored within the Application Land. In common with other modern infrastructure development, secondary containment appropriate to the level of risk will be included in the installed design.

7.3.1.2 The design of the Project includes measures to contain and control any releases of contaminants to ground and surface and foul drainage network. Drainage control for the Project is considered further in Chapter 9: Water Resources and Flood Risk (**Document Reference 6.2.9**).

7.3.1.3 Details of the use, production, transportation, storage, handling and disposal of potential contaminants during operation are provided in Chapter 3: Project Description and Alternatives, (**Document Reference 6.2.3**).

7.3.1.4 Maintenance and operation of the Project will be in accordance with environmental legislation and good practice.

7.3.1.5 Ground gas monitoring is currently ongoing. The first round of ground gas monitoring indicated that the area MW1 is classified as Characteristic Scenario 3 and may require protective measures in the design of any buildings in this area. In the event that ground gas protective measures are required in the design of any buildings, operational monitoring of ground gas would be required as part of system verification.

8. ASSESSMENT OF LIKELY EFFECTS

8.1 Conceptual Site Model

8.1.1.1 Where a source – pathway – receptor linkage has been identified the likely effect of the Project on the receptor has been assessed.

8.1.1.2 Figure 8 presents the conceptual site model showing the likely source-pathway-receptor linkages present during both construction and operation.

8.2 Construction

8.2.1.1 In the locations of the identified potential sources, and in the event of ground disturbance occurring, there is the potential for construction to affect human health, controlled waters, buildings and infrastructure and ecological receptors.

Source-pathway-receptor linkage

Energy Park Land

8.2.1.2 Low concentrations of asbestos were detected at two locations in the wharf area during the ERM site investigation indicating that there may be asbestos within the Made Ground at the northern end of the Energy Park Land.

8.2.1.3 Minor exceedances of beryllium, nickel and chloromethane were identified based on a residential with plant uptake end use. However, as discussed in Section 6.6 the main risk drivers are not currently present and are unlikely to be present in the future.

8.2.1.4 No other sources of contamination within the soil were identified during the ERM site investigation, or the third-party information on site investigations at the former Glanford House and the Rainham Steel site. This indicates that there is unlikely to be widespread sources of contamination in the historically industrial area, or as a result of the Flixborough disaster, however, due to the access limitations during the ERM site investigation and difficulties during drilling on the wharf area, there may be as yet unidentified smaller areas of residual subsurface soil contamination present at the northern end of the Energy Park Land. Potential impacts due to construction of the Project may include, but are not limited to:

- Human health, (on and offsite workers, residential) due to excavation activities during construction, via direct contact, by ingestion or inhalation of vapours/particulates including inhalation of groundwater derived vapours;
- The River Trent or deeper groundwater from preferential pathways created due to piling or deep excavations mobilising shallow impacts within the subsurface soils to leach into perched groundwater which may then migrate;
- The River Trent or deeper groundwater from preferential pathways created due to piling or deep excavations mobilising shallow impacts within the perched groundwater which may then migrate; and/or

- Chemical attack on underground foundations or other structures e.g. plastic pipes or ducts, constructed as part of the Project from residual hydrocarbon contamination.

8.2.1.5 On the western side of the site, closer to the River Trent, potential pollution releases, e.g. spills of fuels or oils, during the construction of the Project would introduce additional sources of contamination that may impact perched groundwater with migration towards the River Trent.

Railway Reinstatement Land

8.2.1.6 The eastern end of the Railway Reinstatement Land crosses land historically used as a landfill.

8.2.1.7 If excavation occurs in this area during construction, the construction workers may be exposed to potential impacts from dermal contact, ingestion or via the inhalation of vapours/particulates.

The Northern DHPWN Land

8.2.1.8 No potential historical sources of contamination have been identified on this land and only limited ground disturbance will occur during construction.

The Southern DHPWN Land

8.2.1.9 No potential historical sources of contamination have been identified on this land and only limited ground disturbance will occur during construction.

8.2.1.10 On the basis of the embedded mitigation measures discussed in Section 7, Table 11 presents the summary of likely significance of effects due to construction.

Likely effects

8.2.1.11 Table 11 presents the summary of likely significance of effects due to construction on the basis that the mitigation measures described in Section 7 have been adopted.

Table 11: Summary of potential effects due to construction

Receptor (sensitivity)	Magnitude of Impact with embedded mitigation	Justification	Significance of effect
Human health – construction workers (**high**)	Negligible	Only minor exceedances of beryllium, nickel and chloromethane were identified within the soils, on the basis of indoor inhalation of fugitive dust, ingestion of soil or consumption of home grown vegetables in a residential setting as the main risk drivers. Potential asbestos within the Made Ground in the wharf area will be managed under an asbestos management plan to ensure no risk to construction workers. Unidentified soil sources will be managed via the CEMP	Negligible – Not significant

Receptor (sensitivity)	Magnitude of Impact with embedded mitigation	Justification	Significance of effect
		Asbestos Management Plan and PPE during construction.	
Human health – off site residential (**high**)	Negligible	An asbestos management plan will be established to ensure no risk to offsite human health from asbestos within the Made Ground in the wharf area. Only minor exceedances of beryllium, nickel and chloromethane were identified within the soils, on the basis of indoor inhalation of fugitive dust, ingestion of soil or consumption of home grown vegetables in a residential setting as the main risk drivers. Any previously unidentified soil sources will be appropriately managed under the CEMP e.g. covered, to prevent inhalation of windblown particles. Covering and/or removal/remediation of impacted soils during excavation will reduce mobilisation to shallow groundwater and therefore reduce the potential for offsite vapour inhalation.	Negligible – Not significant
Controlled Waters – groundwater (**medium**)	Negligible	ERM site investigation as well as third party information provided on the former Glanford House and Rainham Steel site indicates low risk to groundwater. The CEMP will include a spill response plan to reduce impact to groundwater during construction from potential accidental spills. If dewatering is undertaken during construction, water will be tested and treated, if required, prior to discharge. Covering and/or removal/remediation of impacted soils/groundwater encountered during excavation will reduce mobilisation to shallow groundwater from unidentified sources. The final design of the Project will seek provision to prevent the production of preferential pathways which could increase risk to groundwater e.g. design of piling.	Negligible – Not significant
Controlled waters – River Trent (**high**)	Negligible	ERM site investigation as well as third party information provided on the former Glanford House and Rainham Steel site indicates low risk to the River Trent. Adherence to the CEMP will reduce mobilisation of previously unidentified contaminants to shallow groundwater and therefore reduce the impact to the River Trent. The CEMP will include a spill response plan to prevent impacts to the River Trent during construction from potential accidental spills. If	Negligible – Not significant

Receptor (sensitivity)	**Magnitude of Impact with embedded mitigation**	**Justification**	**Significance of effect**
		dewatering is undertaken during construction, water will be tested and treated, if required, prior to discharge preventing impact to the River Trent. Covering and/or removal/remediation of impacted soils/groundwater encountered during excavation will reduce mobilisation to shallow groundwater from unidentified sources which may otherwise migrate towards the River Trent.	
Project (plastic pipes, ducts, foundations) (**medium**)	Small	Impacted soil will be removed/remediated during construction. If required, the final design of the Project will include mitigation measures to prevent impact.	Minor adverse
Off-site buildings (**medium**)	Negligible	Impacted soils will be covered and/or removed/remediated during construction to reduce mobilisation to shallow groundwater	Negligible – Not significant

8.3 Operation

8.3.1.1 In the unlikely event of a spill, any impact to soil and groundwater will be managed through the design of the facility and operational controls e.g. properly designed fuel stores, tanks, bunds, and operating procedures.

8.3.1.2 Table 12 presents the summary of likely significance of effects due to operation on the basis that any mitigation measures discussed in Section 7 have been adopted.

Likely effects

Table 12: Summary of potential effects due to operation

Receptor (sensitivity)	**Magnitude of Impact**	**Justification**	**Significance of effect**
Human health – workers at the Project (**high**)	Negligible	The design of the Project includes measures that would contain and control any releases of contaminants to ground and surface and foul drainage network. Maintenance and operation of the Project will be in accordance with environmental legislation and good practice. Further	Negligible – Not significant
Human health – off site residential (**high**)	Negligible		Negligible – Not significant
Controlled Waters – groundwater (**medium**)	Negligible		Negligible – Not significant
Controlled waters – River Trent (**high**)	Negligible		Negligible – Not significant

Receptor (sensitivity)	Magnitude of Impact	Justification	Significance of effect
Project (plastic pipes, ducts, foundations) (**medium**)	Negligible	details are provided in Chapter 3, Project Description and Alternatives (**Document reference 6.2.3**) and Chapter 9, Water Resources and Flood Risk (**Document Reference 6.2.9**). The currently ongoing ground gas monitoring will help to determine whether protection measures are required within the detailed design of any buildings or whether further monitoring is required.	Negligible – Not significant
Off-site buildings (**medium**)	Negligible		Negligible – Not significant

8.4 Decommissioning

8.4.1.1 As stated in the scoping report, the Project will be designed and operated in a manner to allow its readiness for decommissioning by maximising the recycling of materials. The precise details of the decommissioning process some 25-40 years hence are not presently foreseeable. However, the impacts and effects of decommissioning are unlikely to be materially different or greater than those from construction and associated impacts are likely to be manageable to a similar extent as during construction and as such have not been assessed separately.

9. CONCLUSIONS

9.1 Construction and Demolition

9.1.1.1 A literature review of the baseline conditions within the study area indicated that the bulk of the Application Land poses a low risk to human health or controlled waters either during construction or operation. There were a number of small areas of potential contaminant sources identified at the northern end of the Energy Park Land (Flixborough Industrial Estate, historical tank farm) and the potential for more widespread soil contamination due to the Flixborough disaster.

9.1.1.2 An intrusive SI was undertaken on the Energy Park Land and the Southern DHPWN Land, targeting areas where potentially contaminated sources were identified during the Phase 1 site assessment, as well as to obtain baseline soil and groundwater data. No concentrations were recorded that were likely to significantly impact human health or controlled waters or indicated widespread soil or groundwater impact. However, it should be noted that access to the northern end of the Energy Park Land was limited and there may be unidentified sources in this area.

9.1.1.3 Low concentrations of asbestos fibres were identified at two locations in the Made Ground in the wharf area. An asbestos management plan will be prepared and implemented at the pre-construction/construction phase to ensure no risk to human health on or offsite.

9.1.1.4 If contamination is encountered and removed/remediated during or prior to the construction of the Project, there will be a beneficial residual effect.

9.1.1.5 Monitoring of groundwater and surface water quality may be required under the Environmental Permitting Regulations before construction, during construction, and post-construction.

9.1.1.6 There were a number of access issues that prevented locations on the Railway Reinstatement Land being advanced. In addition, ground conditions at the northern end of the Energy Park Land resulted in refusal at three locations out of nine resulting in less-than-optimal data from this area for soil or groundwater. A further detailed geotechnical investigation is planned. If required as part of the Remediation Strategy, further environmental samples will be obtained during this investigation to provide cover for previously inaccessible areas which will in turn inform the detailed design and development of the detailed CEMP.

9.1.1.7 In conclusion implementation of measures contained in the CoCP at Annex 7 of the ES (**Document Reference 6.3.7**) (and subsequent detailed CEMP) will reduce any adverse effects on soils and groundwater (and human health) arising from either accidental spills or due to mobilisation/disturbance of previously unidentified sources to negligible significance.

9.2 Operation

9.2.1.1 Ground gas monitoring is currently ongoing on the Application Land as part of the SI. Preliminary results indicate that there may need to be some mitigation measures due to methane and carbon dioxide levels. Any necessary mitigation will be included in the detailed design once the ground gas monitoring has been completed.

9.2.1.2 The site will be operated in accordance with the requirements of its Environmental Permit, which will include conditions and measures for the protection of soils and groundwater.

9.2.1.3 Monitoring of groundwater quality will be undertaken throughout the operational life of the Project to determine whether there are any operational impacts.

9.2.1.4 In conclusion the design of the project and the implementation of mitigation measures discussed will reduce any adverse effects to negligible significance.

10. REFERENCES

- The Environmental Permitting Regulations (England and Wales) Regulations 2016
- The Environmental Protection Act 1990 and Part 2A (the Contaminated Land Regime)
- Water Act 2003
- Water Resources Act 1991
- National Planning Policy Framework (2021)
- Planning for Renewable Energy Development (Policy 5, soil and hydrology), Supplementary Planning Document, North Lincolnshire council November 2011;
- North Lincolnshire Council Local Plan, North Lincolnshire Council 2001
- Saved Policies of North Lincolnshire Local Plan, Local Development Frameworks Government Office for Yorkshire and The Humber, 2007
- Envirocheck report: 269869084_1_1, dated 01 December 2020
- Report on Ground Investigation carried out at EFW Plant, Stather Road, Flixborough, Scunthorpe, DN15 8SE, Ian Farmer Associates, October 2018
- North Lincolnshire Green Energy Park Phase I Environmental Site Assessment, ERM, January 2021
- North Lincolnshire Green Energy Park Phase II Site Investigation, ERM, November 2021 (included in Appendix E);
- Humberside Materials Laboratory, Chemical Analysis Summary Sheet, Rainham Steel, Sampled 03/10/2018 – file reference 0839/4666/G;
- Stathers Road, Flixborough, Brichar Ltd – report name/date unknown;
- Geo-Environmental Assessment, Former Glanford House, Stather Road, DeltaSimons, November 2020
- BGS Geology of Britain Viewer
- BGS Maps Portal
- British Geological Survey (BGS) digital mapping
- 1982 BGS drift map, Sheet 89, Brigg 1:50,000
- https://environment.data.gov.uk/catchment-planning/
- Assessing risks posed by hazardous ground gases to buildings, CIRIA C659, 2006
- Flixborough (Nypro UK) Explosion 1st June 1974 (hse.gov.uk)
- Non-statutory guidance for site waste management plans, DEFRA April 2008
- CL:AIRE Definition of Waste: Development Industry Code of Practice (DoW:CoP)

- Asbestos: The analysts' guide for sampling, analysis and clearance procedures (HSG 248), HSE, 2005
- Asbestos: The licensed contractors' guide (HSG 247), HSE, 2006

APPENDIX A FIGURES

Date: May 2022

NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 1 Study Area

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	25,001
ArcMap File	\\UKSSMBNAF- SI_ES_StudyArea_A01

Legend

🟥 Order Limits

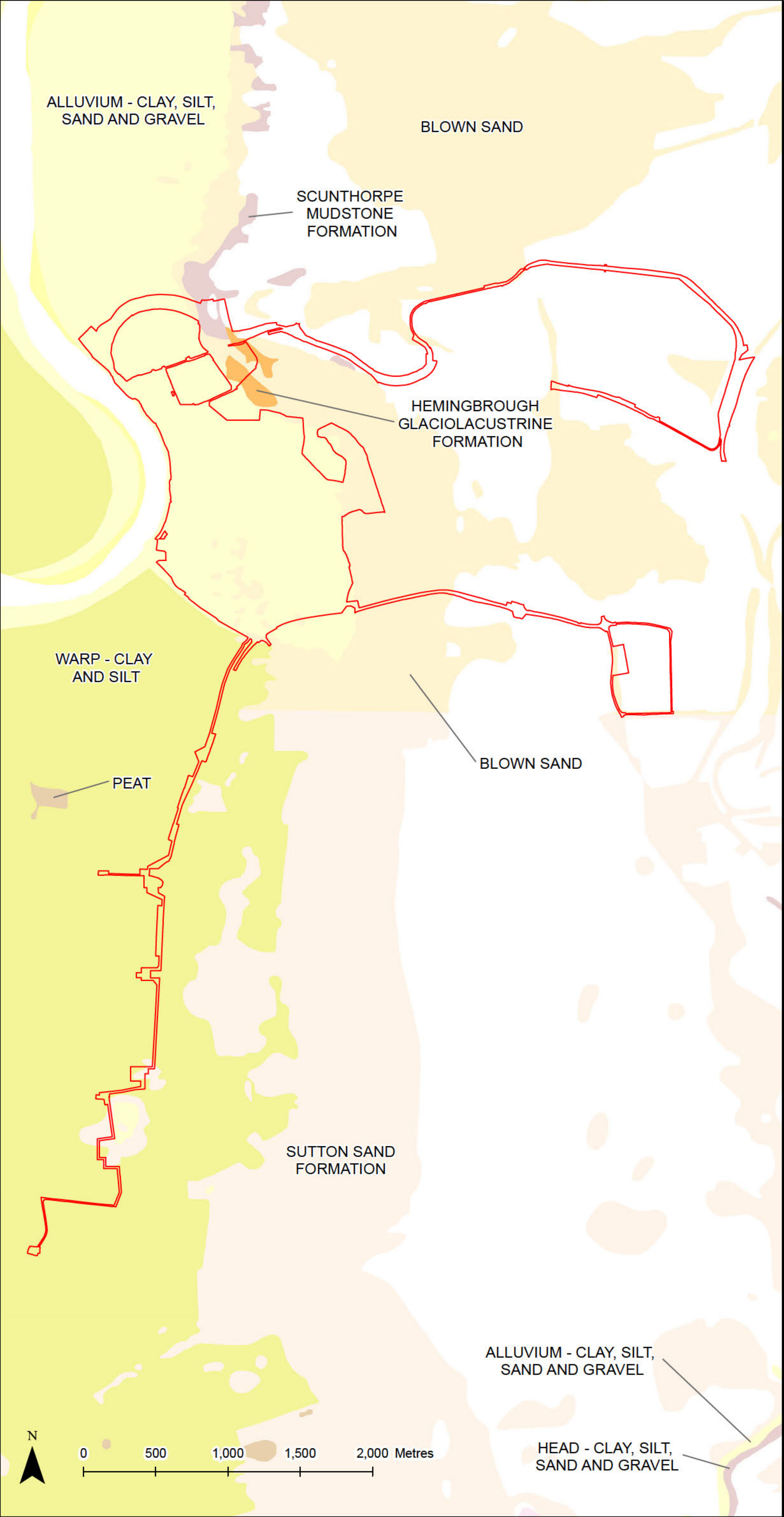
🟦 Additional study area outside the order limits

*Not all laydown areas are shown on the plan. Where laydown areas would be located within the footprint of the the building to be constructed, they have been omitted from the plan to improve clarity.

Layer Source Information

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING



North Lincolnshire Green Energy Park

Title	Figure 2 Superficial Deposits Geology

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	25,001
ArcMap File	\\UKSSMBNAF- SI_ES_Geology_Superficial_A01

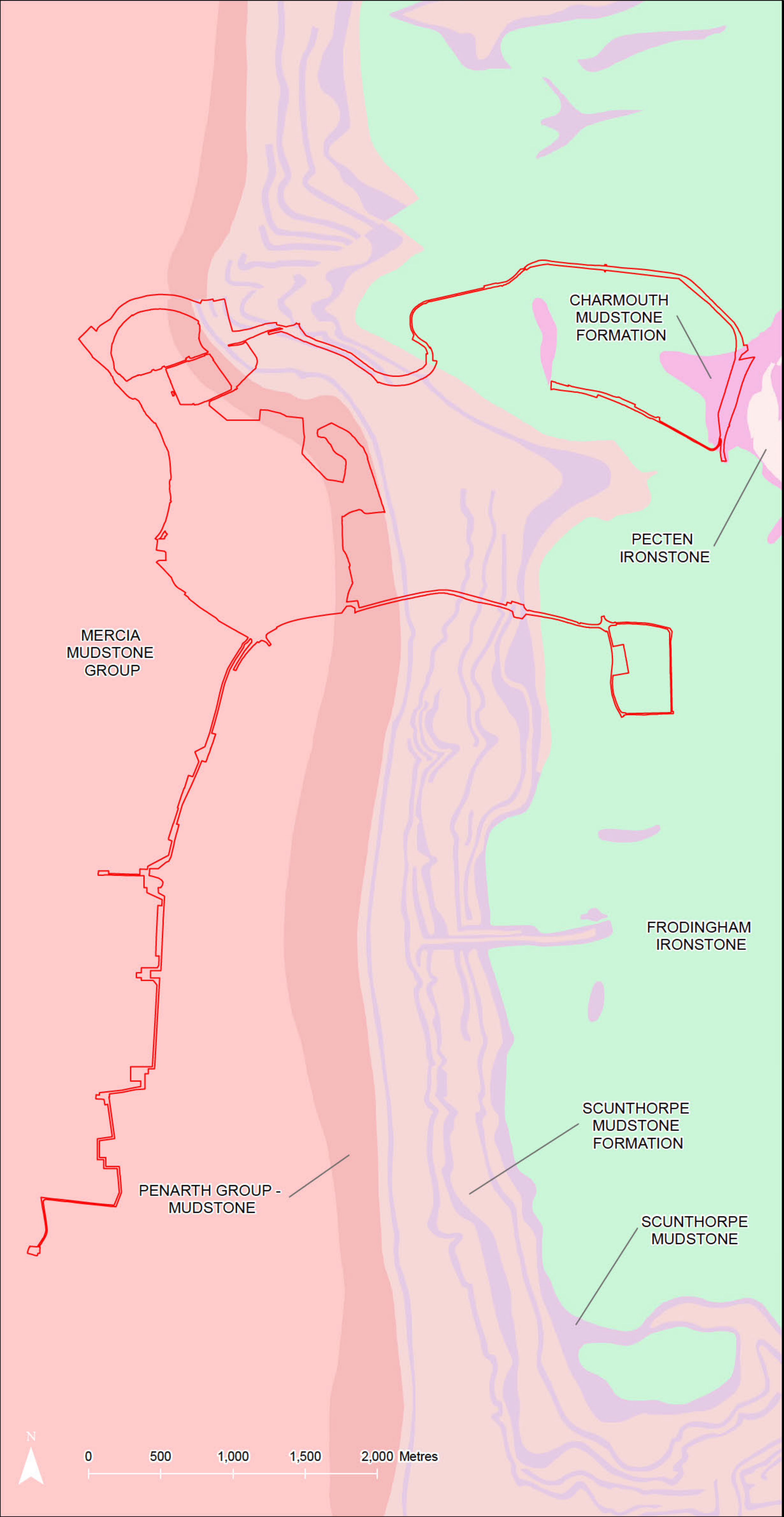
Legend

▭ Order Limits

Layer Source Information

Contains British Geological Survey materials copyright NERC 2021

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 3 Bedrock Geology

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	25,001
ArcMap File	SI_ES_Geology_Bedrock_A01

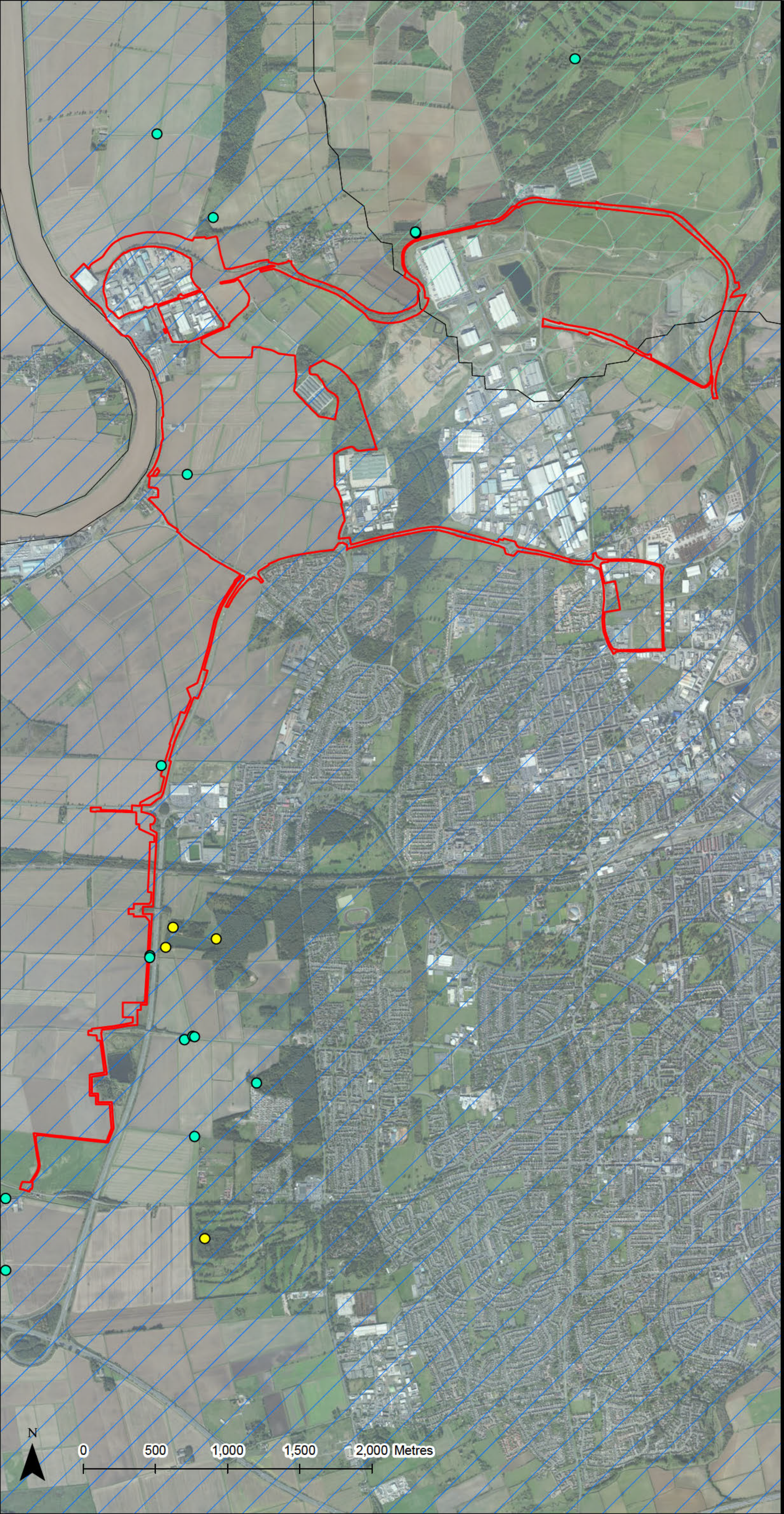
Legend

▭ Order Limits

Layer Source Information

Contains British Geological Survey materials copyright NERC 2021

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 4 Water Abstraction Within 1km of the Order Limits

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	04/05/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	25,001
ArcMap File	\\UKSSMBNAF- SI_ES_WaterAbstraction_A01

Legend

- ● Surface Water
- ● Groundwater
- ▭ Order Limits

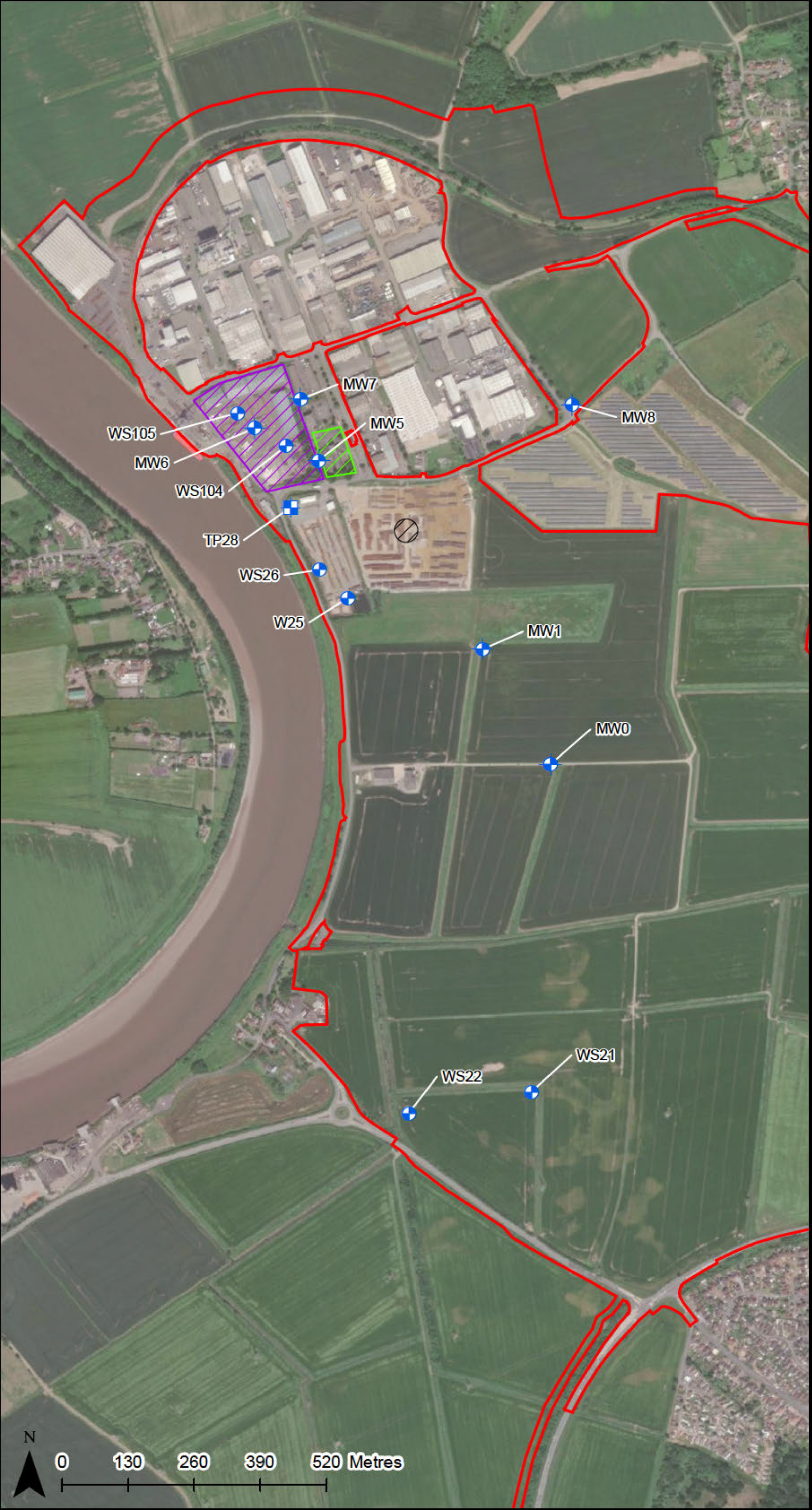
WFD Groundwater Bodies

- ▨ Grimsby Ancholme Frodingham Ironstone Unit
- ▨ Trent Lower Erewash - Secondary Combined

Layer Source Information

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING



North Lincolnshire Green Energy Park

Title	Figure 5 Site Investigation Locations – Energy Park Land

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	10,000

ArcMap File

SI_ES_SiteInvestigationLocations_NLGEP_Land_A01

Legend

▭	Order Limits
▨	Approximate Location of Rainham Steel Trial Pits
▨	Ian Farmer GI
▨	Former Glanford House SI

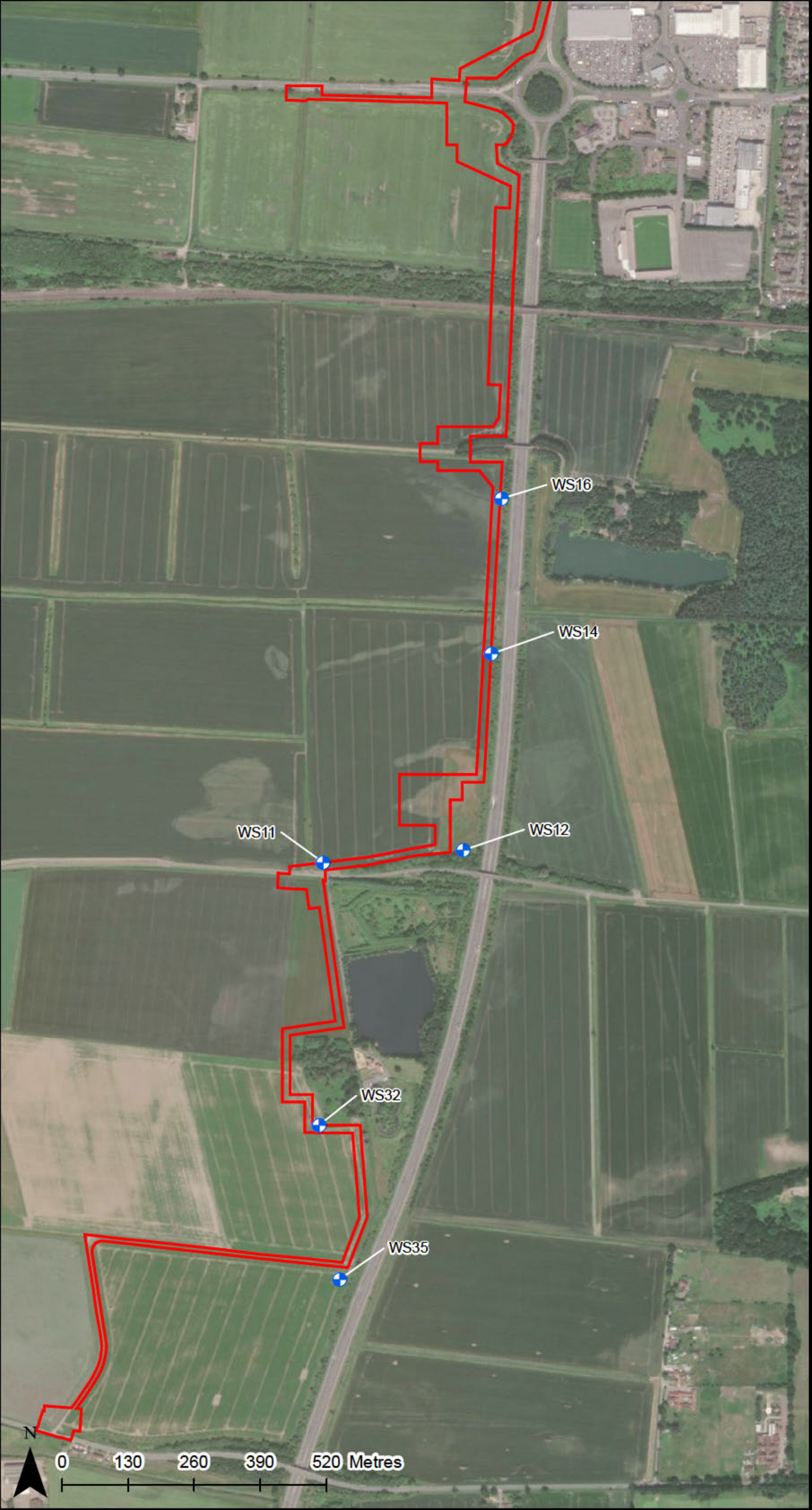
Locations Accessed

⊕	Monitoring Well
◐	Soil Bore
⊞	Trial Pit

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 6 Site Investigation Locations – Southern DHPWN

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	10,000

ArcMap File

SI_ES_SiteInvestigationLocations_SouthernDHPWN_Land_A01

Legend

▭ Order Limits

Locations

⊕ Monitoring Well

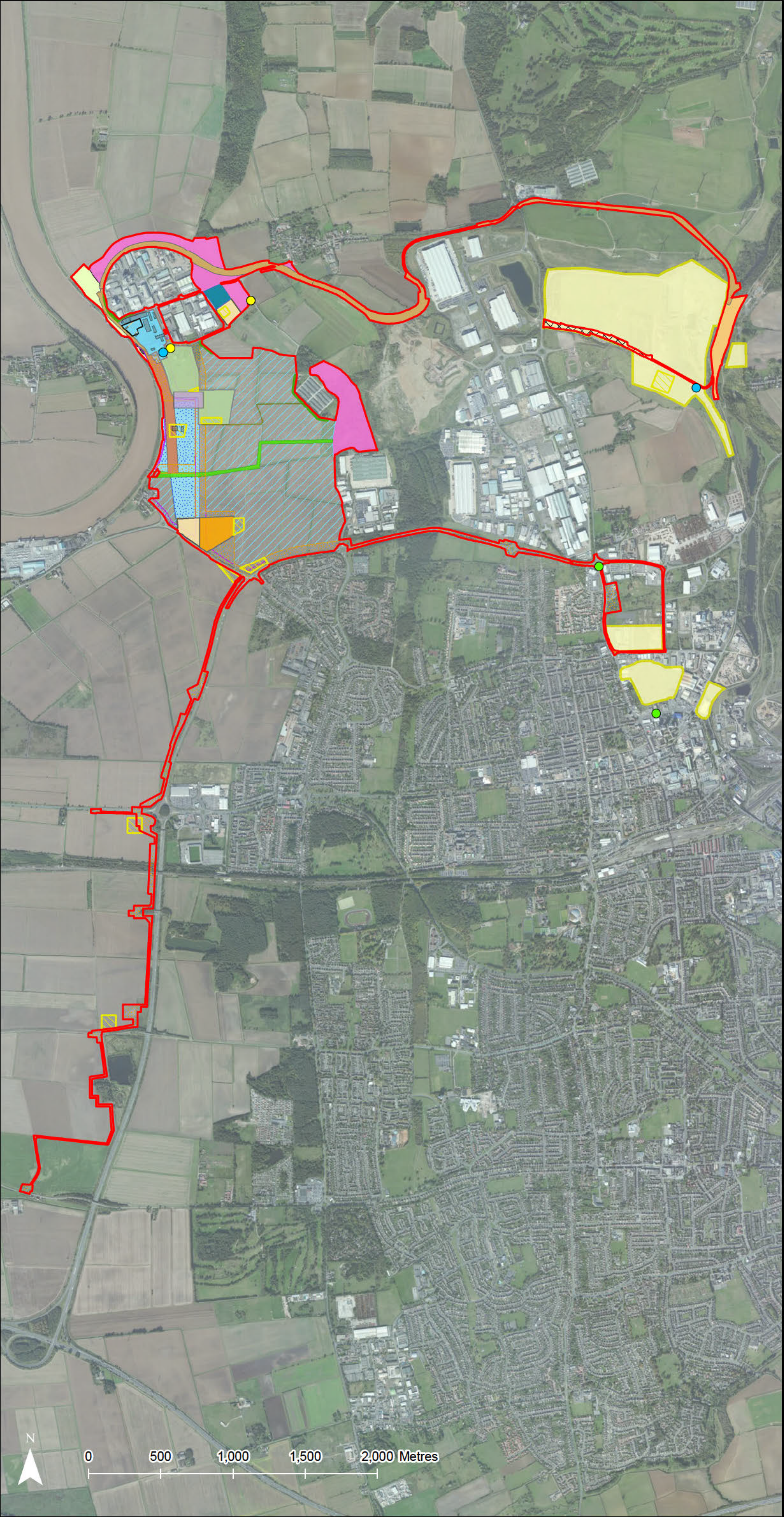
◐ Soil Bore

▣ Trial Pit

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 7 Public Database Review Key Information

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	25,001
ArcMap File	\\UKSSMBNAF- SI_ES_PublicDatabaseReview_A01

Legend

- ● IPC: Integrated Pollution Control
- ● IPPC: Intergrated Pollution, Prevention and Control
- ● LAPPC: Local Authority Pollution and Prevention Controls
- 🟨 Approximate Locations of Current or Historical Landfills
- 🟥 Order Limits
- ⬜ Demolition
- 🟩 Existing Port
- 🟪 Areas for Potential Future Mitagation
- ▨ Surface Access
- ▨ Utilites
- 🟫 Temporary Construction Haul Road
- 🟩 Non-motorised Paths with Landscape Planting
- ▨ Construction Laydown (Indicative Size / Location)*
- ▩ Construction Laydown Limits of Deviation
- ▨ Flood Management
- ▨ Wetland / SuDs

Landuse

- 🟦 Sub Station
- ▨ Carbon capture and associated curtilage landscape
- 🟦 EFW and associated curtilage landscape
- 🟪 Visitor Centre
- 🟩 Concrete manufacturing and polymer plant and associated curtilage landscape
- 🟨 Gas AGI and associated curtilage
- 🟧 Energy storage and refueling station and associated curtilage landscape
- 🟩 Flood Defence Bund

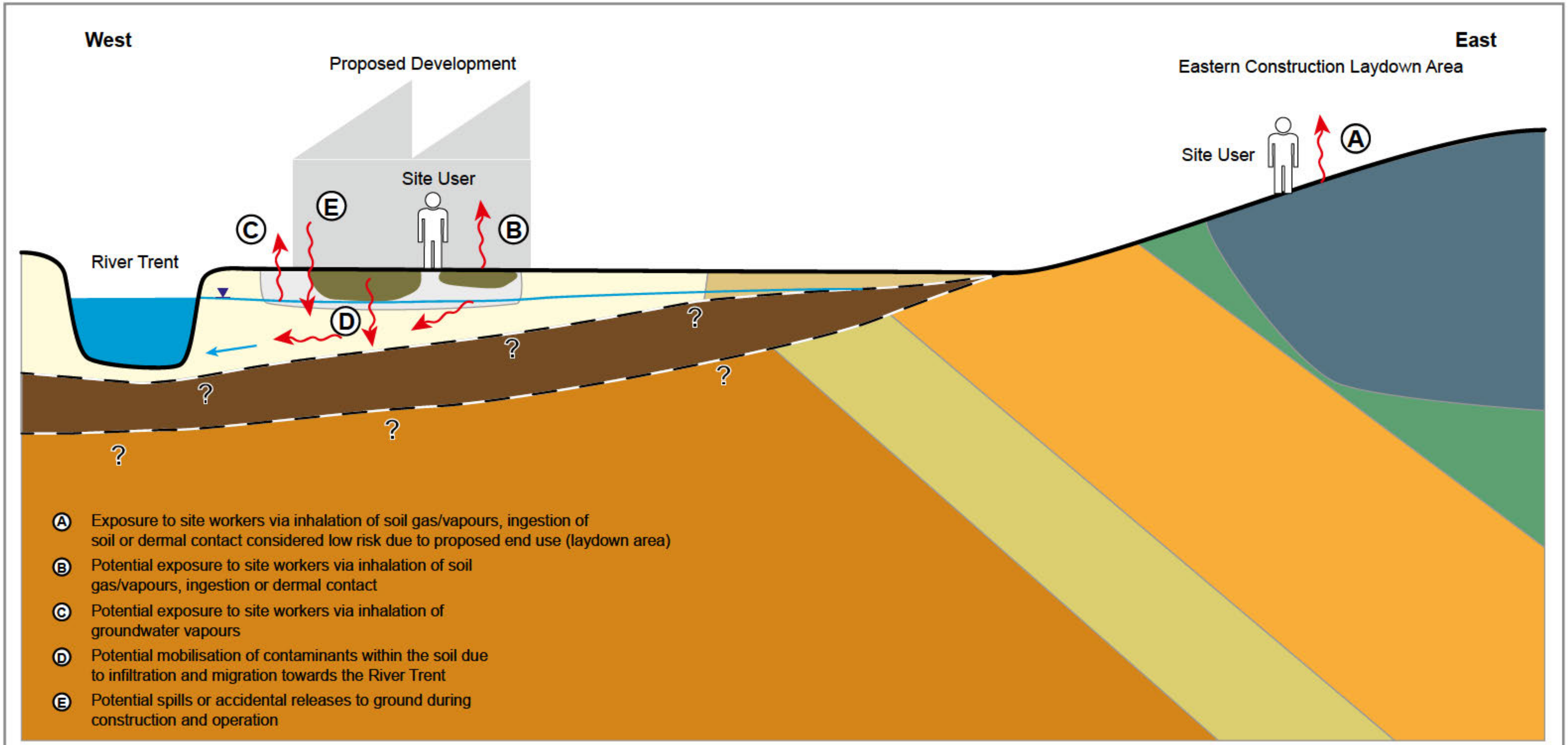
Railway Reinstated

- 🟨 Dragonby Siding Expansion
- 🟫 Railhead
- 🟫 Railspur Upgrade

Layer Source Information

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING



Ⓐ Exposure to site workers via inhalation of soil gas/vapours, ingestion of soil or dermal contact considered low risk due to proposed end use (laydown area)

Ⓑ Potential exposure to site workers via inhalation of soil gas/vapours, ingestion or dermal contact

Ⓒ Potential exposure to site workers via inhalation of groundwater vapours

Ⓓ Potential mobilisation of contaminants within the soil due to infiltration and migration towards the River Trent

Ⓔ Potential spills or accidental releases to ground during construction and operation

■	Made Ground
■	Alluvium
■	Blown Sands
■	Sands & Gravels
■	Mercia Mudstone Group
■	Penarth Group (mudstone)
■	Scunthorpe Mudstone Formation
■	Frodingham Ironstone member
■	Area of historical / current landfill
■	Potential residual soil contamination from historical sources, construction or operation (tanks, railwaylines, Flixborough Industrial Esate, Flixborough disaster)
—	Water table
→	Groundwater flow direction
⇝	Contaminat pathway

Figure 8
Conceptual Site Model

SCALE: Not to Sclae
SIZE: A4
PROJECT: 0483091
DATE: 18/10/2021

VERSION: A01
DRAWN: MTC
CHECKED: SD
APPROVED:

0483091_SI_ES_ConceptualSiteModel_A01.ai

APPENDIX B ENVIROCHECK REPORT

Date: May 2022

APPENDIX C THIRD PARTY GROUND INVESTIGATION REPORTS,

Date: May 2022

- Report on Ground Investigation carried out at EFW Plant, Stather Road, Flixborough, Scunthorpe, DN15 8SE, Ian Farmer Associates, October 2018
- Humberside Materials Laboratory, Chemical Analysis Summary Sheet, Rainham Steel, Sampled 03/10/2018 – file reference 0839/4666/G;
- Stathers Road, Flixborough, Brichar Ltd – report name/date unknown;
- Geo-Environmental Assessment, Former Glanford House, Stather Road, DeltaSimons, November 2020

SOLAR 21 RENEWABLE ENERGY LIMITED

EFW PLANT,
STATHER ROAD, FLIXBOROUGH, SCUNTHORPE DN15 8SE

REPORT ON GROUND INVESTIGATION

Contract: 31554

Date: October 2018

Ian Farmer Associates (1998) Limited
Unit 4 Faraday Close,
Washington, Tyne and Wear, NE38 8QJ
Tel: 0191 482 8500
Fax: 0191 482 8520

REPORT ON GROUND INVESTIGATION

Carried out at

EFW PLANT,

STATHER ROAD, FLIXBOROUGH, SCUNTHORPE DN15 8SE

Prepared for

SOLAR 21 RENEWABLE ENERGY LIMITED
Rathcoole Premier Office Centre
Main Street
Rathcoole
Co. Dublin
D24 K519

Contract No: 31554

Date: October 2018

Ian Farmer Associates (1998) Limited
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Washington, Tyne and Wear, NE38 8QJ
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Report Issue Log

Draft Issue	Written By P. Challinor	Checked By C. Lewis
Issue Method E	Date 17/10/2018	Date 18/10/2018

Final Issue	Issued By	Checked By
Issue Method E/P/D	Date	Date

Revision	Issued By	Checked By
Issue Method E/P/D	Date	Date

Issue Method: E = Electronic
P = Paper
D = Disc

EXECUTIVE SUMMARY

It is understood that the investigation is to determine the suitability or otherwise of the proposed site for the construction of a power plant.

On the instructions of Solar 21 Renewable Energy Limited, an investigation was undertaken to determine ground conditions to enable foundation and earthworks design to be carried out, together with a contamination risk assessment and a review of gas emissions.

The site is situated on an industrial estate 1.2km to the west of Flixborough off Stather Road which is 4.5km to the northwest of Scunthorpe town centre and may be located by National Grid Reference 486925, 414906.

The geological map indicates the site to be underlain by superficial deposits of Alluvium, some of which is suggested to be of estuarine origin and was indicated to consist of clay, silt, sand and gravel.

The superficial deposits formed up to 2 million years ago in the Quaternary Period and are underlain by Mercia Mudstone Group consisting of a mudstone sedimentary bedrock formed approximately 201 to 252 million years ago in the Triassic Period.

The site work was carried out between 21st August and 3rd September 2018 and consisted of six boreholes, designated BH1 to BH6, sunk by light cable percussion methods. Boreholes BH2, 3, 4 and 6 were extended from rock-head levels to the terminal depth of 30.0mbgl by rotary coring methods using air/mist drilling techniques to obtain PW sized strata core.

The ground conditions encountered on the site was principally a thin covering of Made Ground overlying alluvial deposits of soft laminated clay, organic clay and peat onto a gravelly sand.

The alluvial deposits overlay the Mercia Mudstone which appeared to be initially weathered to a gravelly clay with bedrock found at 20.10 to 22.60mbgl.

Groundwater was encountered at 11.70/12.3mbgl rising to 6.3/ 6.7mbgl due to the nearby influence of the River Trent.

On the basis of observations made on site together with results of in-situ and laboratory tests, together with empirical correlations, consideration could be given to the adoption of deep foundations to support the proposed structures and a piled foundation is to be considered.

It is suggested that the alluvial soils would not provide adequate support for piling and due to the weak nature of these soils they could impart negative shaft adhesion and skin friction to the piles, which would increase the load on the piles.

It is suggested that all piling be taken into the Mercia Mudstone formation where rock sockets should be formed to provide adequate strength, predominantly in end bearing.

It should be noted that groundwater was present, which could affect the installation of the piles.

A sample of organic clay indicated a water soluble sulphate content of 3450mg/l suggesting a DS4 classification and also indicate that pyrite is present and may be oxidised to sulphate where the ground is disturbed. The total potential sulphate gives a value greater than DS5 classification.

It is suggested that precautions should be taken when piles are sunk through organic clays and peat deposits and a lined pile should be considered an option, which would also reduce the risk of negative skin friction through the alluvial deposits.

The results of the soil analyses have initially been compared to Suitable 4 Use Levels (S4ULs), determined by LQM and CIEH, or CLEA SGVs published in Environment Agency Science Reports SC050021/SR3, and SC050021 and DEFRA C4SL (Category 4 Screening Levels) for lead, in accordance with current legislation and guidance.

Those contaminants with observed concentrations above the GAC are detailed below:

Location	Depth (m)	Contaminant	Concentration (mg/kg)	Guidance Level (mg/kg)
BH2	0.50	Nickel	1200	980

Where the concentration of any contaminant is above guidance values, the 'mean value test' is applied to the results giving the upper 95th percentile bound (UCL) of the sample. This upper bound indicates whether any high concentrations represent a significant possibility of harm to human health. The result is tabulated below:

Contaminant	Value of UCL (mg/kg)	Guidance Value (mg/kg)	Comments
Nickel	658	980	Risk within acceptable limits for proposed use

The results of the mean value tests determined that the elevated contaminant is unlikely to present a significant risk to human health in relation to the proposed site end use and requires no further consideration.

The site can be considered uncontaminated for the proposed industrial usage.

The presence of organic clays and peat beneath the site is the potential source of ground gas and it can be seen that the Gas Screening Values (GSV) are reducing over the time since the standpipe installations.

From monitoring of the standpipes, the GSV calculated for carbon dioxide ranged from 0.07 to 3.9 litres/hour. The GSV calculated for methane is between 2.58 and 53.7 litres/hour.

The recent monitoring would suggest a reduction from an initial readings giving Characteristic Situation 5 (Appendix 7, Table A7.2) to recent readings giving a Characteristic Situation 3.

For Situation A, being any development other than low rise residential with suspended floor slab and ventilated void, gas protective measures are given in Appendix 7. These protection requirements are outlined and these should be included in the building design.

These comments are based on three sets of readings over a period of three weeks at high atmospheric pressure (>1000mb), which does not follow the recommended guidelines, it is recommended that a continued programme of monitoring be carried out to comply more closely with these guidelines before final design is undertaken, the results of which will be issued as an addendum to this report. A further monitoring visits are scheduled.

CONTENTS

1.0 INTRODUCTION

1.1 It is understood that the investigation is to determine the suitability or otherwise of the proposed site for the construction of a power plant.

1.2 On the instructions of Solar 21 Renewable Energy Limited, an investigation was undertaken to determine ground conditions to enable foundation and earthworks design to be carried out, together with a contamination risk assessment and a review of gas emissions.

1.3 A Desk Study/ Preliminary Investigation, was not a requirement of this investigation.

1.4 It is recommended that a copy of this report be submitted to the relevant authorities to enable them to carry out their own site assessments and provide any comments.

1.5 This report has been prepared for the sole use of the Client for the purpose described and no extended duty of care to any third party is implied or offered. Third parties using any information contained within this report do so at their own risk.

1.6 The comments given in this report and the opinions expressed herein are based on the information received, the conditions encountered during site works, and on the results of tests made in the field and laboratory. However, there may be conditions prevailing at the site which have not been disclosed by the investigation and which have not been taken into account in the report.

1.7 The comments on groundwater conditions are based on observations made at the time the site work was carried out. It should be noted that groundwater levels vary owing to seasonal or other effects.

2.0 SITE SETTING

2.1 Site Location

2.1.1 The site is situated on an industrial estate 1.2km to the west of Flixborough off Stather Road which is 4.5km to the northwest of Scunthorpe town centre and may be located by National Grid Reference 486925, 414906.

2.1.2 The site is situated on the eastern banks of the River Trent and has wharfing and rail facilities.

2.1.3 A site location plan is included in Appendix 1, Figure A1.1.

2.2 Geological Setting

2.2.1 Details of the geology underlying the site have been obtained from the British Geological Survey map, Sheet No. 80, ‘Kingston upon Hull’, solid and drift editions, 1:50,000 scale, published 1983.

2.2.2 The geological map indicates the site to be underlain by superficial deposits of Alluvium, some of which is suggested to be of estuarine origin and was indicated to consist of clay, silt, sand and gravel.

2.2.3 Close to and on the inside of the bends in the river, Tidal Flat Deposits can be found consisting of clay and silt.

2.2.4 The superficial deposits formed up to two million years ago in the Quaternary Period and are underlain by Mercia Mudstone Group consisting of a mudstone sedimentary bedrock formed approximately 201 to 252 million years ago in the Triassic Period.

3.0 SITE WORK

3.1 The site work was carried out between 21st August and 3rd September 2018 with the borehole locations determined by the client and the site work carried out on the basis of the practices set out in BS 10175:2011+A2:2017, ref. 9.2, BS 5930: 2015, ref. 9.3, and ISO 1997:2007, ref. 9.4.

3.2 Six boreholes, designated BH1 to BH6, were sunk by light cable percussion methods, at the positions shown on the site plan, Appendix 1, Figure A1.2.

3.3 Borehole BH1 was terminated on an obstruction at 1.4mbgl in the Made Ground after three locations were attempted. All the other boreholes were extended to 30.0mbgl.

3.4 Boreholes BH2, 3, 4 and 6 were extended from rock-head levels of between 20.9 to 22.6mbgl to the terminal depth of 30.0mbgl by rotary coring methods using air/mist drilling techniques to obtain PW sized strata core.

3.5 The depths of boreholes, descriptions of strata encountered and comments on groundwater conditions are given in the borehole records, in Appendix 2.

3.6 Photographs of the rock core are also given in Appendix 2.

3.7 Representative disturbed and undisturbed samples were taken at the depths shown on the borehole records and were dispatched to the laboratory for examination and testing. Samples for environmental purposes were collected in amber glass jars.

3.8 Standard (split-barrel and cone) penetration tests, refs. 9.6 and 9.5, were carried out in the boreholes in the various strata to assess the relative density or consistency. The values of penetration resistance are given in the borehole records.

3.9 Monitoring installations protected by a stopcock cover were installed in boreholes BH3 and BH6, as detailed together with a visual representation of the standpipes in the relevant borehole records.

3.10 Groundwater and ground gas monitoring visits were undertaken on three occasions on the 28th September, 9th and 16th October 2018, records of which are presented in Appendix 2.

3.11 The ground levels at the borehole locations were not determined.

4.0 LABORATORY TESTS

4.1 Geotechnical Testing Soil

4.1.1 Geotechnical soil analysis was undertaken of samples obtained during the investigation as follows:

- 12 No. Water Content Tests
- 12 No. Plasticity Index Tests
- 3 No. Particle Size Distributions (by Wet Sieving)
- 6 No. Quick Undrained Single/Multi-stage Triaxial Tests

4.1.2 The laboratory test report is given in Appendix 3, Test Report 31554/1

4.2 Geotechnical Testing Rock

4.2.1 Geotechnical analysis was undertaken of samples of rock core obtained during the investigation as follows:

- 2 No. Water Content Tests
- 2 No. Bulk Density Tests
- 2 No. Uniaxial Compression Tests
- 9 No. Point Load Index Tests

4.2.2 The laboratory test report is given in Appendix 3, Test Report 31554R/1

4.3 Chemical Testing

4.3.1 The suite of chemical analyses has been based upon any on-site observations, to investigate the potential sources of contamination. The chemical analyses were carried out on ten soil samples, one groundwater sample. Leachate analysis was also conducted on four selected samples. The nature of the analyses is detailed below:

- **Metals** - arsenic, cadmium, chromium (hexavalent), chromium (total), copper, lead, mercury, nickel, selenium and zinc.
- **Inorganics** – pH, cyanide (total), soil organic matter
- **Organics -** petroleum hydrocarbons – EPH basic carbon banded analysis, polycyclic aromatic hydrocarbons (PAH) – USEPA 16 suite,
- **Others** – Asbestos fibres in soil, Sulphate Contents (Water and Acid Soluble) and Total Sulphur

4.3.2 The results of these tests are presented in Appendix 4, Certificate of Analysis 18/07080, 18/07187, 18/07299, and 18/07300.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 Sequence

5.1.1 The sequence of the strata encountered during the investigation generally confirms the anticipated geology as interpreted from the geological map.

5.1.2 Interpolation of strata depths between locations should be undertaken with caution, particularly for depths of Made Ground where structures are still present at the time of the investigation.

5.1.3 The sequence and indicative thicknesses of strata are provided below:

Strata Encountered	Depth Encountered (m bgl)		Strata Thickness (m)
	From	To	
Made Ground	0.00	0.60 to 2.10	0.60 to 2.10
Light brown sandy gravelly Clay	0.60 to 1.40	1.0 to 2.0	0.40 to 1.25
Laminated light brown sandy Clay	1.0 to 2.0	1.85 to 3.20	0.85 to 1.70
Laminated organic light grey brown sandy Clay	1.85 to 3.20	4.70 to 6.70	2.85 to 4.60
Laminated brown sandy Clay with peat	6.20 to 6.70	12.20 to 12.50	5.80 to 6.0
Peat	4.70 to 6.70	11.70 to 12.30	5.60 to 7.0
Gravelly Sand	11.70 to 12.50	17.10 to 19.40	4.90 to 7.10
Brown sandy gravelly clay	17.20	18.50	1.30
Red brown sandy gravelly Clay	17.10 to 19.40	20.10 to 22.60	1.80 to 4.20
Mercia Mudstone	20.10 to 22.60	30.0 to 30.10	7.40 to 9.90

5.2 Made Ground

5.2.1 Made Ground was encountered in all boreholes to a maximum thickness of 2.10m and consisted of a gravelly sand/ sandy gravel with brick, concrete, slag, sandstone and mudstone content.

5.2.2 In borehole BH4 a sandy gravelly clay with similar inclusions was encountered between 0.6 and 1.4mbgl.

5.3 Alluvial Deposits

5.3.1 The alluvial deposits consisted of soft laminated sandy clays often found to contain peat fibres and occasionally organic.

5.3.2 These upper laminated clays were underlain in boreholes BH3, 4 and 6 by a peat deposit at depths of between 4.70 to 6.70mbgl extending to depths of between 11.70 to 12.30mbgl.

5.3.3 The peat and organic clays were underlain by a gravelly sand deposit at 11.70 to 12.50mbgl and for a thickness of between 4.90 to 7.10m.

5.4 Weathered Mudstone

5.4.1 Weathered Mercia Mudstone was encountered at 17.10 to 19.40mbgl generally as a red brown sandy gravelly clay.

5.5 Mudstone

5.5.1 Mercia Mudstone bedrock was encountered in all boreholes (except BH1) at depths of between 20.10 to 22.60mbgl and was proven by rotary coring to circa 30.0mbgl.

5.6 Groundwater

5.6.1 Groundwater was encountered in the following boreholes and depths.

Groundwater Occurrence		
Borehole No	**Strike Depth metre**	**after 20minutes rest metre**
BH3	12.30	6.80
BH4	12.30	6.70
BH6	11.70	6.30

5.6.1 On return visits to monitor the standpipes groundwater rest levels were recorded between 1.65 and 2.08mbgl.

6.0 GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS IN RELATION TO THE PROPOSED DEVELOPMENT

6.1 Structural Details

6.1.1 It is understood that the proposed development is to consist of an EFW plant, precise structural details were not available at the time of preparation of this report.

6.2 Assessment of Soil Condition

6.3 General

6.3.1 The ground conditions encountered on the site was principally a thin covering of Made Ground overlying alluvial deposits of soft laminated clay, organic clay and peat onto a gravelly sand.

6.3.2 The alluvial deposits overlay the Mercia Mudstone which appeared to be initially weathered to a gravelly clay with bedrock found at 20.10 to 22.60mbgl.

6.3.3 Ground water was encountered at 11.70/ 12.3mbgl rising to 6.3/ 6.7mbgl due to the nearby influence of the River Trent.

6.4 Alluvial Deposits

Cohesive

6.4.1 The plastic index test results are presented on the plasticity classification chart, Appendix 3, Figure A3.1.

- *Alluvial Clays*

6.4.2 The alluvial clays were found to be of an intermediate to high plasticity with plasticity index values of between 14 and 32% averaging 23%.

6.4.3 Consistency index determinations (w_L-w/PI) were between 0.58 and 1.21 averaging 0.83 suggesting the stratum to be generally firm consistency.

6.4.4 Unconsolidated un-drained triaxial compression tests, undertaken on ‘undisturbed’ (Class B) samples suggest c_u values of 29, 31 and 54kPa.

- *Organic Clays*

6.4.5 Laboratory testing indicated a high plasticity with a plasticity index value of 33%.

6.4.6 Consistency index determination was 0.53 suggesting the stratum to be generally soft/ firm consistency.

6.4.7 Unconsolidated un-drained triaxial compression tests, undertaken on 'undisturbed' (Class B) samples suggest c_u values of 35 and 59kPa.

- *Peat*

6.4.8 Samples of peat were found to be of a high and very high plasticity with classifications of MH and MV with plasticity index values of 30 and 44%.

6.4.9 Moisture contents were found to be above the liquid limit with values of 79.5 and 176%.

6.4.10 Unconsolidated un-drained triaxial compression tests, undertaken on 'undisturbed' (Class B) samples indicated a c_u value of 30kPa.

Granular

6.4.11 Participle size distributions undertaken on bulk samples taken from the boreholes indicated a slightly silty fine to medium grained sand with gravel content of 1 and 2%, sand content of between 94 and 95% and silt/clay content of 5 and 6%.

6.4.12 SPT's were undertaken and where full penetration was achieved, recorded relative densities of loose to medium dense.

6.5 Weathered Mudstone

6.5.1 The alluvial deposits were underlain by a weathered Mercia Mudstone presented as a firm red brown sandy gravelly clay.

6.5.2 This clays were found to be of an intermediate plasticity with plasticity index values of between 13 and 15% averaging 14%.

6.5.3 Consistency index determinations (w_L-w/PI) were between 0.77 and 1.23 averaging 1.07 suggesting the stratum to be generally firm and stiff consistency.

6.6 Mercia Mudstone Bedrock

6.6.1 Mercia Mudstone bedrock was encountered at depths of between 20.10 to 22.60mbgl and was proven by rotary coring to circa 30.0mbgl.

6.6.2 Uniaxial compression testing indicated compressive strengths of 0.4 and 0.7MPa.

6.6.3 Point load testing have suggested compressive strengths of between 0.48 and 5.76MPa with an average value of 1.84MPa, which might indicate predominately a very weak rock strength; BS5930 amendment 2, ref. 9.3.

6.7 Foundation Options

6.7.1 On the basis of observations made on site together with results of in-situ and laboratory tests, together with empirical correlations, consideration could be given to the adoption of deep foundations to support the proposed structures.

6.7.2 It may be considered that for foundations over a certain depth it may be more economical to adopt piles. Guidelines for the design of piles are given in Appendix 5.

6.7.3 It is suggested that the alluvial soils would not provide adequate support for piling and due to the weak nature of these soils they could impart negative shaft adhesion and skin friction to the piles, which would increase the load on the piles.

6.7.4 It is suggested that all piling be taken into the Mercia Mudstone formation where rock sockets should be formed to provide adequate strength, predominantly in end bearing.

6.7.5 The carrying capacity of piles depends not only on their size and the ground conditions but also on their method of installation. Pile design and installation are continuously evolving processes and state-of-the-art techniques are often employed before they reach the public domain, perhaps several years down the line. Therefore, it is recommended that specialist Piling Contractors be contacted as to the suitability and carrying capacity of their piles in the ground conditions pertaining to the site.

6.7.6 It should be noted that groundwater was present, which could affect the installation of the piles.

6.8 Excavations

6.8.1 On the basis of observations on site together with the results of in-situ and laboratory tests, it is considered that excavations to less than 1.20m would not stand unsupported in the short term.

6.8.2 Side support for safety purposes should of course be provided to all excavations which appear unstable, and those in excess of 1.20m deep, in accordance with Health and Safety Regulations, ref. 9.13.

6.8.3 Groundwater should not be expected in shallow excavations for services. However, it is possible that perched groundwater could be present in the Made Ground overlying the alluvial deposits. It is considered that this could be dealt with by the use of a small pump.

6.8.4 The close proximity of the River Trent will suggest that deep excavations could be affected by ground water inflow.

6.8.5 Groundwater could be expected in excavations taken to depths in excess of 6.0mbgl.

6.9 Road and Hard Standing Design

6.9.1 The structural design of a road or hard standing is based on the strength of the subgrade, which is assessed on the California Bearing Ratio, CBR, scale from which the subgrade surface modulus can be estimated.

6.9.2 In practice, the correlation given by the Highways Agency, ref. 9.14, is usually more appropriate than direct determination of the CBR.

6.9.3 The process of design given in the guidance notes requires an estimate of CBR and subgrade stiffness modulus to be made at the design stage and in-situ measurement prior to construction.

6.9.4 On the basis of laboratory classification tests it is recommended that for formation prepared in the alluvial clay, with a characteristic plastic index value of between 23 to 27%, a subgrade CBR value of 3% be adopted for design purposes.

6.9.5 The assessment assumes there to be a high water table, poor construction conditions and a thin pavement construction.

6.9.6 Any areas of soft or deleterious material in the Made Ground should be excavated and replaced with a properly compacted granular fill.

6.9.7 For routine cases, all material within 450mm of the road surface should be non frost-susceptible.

6.10 Chemical Attack on Buried Concrete

6.10.1 The site has been classified in accordance with BRE Special Digest 1, ref. 9.15, as natural ground without the presence of pyrite and laboratory testing undertaken accordingly. It is recommended that the guidelines given in BRE Special Digest 1, ref. 9.15, be adopted.

6.10.2 The non-pyritic soil samples tested included Made Ground, Alluvial Clays, Weathered Mercia Mudstone and ground water

6.10.3 The results of chemical tests in the non-pyritic soils indicate a sulphate concentration in the soil of between 41mg/l and 418mg/l as a 2:1 water/soil extract, with pH values in the range of 7.41 to 12.63.

6.10.4 It is recommended that for conventional shallow foundations the groundwater should be regarded as mobile.

6.10.5 A sample of organic clay from BH5 at 7.5mbgl indicated a water soluble sulphate content of 3450mg/l suggesting a DS4 classification. The values for Oxidisable Sulphate (OS) was 18% (greater than 0.30%) which would indicate that pyrite is present and may be oxidised to sulphate where the ground is disturbed. The total potential sulphate of 19.5 would give a value greater than DS5 classification.

6.10.6 It is suggested that precautions should be taken when piles are sunk through organic clays and peat deposits and a lined pile should be considered an option, which would also reduce the risk of negative skin friction through the alluvial deposits.

7.0 ENVIRONMENTAL RISK ASSESSMENT IN RELATION TO PROPOSED DEVELOPMENT

7.1 Contaminated Land

7.1.1 The statutory definition of contaminated land is defined in the Environmental Protection Act 1990, ref. 9.16, which was introduced by the Environment Act 1995, ref. 9.17, as;

7.1.2 'Land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.'

7.2 Risk Assessment

7.2.1 The definition of contaminated land is based on the principles of risk assessment. Risk is defined as a combination of:

- The probability, or frequency of exposure to a substance with the potential to cause harm, and:
- The seriousness of the consequence.

7.3 Pollutant Linkage

7.3.1 The basis of an environmental risk assessment involves identifying a 'source' of contamination, a 'pathway' along which the contamination may migrate and a 'receptor' at risk from the contamination.

7.3.2 Current legislation defines the various elements of the pollution linkage as:

- A contaminant is a substance, which is in or under the ground and which has the potential to cause harm or to cause pollution of controlled waters.
- A pathway is one or more routes through which a receptor is being exposed to, or affected by, a contaminant, or could be so affected.
- A receptor is either a living organism, an ecological system, a piece of land or property, or controlled water.

7.3.3 A pollutant linkage indicates that all three elements have been identified. The site can only be defined as 'Contaminated Land' if a pollutant linkage exists and the contamination meets the criteria in Section 7.1 above.

7.3.4 The guidance proposes a four-stage approach for the assessment of contamination and the associated risks. The four stages are listed below:

- Hazard Identification
- Hazard Assessment
- Risk Assessment
- Risk Evaluation

7.3.5 The hazard identification and hazard assessment is based upon a Preliminary Investigation which was not a requirement of this investigation. The risk assessment and evaluation stages are presented in this phase 2 interpretive report, after an intrusive ground investigation has taken place.

7.4 Risk Assessment – Human Health

7.4.1 The proposed development consists of an EFW Plant. The risk assessment has therefore been based on guidelines for an

7.4.2 industrial end use. Should the proposed development be changed in the future then further risk assessment may be required, particularly should a more sensitive end-use be envisaged.

7.4.3 The results of the soil analyses have initially been compared to Suitable 4 Use Levels (S4ULs), determined by LQM and CIEH, ref. 9.20, or CLEA SGVs published in Environment Agency Science Reports SC050021/SR3, ref. 9.18, and SC050021, ref. 9.19, , and DEFRA C4SL (Category 4 Screening Levels) for lead, ref 9.22, in accordance with current legislation and guidance, as detailed in Appendix 6.

7.4.4 The Generic Assessment Criteria (GAC) used within this contamination assessment have been tabulated and are detailed within Appendix 6.

7.4.5 The results of chemical analyses have been processed in accordance with recommendations set out in the CIEH and CL:AIRE document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', ref. 9.23. Where the concentrations determined on site are at or below the respective Generic Assessment Criteria, they are considered not to pose a risk and are removed from further consideration, unless otherwise stated.

7.4.6 Those contaminants with observed concentrations above the GAC are detailed below:

Location	Depth (m)	Contaminant	Concentration (mg/kg)	Guidance Level (mg/kg)
BH2	0.50	Nickel	1200	980

7.4.7 Where the concentration of any contaminant is above the GAC, further statistical analysis of the results has been conducted in accordance with the

CIEH and CL:AIRE guidance. The 'mean value test' was applied to the results of those contaminants which exceeded their relevant GAC. Applying the mean value test to the results gives the upper 95th percentile bound (UCL) of the samples. This upper bound indicates whether any high concentrations represent a significant possibility of harm to human health.

7.4.8 The result from the calculations from the mean value tests is tabulated below:

Contaminant	Value of UCL (mg/kg)	Guidance Value (mg/kg)	Comments
Nickel	658	980	Risk within acceptable limits for proposed use

7.4.9 The results of the mean value tests determined that the elevated contaminant is unlikely to present a significant risk to human health in relation to the proposed site end use and requires no further consideration.

7.4.10 The site can be considered uncontaminated for the proposed industrial usage.

7.5 Risk Assessment - Asbestos

7.5.1 Asbestos including Asbestos Containing Soils (ACS) only presents a risk to health if fibres are released into the air. It is generally assumed that only near surface ACS would contribute airborne fibres. However, in instances where gardens are proposed, then there is a risk that ACS could be exposed to the atmosphere through the action of digging.

7.5.2 Although no assessment criteria (AC) has been proposed in the new CIRIA C733, ref.: 9.27, Ian Farmer Associates have adopted the view that if asbestos is identified within soil then further sampling and testing will be required; specifically to quantify the amount and type of asbestos present. This information should then be used in Detailed Quantitative Risk Assessment (DQRA) as outline in CIRIA C733.

7.5.3 None of the samples at this site contained asbestos

7.6 Risk Assessment - Controlled Waters

7.6.1 The site is located adjacent to the River Trent

7.6.2 The leachate results have been screened against the Water Supply (Water Quality) Regulations 2000, ref. 9.28, and he *freshwater* Environmental Quality Standards (EQS), ref. 9.30.

7.6.3 The guidance levels used within the controlled waters assessment have been tabulated and are detailed within Appendix 6.

7.6.4 A sample of Made Ground from BH4 at 1.0mbgl indicated leachable values for arsenic, copper and lead above the water supply regulations but the content of these metals in the soil from this sample was low and below residential with gardens usage. In light of this the risk to the River Trent is considered to be a low risk.

7.6.5 It is recommended that the Environment Agency be consulted with regard to the significance of these results, within the Water Supply Regulations 2000.

7.6.6 Given the ground conditions encountered at the site and the results of this contamination assessment, it is considered unlikely that further assessment of the risks to controlled waters will be required.

7.7 Gas Generation

7.7.1 Gas monitoring visits were undertaken on three occasions on the 28th September, 9th and 16th October 2018. The results of the gas monitoring are included within Appendix 2.

7.7.2 The presence of organic clays and peat beneath the site is the potential source of ground gas and it can be seen that the Gas Screening Values are reducing over time since the standpipe installations.

7.7.3 In accordance with the methodology published in CIRIA Document C665, ref. 9.44, the maximum recorded values were taken to calculate a Gas Screening Value for the site.

7.7.4 Methane concentrations of between 89.1 and 92.9% by volume were recorded during the various monitoring phases together with carbon dioxide concentrations of between 17.4 and 19.1%v/v. Variable oxygen concentrations were recorded mostly depleted 1 and 14%.

7.7.5 Flow rates were recorded over a three minute period during the various return monitoring visits. The maximum of the three minute average flows was recorded at between 1.2 and 57.8 litres/hour.

7.7.6 The GSV calculated for carbon dioxide ranged from 0.07 to 3.9 litres/hour. The GSV calculated for methane is between 2.58 and 53.7 litres/hour.

7.7.7 The recent monitoring would suggest would suggest a reduction from an initial readings giving Characteristic Situation 5 (Appendix 7, Table A7.2) to recent readings giving a Characteristic Situation 3.

7.7.8 For Situation A, being any development other than low rise residential with suspended floor slab and ventilated void, gas protective measures are given in Appendix 7, sections A7.7 and A7.10.

7.7.9 The protection requirements are outlined and these should be included in the building design.

7.7.10 These comments are based on three sets of readings over a period of three weeks at high atmospheric pressure (>1000mb), which does not follow the recommended guidelines given in Appendix 7, Table A7.1.

7.7.11 However, these values were elevated and varied over the period of monitoring and therefore, it is recommended that a continued programme of monitoring be carried out to comply more closely with these guidelines before final design is undertaken, the results of which will be issued as an addendum to this report.

7.7.12 It is recommended that the Local Authority are consulted regarding these gas protection measures for their approval prior to commencing construction.

7.8 Protection Of Services

7.8.1 Due to the increasing number of developments being undertaken on potentially contaminated land, the Water Supply Industry has identified the need to protect newly laid water supply pipes. They are likely to impose constraints on the nature of water supply pipes that are to be laid in contaminated land. Current guidance on the selection of materials for water pipes is provided by the UK Water Industry Research Limited, ref. 9.31, though some water supply companies may continue to refer to the previous guidance provided by Water Regulations Advisory Scheme, ref. 9.32, and should be consulted for confirmation.

8.0 MANAGEMENT OF CONTAMINATION

8.1 Remediation and Verification

8.1.1 The risk management framework set out in the Model Procedures for the Management of Land Contamination, CLR 11, ref. 9.33, is applicable to the redevelopment of sites that may be affected by contamination.

8.1.2 The risk management process set out in the Model Procedures has three main components:

- Risk assessment
- Options appraisal
- Implementation

8.1.3 This initial risk assessment has not identified the presence of elevated contaminant within the Made Ground and natural stratum across the site and therefore the site can be considered to be uncontaminated with respect to the proposed industrial usage.

8.2 Management of Unidentified Sources of Contamination

8.2.1 There is the possibility that sources of contamination may be present on the site, which were not detected during the investigation. Should such contamination be identified or suspected during the site clearance or ground works, these should be dealt with accordingly. A number of options are available for handling this material, which include:

- The removal from site and disposal to a suitably licensed tip of all material suspected of being contaminated. The material would need to be classified prior to disposal.

- Short-term storage of the suspected material while undertaking verification testing for potential contamination. The storage area should be a contained area to ensure that contamination does not migrate and affect other areas of the site. Depending upon the amounts of material under consideration, this could be either a skip or a lined area.

- Having a suitably experienced environmental engineer either on-call or with a watching brief for the visual and olfactory assessment of the material, and sampling for verification purposes.

8.3 Consultation

8.3.1 During the development of a site, consultation may be required for a number of reasons with a number of regulatory Authorities. The following provides an indication as to the most likely Authorities with which consultation may be required.

- **Local Authority.** There may be a planning condition regarding contamination and consultation will be required with a designated Contaminated Land Officer within the Environmental Health Department. The Local Authority is generally concerned with human health risks. Some Authorities now require 'Completion Certificates' to be signed off following remediation works.

- **Environment Agency.** Where a site is situated above an aquifer, within a groundwater protection zone or has been designated as a special site, the Environment Agency is likely to be involved to ensure that controlled waters are protected.

8.3.2 Based on the results of any consultation, there may be specific remediation requirements imposed by one or more of the Authorities.

8.4 Risk Management During Site Works

8.4.1 During ground works, some simple measures may have to be put in place to mitigate the risk of any known or previously unidentified contamination affecting the site workers and the environs. The majority of the proposed measures represent good practice for the construction industry and include:

- Informing the site workers of the contamination on site and the potential health effects from exposure.

- Where appropriate, the provision of suitable Personal Protective Equipment (PPE) for workers who may be potentially impacted by working in areas of the contamination.

- Ensuring good hygiene is enforced on site and washing facilities are maintained on the site. Workers are discouraged from smoking, eating or drinking without washing their hands first.

- Dust monitoring, and if necessary, suppression measures should be put into practice where contamination is becoming airborne.

- Site drainage should be prevented from entering any adjacent watercourse, ref. 9.34.

8.4.2 Where contaminated materials are being removed from the site they should be disposed of at a suitably licensed landfill, with a 'duty of care' system in place and maintained throughout the disposal operations.

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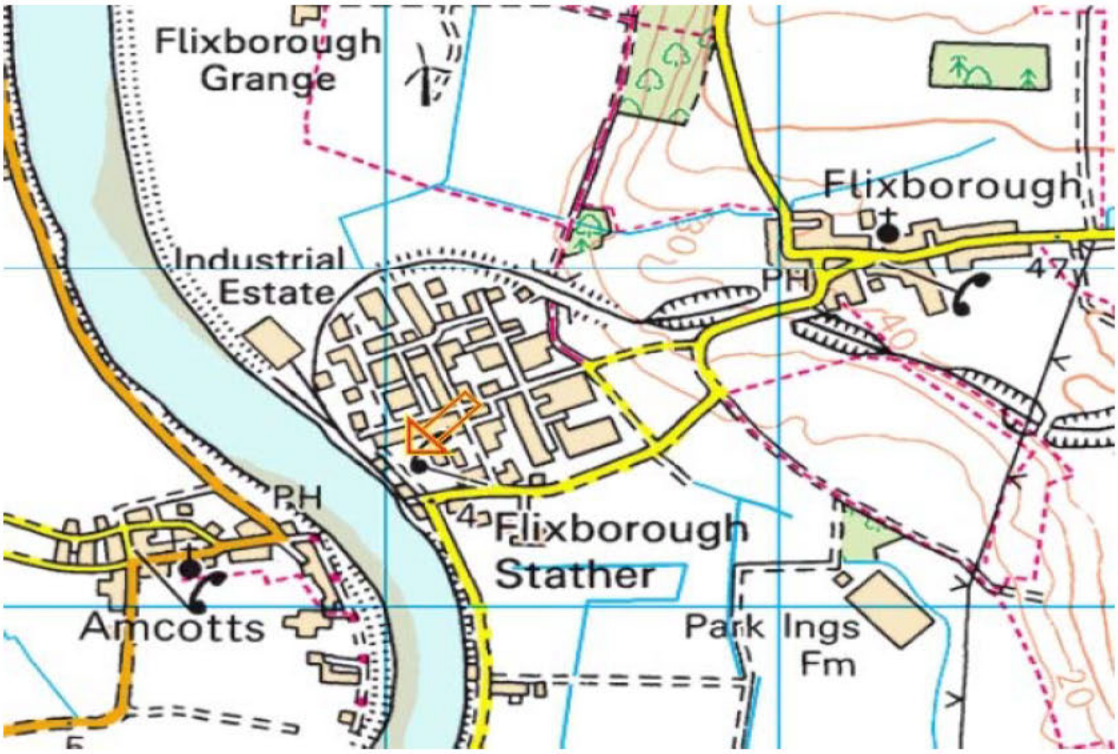
APPENDIX 1

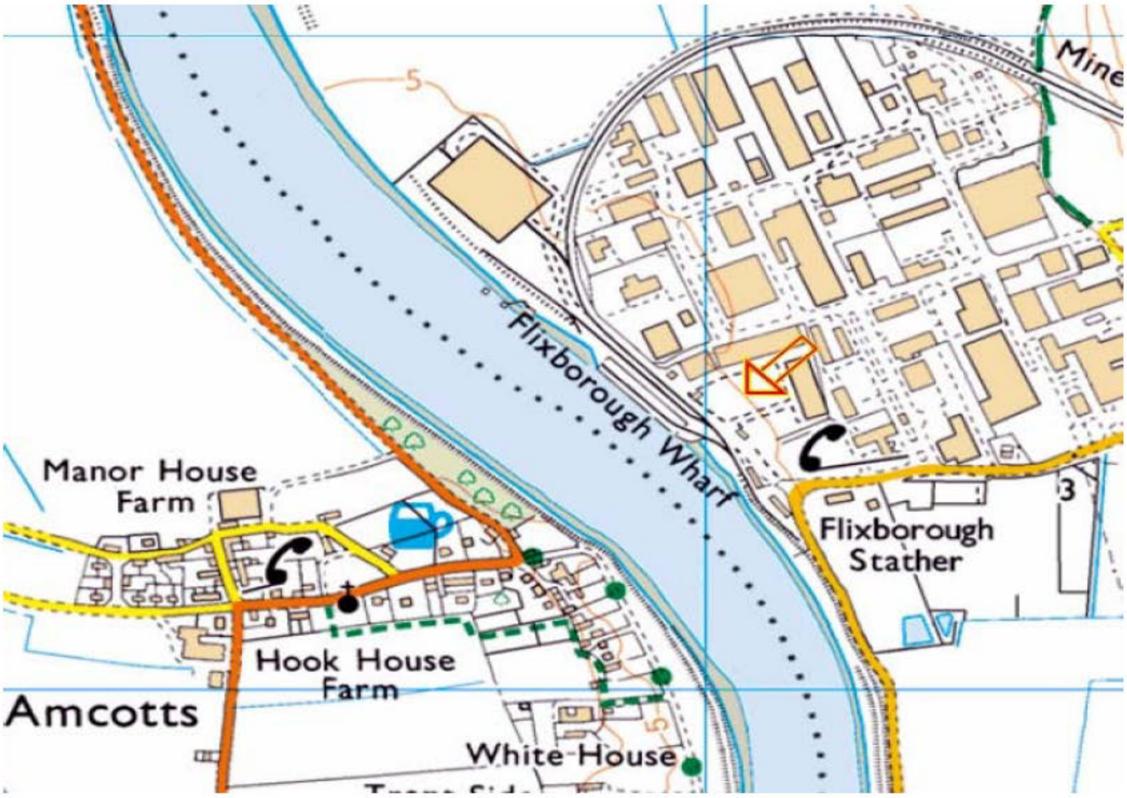
DRAWINGS & PHOTOGRAPHS

IAN FARMER ASSOCIATES

Contract: EFW Plant, Flixborough, Scunthorpe
Contract No: 31554
Site Location Plan
Figure No: A1.1

REPRODUCED FROM ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE





Licence No. LAN1001322

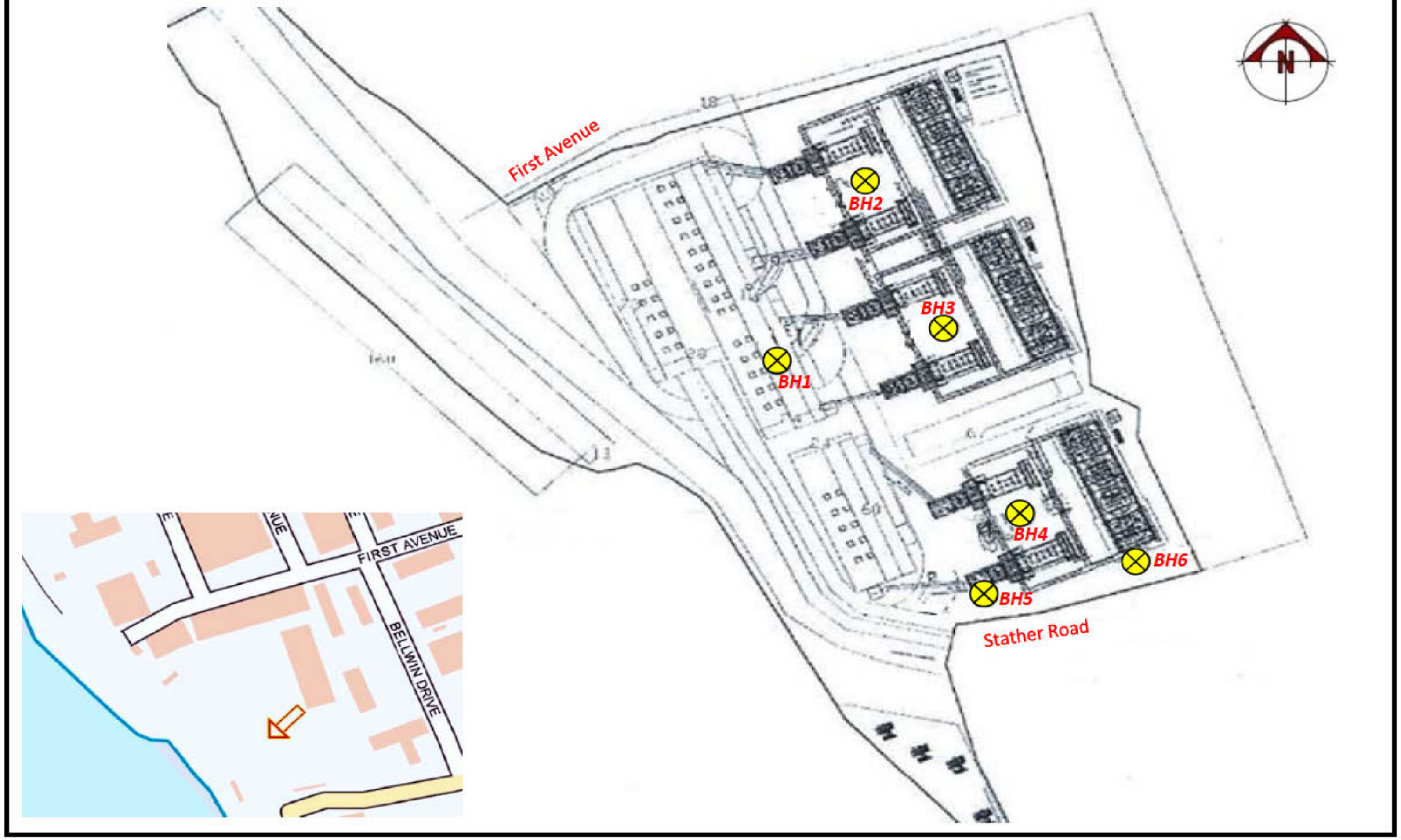
IAN FARMER ASSOCIATES

Contract: EFW Plant, Flixborough, Scunthorpe

Contract No: 31554

Figure No. A1.2

Exploratory Hole Location Plan



APPENDIX 2

SITE WORK

APPENDIX 2

GENERAL NOTES ON SITE WORKS

A2.1 SITE WORK

A2.1.1 General

Site work is carried out in general accordance with the guidelines given in ISO 1997, 9.4 and BS 5930, ref. 9.3.

A2.1.2 Light Cable Percussion Boring

For routine soil exploration to depths in excess of 3m, the light cable percussion rig is generally employed for boring through soils and weak rocks, refs 9.3, 9.4 and 9.5 It consists of a powered winch and tripod frame, with running wheels that are permanently attached so that the rig may be towed behind a suitable vehicle. The rig is towed into position and set up using its own winching system.

The locations of services are checked to make sure the borehole is not situated unacceptably near any services. Regardless of the proximity of services, a CAT scan is undertaken at the borehole location and a trial hole dug to 1.20m by hand.

Boreholes are advanced in soil by the percussive action of the cable tool. The force of the cylindrical tool as it is dropped a short distance cuts a plug of cohesive soil that is removed by the tool.

In non-cohesive soils, the borehole is advanced by a ‘shell’, otherwise known as a ‘bailer’ or ‘sand pump’, which incorporates a clack valve. Material is transferred into the shell and retained by the clack valve. The water level in a borehole is maintained above that in the surrounding granular soil to allow for temporary reductions in the head of water as the shell is withdrawn from the borehole. Water should flow from the borehole into the surrounding soil at all times to prevent ‘piping’ and loosening the soil at the base of the hole. The casing is always advanced with the borehole in granular soil so that material is drawn from the base rather than the borehole sides.

Obstructions to boring are overcome by fitting a serrated chiselling ring to the base of the percussion tool. For large obstructions, a heavy chisel with a hardened cutting edge may have to be used.

Disturbed samples are taken in polythene bags, jars or tubs that are sealed against air or water loss.

Undisturbed samples are generally taken in cohesive materials at changes in strata and at one metre intervals to 5 metres then at 1.5 metre intervals to the full depths of the borehole. The general purpose open-tube sampler is suitable for firm to stiff clays, but is often used to retrieve disturbed samples of weak rocks, soft or hard clay and also clayey sand or silts. This has been adopted for routine use, and usually consists of a 100mm internal diameter tube (U100), which is capable of taking soil samples up to 450mm in length. The undisturbed samples are sealed at each end using micro-crystalline wax to prevent drying.

Standard penetration tests are generally carried out in non-cohesive soils but also in stiff clays and soft rocks at frequencies similar to that of undisturbed sampling.

A2.1.3 Rotary Drilling

For exploration within rock rotary drilling methods are employed, where the drill bit is rotated on the bottom of the borehole. This method is occasionally used for drilling within soils. The drilling fluid is transferred from the surface though hollow drilling rods to the bit cooling and lubricating. Drilling fluids commonly comprise clean water, air, foam, mud or polymers which aid the transportation of drill cuttings to the surface and maximise core recovery.

There are two basic types of rotary drilling:

- Open hole where the drill bit cuts all the material within the diameter of the borehole. This technique is sometimes used in soils and weak rocks as a rapid and economical means of making holes for taking soil samples, carrying out insitu soil tests, installing instruments and probing for voids such as mine workings or solution cavities. The only samples recovered are the poor quality drill cuttings.

- Core drilling where an annular bit fixed to the bottom of the core barrel cuts a core, which is recovered within the innermost tube of the core barrel. Coring is normally carried out by triple tube core barrels. At the end of the core run the core barrel assembly is brought to the surface. The core is prevented from dropping out of the barrel by a core catcher made of spring steel. The non-rotating inner barrel contains a removable sample tube or liner. At the end of each coring run the liner is extracted from the barrel and stored in a core box, where it can be photographed, described and tested.

A2.2 IN-SITU TESTS

A2.2.1 Standard Penetration Test

The Standard Penetration Test is carried out in accordance with the proposals recommended by ISO 1997, ref. 9.4, BS 1377, Part 9, 1990 ref. 9.6 and ISO 22476 ref. 9.5.

The standard penetration test, **SPT**, covers the determination of the resistance of soils to the penetration of a split barrel sampler. A 50mm diameter split barrel sampler is driven 450mm into the soil using a 63.5kg hammer with a 760mm drop. The penetration resistance is expressed as the number of blows required to obtain 300mm penetration below an initial seating drive of 150mm through any disturbed ground at the bottom of the borehole. The number of blows to achieve the standard penetration of 300mm is reported as the ‘N’ value.

The test is generally carried out in fine soils, however, it may also be carried out in coarse granular soils, weak rocks and glacial tills using the same procedure as for the SPT but with a 50mm diameter, 60° apex solid cone replacing the split spoon sampler, **CPT.**

When attempting the standard penetration test in very dense material or weathered rocks it may be necessary to terminate the test before completion to prevent damage to the equipment. In these circumstances it is important to distinguish how the blow count relates to the penetration of the sampler. This may be achieved in the following manner:

- Where the seating drive has been completed, the test drive is terminated if 50 blows are reached before the full penetration of 300mm is achieved. The penetration for 50 blows is recorded and an approximate N value obtained by linear extrapolation of the number of blows for the partial test drive.

- If the seating drive of 150mm is not achieved within the first 25 blows, the penetration after 25 blows is recorded and the test drive then commenced.

- For tests in soft rocks, the test drive should be terminated after 100 blows where the penetration of 300mm has not been achieved.

The N-value obtained from the Standard Penetration Test may be used to assess the relative density of sands and gravels as follows:

Term	SPT N-Value : Blows/300mm Penetration
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

A2.3 SAMPLES

A2.3.1 General

Samples have been recovered and stored in accordance with the guidelines given in ISO 22475-1:2006, ref. 9.35 and BS 5930, ref. 9.3.

The undisturbed samples recovered from the percussive sampler were of varying diameters depending upon the depth taken and the ground conditions encountered.

In accordance with EN ISO 22475, ref. 9.35, and BS 5930, ref. 9.3, the thick walled U100 sample is considered as a Class B sampling technique and will only produce Class 3 to 5 quality samples in accordance with EN 1997-2:2007, ref. 9.4. A similar assumption can be made from samples tested from the percussive window sample probing.

Laboratory strength and consolidation testing can only be carried out on Class 1 quality samples, which can be obtained from a Class A sampling technique, ref. 9.4. This is due to possible disturbance during sampling, giving a weaker strength in testing.

Therefore values for c_u and mv derived for use in this report can only be used as guidance and not used to determine the shear strength properties of the clay and is not used to give a descriptive strength in the borehole records.

UT	represents undisturbed 100mm diameter samples taken in thin walled sample tubes, the number of blows to obtain the sample also recorded.
U	represents undisturbed 100mm diameter sample, the number of blows to obtain the sample also recorded.
U fail	indicates undisturbed sample not recovered
ES	represents sample recovered in an amber jar, generally for environmental analysis
HV	represents Hand Vane test with equivalent undrained shear strength in kPa.
PP	represents Pocket Penetrometer test with equivalent undrained shear strength in kPa.
CBR	represents California Bearing Ratio test
B	represents large bulk disturbed samples
D	represents small disturbed sample
W	represents water sample
∇	represents water strike
▼	represents level to which water rose

A2.4 DESCRIPTION OF SOILS

A2.4.1 General

The procedures and principles given in ISO 14688 Parts 1 and 2, ref. 9.36, supplemented by section 6 of BS 5930, ref. 9.3 have been used in the soil descriptions contained within this report.

BOREHOLE RECORDS

IAN FARMER ASSOCIATES

Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH1 Sheet 1 of 1
Contract Number: 31554	Date Started: 24/08/2018	Logged By: SP	Checked By: PC	Status: FINAL	
Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

Cable Percussion Borehole Log

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing

Depth	Sample ID	Test Result
0.10	D1	
0.30	ES2	
0.50	ES3	
0.50 - 1.00	B4	
1.00	ES5	
1.20		SPT(S) 50 (25 for 21mm/50 for 13mm)
1.20	D6	

Strata Details

Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description
	0.10	▨	MADE GROUND: Tarmac/Concrete.
	(1.30) 1.40	▨	MADE GROUND: Slag.
			End of Borehole at 1.40m

1 2 3 4 5 6 7 8 9 10

Groundwater

Water Strike	Backfill/ Installation

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
24-08-2018	00:00	1.40			1.40	200		

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)
1.20	1.40	01:30					

Remarks:

Inspection pit dug to 1.20m. Borehole terminated due to refusal at 1.40m. No groundwater observed.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH1A
	Contract Number: 31554	Date Started: 28/08/2018	Logged By: SP	Checked By: PC	Status: FINAL	Sheet 1 of 1
Cable Percussion Borehole Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.20	D1			0.10	▨	MADE GROUND: Tarmac and concrete.		
0.50 0.50	B3 ES2			(1.20)	▨	MADE GROUND: Light grey sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of concrete and slag. Cobbles are angular slag.		
1.00	ES4							
				1.30		*Terminated on large cobble of slag.* End of Borehole at 1.30m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
28-08-2018	00:00	1.30			1.30	200		

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)
1.20	1.30	00:40					

Remarks:

Inspection pit dug to 1.20m. Borehole terminated due to refusal at 1.30m.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

IAN FARMER ASSOCIATES

Cable Percussion Borehole Log	Contract Name: Flixborough EFW Plant, Scunthorpe		Client: Solar 21		Borehole ID: BH1B Sheet 1 of 1
	Contract Number: 31554	Date Started: 28/08/2018	Logged By: SP	Checked By: PC	Status: FINAL
	Easting:	Northing:	Ground Level:	Print Date: 18/10/2018	Scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				0.10	▨	MADE GROUND: Tarmac and concrete.		
0.50 0.50	B2 ES1			(0.80)	▨	MADE GROUND: Light grey sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse slag and concrete. Cobbles are angular slag. *Terminated on large cobbles of slag.*		
0.90	ES3			0.90		End of Borehole at 0.90m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
28-08-2018	00:00	0.90						

Remarks:

Inspection pit dug to 1.20m. Borehole terminated at 0.90m on cobbles of slag.

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

IAN FARMER ASSOCIATES

CP & Rotary Core Drilling Log	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH2
	Contract Number: 31554	Date Started: 29/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 1 of 4
	Easting:	Northing:	Ground Level:	Plant Used:	Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					D1 0.10		0.10		MADE GROUND: Tarmacadam.		
					ES2 0.30 ES3 0.50 B4 0.75		(0.65) 0.75		MADE GROUND: Light brown gravelly fine to coarse SAND with low cobble content. Gravel is angular to subrounded fine to coarse of flint, brick, concrete, slag, mudstone and sandstone. Cobbles are angular slag.		
1.20					ES5 1.00 B7 1.20 D6 1.20 N=5 (1,1/1,1,1,2) (S) D8 1.85		(1.25) 2.00		Soft light brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to medium of mudstone, flint and coal. occasionally laminated at 1.00mbgl.		
3.00					D9 2.00 U10 2.00 D11 2.45 D12 2.75 B15 3.00 D13 3.00 N=6 (1,1/1,1,2,2) (S)		(1.20) 3.20		Firm light brown mottled grey sandy CLAY occasionally laminated.		
5.00					D14 3.20 D16 3.75 U17 4.00 D18 4.45 D19 4.75 B21 5.00 D20 5.00 N=5 (1,1/1,1,1,2) (S) D22 5.75 U23 6.50		(3.50) 6.70		Very soft to soft light grey brown slightly silty slightly sandy to sandy laminated CLAY. *At 5.00m plant matter noted*		
8.00					D25 6.70 D24 6.95 D26 7.25 B28 8.00 D27 8.00 N=8 (1,1/1,2,2,3) (S) D29 8.75 U30 9.50 D31 9.95		(5.80)		Soft to firm brown slightly sandy slightly silty laminated CLAY with large pockets of dark brown fibrous peat.		

Continued next sheet

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
29-08-2018	00:00	18.00	18.00	16.90
30-08-2018	00:00	21.90	21.58	9.60
06-09-2018	00:00	30.10		28.10

Borehole Diameter

Depth (m)	Dia (mm)
12.90	200
21.90	150

Casing Diameter

Depth (m)	Dia (mm)
12.90	200
21.80	150

Remarks:

Inspection pit dug to 1.20m. Groundwater encountered at 12.50m. Borehole backfilled with bentonite grout on completion.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Flush Information

Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation

Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH2
	Contract Number: 31554	Date Started: 29/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 2 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details					Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
					D32 10.25							
11.00					B34 11.00 D33 11.00 N=9 (1,1/2,2,2,3) (S) D35 11.75				*At 11.00mbgl peat content increasing*	11		
										12		
12.50					B39 12.50 D36 12.50 D37 12.50 EW38 12.50 N=5 (1,0/0,1,2,2) (S) D40 13.25		12.50		Loose becoming medium dense light grey slightly gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of quartzite, flint, mudstone and coal.	13		
14.00					B42 14.00 D41 14.00 N=8 (0,0/0,2,3,3) (S) D43 14.75		(3.70)			14 15		
15.50					B45 15.50 D44 15.50 N=14 (1,1/2,3,4,5) (S)				*Medium dense at 15.50m.*	16		
					D46 16.25		16.20		Medium dense light brown to brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of mudstone, flint, quartzite and occasional coal.			
17.00					B48 17.00 D47 17.00 N=16 (1,2/2,3,5,6) (S)		(1.40)			17		
					D49 17.60 D50 17.75		17.60		Firm red brown mottled grey slightly gravelly slightly sandy CLAY. Gravel is angular to rounded fine to coarse of flint, mudstone and quartzite	18		
					B51 18.50		(4.20)					
19.00					B53 19.00 D52 19.00 N=18 (2,3/3,5,5,5) (S) D54 19.75				*Becoming stiff at 19.00m.*	19		
									Continued next sheet	20		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
29-08-2018	00:00	18.00	18.00	16.90	12.90	200	12.90	200
30-08-2018	00:00	21.90	21.58	9.60	21.90	150	21.80	150
06-09-2018	00:00	30.10		28.10				

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 12.50m. Borehole backfilled with bentonite grout on completion.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES

Contract Name:	Client:	Borehole ID:
Flixborough EFW Plant, Scunthorpe	Solar 21	BH2

Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 3 of 4
31554	29/08/2018	SP/CL	PC	FINAL	

CP & Rotary Core Drilling Log

Easting:	Northing:	Ground Level:		Print Date:	Scale:
				18/10/2018	1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
20.50					B56 20.50 D55 20.50 N=16 (2,2/3,3,4,6) (S) D57 21.25						
21.80 21.90					D58 21.80 D59 21.80 50 (25 for 37mm/50 for 97mm) (S) D60 21.90 50 (25 for 29mm/50 for 28mm) (S)		21.80 21.90		Light blue / green grey weathered MUDSTONE with quartz veins.		
22.00 - 23.10	100	90	34	11 NI 17 NI			(2.00)		Very weak to weak red brown and green grey MUDSTONE with very closely and closely spaced laminations, very thin and occasional thin beds of gypsum. Discontinuities: Horizontal and subhorizontal, very closely and closely spaced, planar smooth.		
23.10 - 24.00	66	27	0	NR 24 NI 17 NI NR					*From 23.50m to 23.57m: Gypsum.*		
24.00 - 24.60	92	92	52	11	C1 24.18		24.00		Weak red brown, locally green grey, MUDSTONE with very closely to medium spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal and subhorizontal, very closely to medium spaced, planar and undulating, smooth.		
24.60 - 26.10	87	87	63	NR 9			(2.80)				
26.10 - 27.60	100	100	67	11 3 27	C2 26.34		26.80		Weak grey, locally red brown, MUDSTONE with very closely to medium spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal and subhorizontal, very closely to medium spaced, planar and undulating, smooth.		
27.60 - 29.10	97	92	69	4 30 NI 17 NI 5	C3 27.60		(2.60)				
29.10 - 30.10	100	100	80	13	C4 29.14		29.40 (0.60) 30.00		Weak red brown MUDSTONE with closely spaced spaced laminations and thin beds of gypsum. Discontinuities: Horizontal and subhorizontal, planar smooth.		

Continued next sheet

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
29-08-2018	00:00	18.00	18.00	16.90
30-08-2018	00:00	21.90	21.58	9.60
06-09-2018	00:00	30.10		28.10

Borehole Diameter

Depth (m)	Dia (mm)
12.90	200
21.90	150

Casing Diameter

Depth (m)	Dia (mm)
12.90	200
21.80	150

Remarks:

Inspection pit dug to 1.20m. Groundwater encountered at 12.50m. Borehole backfilled with bentonite grout on completion.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Flush Information

Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation

Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES

Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH2
Contract Number: 31554	Date Started: 29/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 4 of 4

CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
									End of Borehole at 30.100m		

31

32

33

34

35

36

37

38

39

40

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
29-08-2018	00:00	18.00	18.00	16.90	12.90	200	12.90	200
30-08-2018	00:00	21.90	21.58	9.60	21.90	150	21.80	150
06-09-2018	00:00	30.10		28.10				

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 12.50m. Borehole backfilled with bentonite grout on completion.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH3
	Contract Number: 31554	Date Started: 30/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 1 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Water Strike	Backfill/ Installation
							0.15	MADE GROUND: Tarmac/concrete.		
					D1 0.20 ES2 0.30 B4 0.50 ES3 0.50 ES5 1.00		(1.95)	MADE GROUND: Light grey brown sandy GRAVEL with high cobble content of slag. Sand is fine to coarse. Gravel is angular to subangular fine to coarse slag, concrete, flint and mudstone. Cobbles are angular slag.	▼	
3.00					B8 2.10 D6 2.10 U7 2.10 D9 2.75 B10 3.00 N=3 (1,1/0,1,1,1) (S) D11 3.75 U12 4.00		2.10 (2.00)	Soft grey brown slightly sandy slightly gravelly, locally laminated, CLAY. Gravel is angular to subrounded fine to coarse flint and mudstone.		
5.00					D13 4.45 D14 4.75 B16 5.00 D15 5.00 N=5 (1,1/1,1,2,1) (S) D17 5.75 U18 6.50		4.10 (2.60)	Soft light grey brown slightly sandy silty laminated slightly organic CLAY with inclusions of peat.		
8.00					D20 6.70 D19 6.95 D21 7.25 B23 8.00 D22 8.00 N=8 (1,1/2,2,2,2) (S) D24 8.75 U25 9.50 D26 9.95		6.70 (5.60)	Brown fibrous PEAT with pockets of brown slightly sandy silty organic clay.	▼	

Continued next sheet

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
30-08-2018	00:00	3.45	2.90		13.00	200	13.00	200
31-08-2018	00:00	18.00	16.90	8.10	18.00	150	21.00	150
03-09-2018	00:00	21.25	21.00	2.30				
05-09-2018	00:00	30.00		2.90				

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	2.00	PLAIN	
					2.00	12.00	SLOTTED	

Remarks:

Inspection pit dug to 1.20m. Water encountered at 0.35m in inspection pit. Groundwater strike at 12.30m. water level on completion of borehole, 3.90m. Standpipe installed to 12.00m.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
0.35			0		
12.30			20	6.80	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

HBSI RC Issue Number: 3 Issue Date: 10/05/16

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH3
	Contract Number: 31554	Date Started: 30/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 2 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					D27 10.25						
11.00					B29 11.00 D28 11.00 N=9 (1,1/2,2,2,3) (S) D30 11.75						
12.50					D31 12.30 EW36 12.30 B33 12.50 D32 12.50 N=6 (1,0/0,1,2,3) (S) D34 13.25		12.30		Loose becoming medium dense light grey slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse sandstone and mudstone.	▽	
14.00					B37 14.00 D35 14.00 N=11 (0,0/0,3,3,5) (S) D38 14.75		(3.90)		*Medium dense below 14.00m.*		
15.50					B40 15.50 D39 15.50 N=13 (1,2/2,3,3,5) () D41 16.25						
							16.20		Medium dense red brown slightly silty very gravelly fine to coarse SAND.. Gravel is angular to subrounded fine to coarse sandstone and mudstone.		
17.00					B43 17.00 D42 17.00 N=17 (2,3/3,3,5,6) (S) D44 17.50 D45 17.75		(2.90)				
18.50					B47 18.50 D46 18.50 N=20 (2,2/3,5,5,7) (S) D48 19.10						
							19.10		Firm light red brown mottled grey sandy CLAY.		
							(1.80)				
					B40 20.00				Continued next sheet		

Start & End of Shift Observations				
Date	Time	Depth (m)	Casing (m)	Water (m)
30-08-2018	00:00	3.45	2.90	
31-08-2018	00:00	18.00	16.90	8.10
03-09-2018	00:00	21.25	21.00	2.30
05-09-2018	00:00	30.00		2.90

Borehole Diameter		Casing Diameter	
Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
13.00	200	13.00	200
18.00	150	21.00	150

Remarks:
Inspection pit dug to 1.20m. Water encountered at 0.35m in inspection pit. Groundwater strike at 12.30m. water level on completion of borehole, 3.90m. Standpipe installed to 12.00m.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
0.35			0		
12.30			20	6.80	

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)
0.00	2.00	PLAIN	
2.00	12.00	SLOTTED	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe		Client: Solar 21			Borehole ID: BH3
	Contract Number: 31554	Date Started: 30/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 3 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
20.50 21.20 21.25					D50 20.50 N=15 (2,2/3,3,4 ,5) (S) D51 20.75 D52 20.90 D53 21.20 D54 21.20 50 (25 for 58mm/50 for 55mm) (S) D55 21.25 50 (25 for 32mm/50 for 47mm) (S) C1 21.98 C2 22.59		20.90 (0.90)		Light grey weathered MUDSTONE with inclusions of gypsum..		
21.80 - 23.00	100	77	59	NI 33 6 NI 10			21.80		Weak red brown, locally green grey, MUDSTONE with very closely and closely spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal to subhorizontal very closely to closely spaced, occasionally medium spaced, planar smooth.		
23.00 - 24.50	100	83	75	NI 17 NI 20 NI	C3 23.80		(3.38)				
24.50 - 26.00	100	100	95	6	C4 24.70		25.18		Weak green grey MUDSTONE, locally grading to siltstone, with very closely and closely spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal and subhorizontal, closely and medium spaced, planar smooth.		
26.00 - 27.50	100	97	97	NI 6	C5 26.00		(2.32)				
27.50 - 29.00	100	100	78	14 8	C6 27.71		27.50		Weak red brown, locally green grey, MUDSTONE with very closely and closely spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal to subhorizontal very closely to closely spaced, planar smooth. *From 27.50m to 27.57m: Weak red brown fine grained sandstone.*		
29.00 - 29.60	100	42	33	NI 10 NI 10 NI			(2.50)		*Below 29.00m: Predominantly recovered none intact. Driller notes fractured marl.*		
29.60 - 30.00 30.00	88	0	0	NR NI			30.00				

Continued next sheet

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
30-08-2018	00:00	3.45	2.90		13.00	200	13.00	200
31-08-2018	00:00	18.00	16.90	8.10	18.00	150	21.00	150
03-09-2018	00:00	21.25	21.00	2.30				
05-09-2018	00:00	30.00		2.90				

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	2.00	PLAIN	
					2.00	12.00	SLOTTED	

Remarks:
Inspection pit dug to 1.20m. Water encountered at 0.35m in inspection pit. Groundwater strike at 12.30m. water level on completion of borehole, 3.90m. Standpipe installed to 12.00m.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
0.35			0		
12.30			20	6.80	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21			Borehole ID: BH3
	Contract Number: 31554	Date Started: 30/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL		Sheet 4 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018		Scale: 1:50
		SPT Hammer: ALMC1 Energy Ratio: 51%					

Samples & In Situ Testing						Strata Details					Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
					50 (17,8/50 for 75mm) (C)				End of Borehole at 30.000m			
										31		
										32		
										33		
										34		
										35		
										36		
										37		
										38		
										39		
										40		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
30-08-2018	00:00	3.45	2.90		13.00	200	13.00	200
31-08-2018	00:00	18.00	16.90	8.10	18.00	150	21.00	150
03-09-2018	00:00	21.25	21.00	2.30				
05-09-2018	00:00	30.00		2.90				

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	2.00	PLAIN	
					2.00	12.00	SLOTTED	

Remarks:

Inspection pit dug to 1.20m. Water encountered at 0.35m in inspection pit. Groundwater strike at 12.30m. water level on completion of borehole, 3.90m. Standpipe installed to 12.00m.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
0.35			0		
12.30			20	6.80	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe		Client: Solar 21		Borehole ID: BH4
	Contract Number: 31554	Date Started: 22/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL
					Sheet 1 of 3
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018
					Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					D1 0.10		0.05		MADE GROUND: Tarmacadam.		
					ES2 0.30 ES3 0.50 B4 0.60		(0.55) 0.60		MADE GROUND: Light grey slightly sandy GRAVEL. Gravel is angular to rounded fine to coarse of dolerite, hardcore, slag and concrete. Sand is fine to coarse.		
1.20					ES5 1.00 B8 1.20 D6 1.20 N=8 (1,1/1,2,2,3) (S) D7 1.40		(0.80) 1.40		MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of coal, mudstone and brick.		
					D9 1.85		(0.45) 1.85		Very soft to soft light brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse of coal, mudstone and possible brick..		
					D11 2.00 U10 2.00		2.00		Soft light brown slightly silty slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse of sandstone and mudstone.		
3.00					D12 2.75 B15 3.00 D13 3.00 N=5 (1,1/1,1,1,2) (S) D14 3.20		(1.20) 3.20		Soft light brown mottled grey slightly silty slightly sandy laminated CLAY.		
5.00					D16 3.75 U17 4.00 D18 4.45 D19 4.75 B21 5.00 D20 5.00 N=6 (1,1/1,1,2,2) (S) D22 5.75 D23 6.10		(2.90) 6.10		Soft light grey slightly sandy CLAY.		
8.00					U24 6.50 D25 6.95 D26 7.25 B28 8.00 D27 8.00 N=9 (1,1/2,2,2,3) (S) D29 8.75 U30 9.50 D31 9.95		(6.20)		Soft dark brown slightly silty slightly sandy clayey fibrous PEAT with large wood fragments and plant matter.	▼	

Continued next sheet

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
22-08-2018	00:00	8.45	7.80	
23-08-2018	00:00	22.70	22.50	7.45

Borehole Diameter

Depth (m)	Dia (mm)
12.50	200
22.70	150

Casing Diameter

Depth (m)	Dia (mm)
12.50	200
22.50	150

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 12.30m. Borehole backfilled with bentonite grout.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
12.30	12.20		20	6.70	

Flush Information

Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation

Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: **BH4** Sheet 2 of 3
	Contract Number: 31554	Date Started: 22/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50
				SPT Hammer: ALMC1 Energy Ratio: 51%		

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					D32 10.25						
11.00					B34 11.00 D33 11.00 N=7 (1,1/1,1,2,3) (S) D35 11.75						
					D36 12.30		12.30		Very loose Light grey slightly gravelly fine and medium SAND. Gravel is angular to subrounded fine to coarse of mudstone, flint and coal.	▽	
12.50					B38 12.50 D37 12.50 N=2 (2,1/0,0,1,1) (S) D39 13.25		(1.80)				
14.00					B42 14.00 D40 14.00 EW41 14.00 N=9 (1,/1,2,2,4) (S) D43 14.75		14.10		Loose to medium dense light grey brown slightly gravelly to gravelly SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone , flint and some coal.		
15.50					B45 15.50 D44 15.50 N=15 (1,1/2,4,4,5) (S) D46 16.25		(3.30)		*Medium dense at 15.50m.*		
17.00					B48 17.00 D47 17.00 N=18 (1,2/3,5,5,5) (S) D49 17.40 D50 17.75		17.40 (1.10)		Medium dense light brown gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, flint, mudstone and coal.		
18.50					B51 18.50 N=17 (2,2/3,3,4,7) (S)		18.50 (0.90)		Medium dense light brown SAND and GRAVEL. Gravel is angular to subrounded fine to coarse of sandstone, mudstone, flint and coal. Sand is fine to coarse.		
					D52 19.25 D53 19.40		19.40		Firm to stiff light brown mottled grey slightly gravelly slightly silty CLAY. Gravel is angular to subrounded fine to coarse of mudstone, coal and flint.		
20.00					B56 20.00				Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
22-08-2018	00:00	8.45	7.80		12.50	200	12.50	200
23-08-2018	00:00	22.70	22.50	7.45	22.70	150	22.50	150

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 12.30m. Borehole backfilled with bentonite grout.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
12.30	12.20		20	6.70	

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH4
	Contract Number: 31554	Date Started: 22/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 3 of 3
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details			Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Water Strike	Backfill/ Installation
					D54 20.00 N=23 (2,2/4,5,6,8) (S) D56 20.75 B57 21.50 D58 22.25		(3.20)			
~~22.60~~ 22.70				NI	D59 22.60 D60 22.60 50 (10,14/50 for 78mm) (S)		22.60 22.70	Light grey weathered MUSTONE.		
22.60 - 23.50	100	90	68	9	50 (22 for 57mm/50 for 24mm) (S) C1 22.76 C2 22.88 C3 23.10 4 23.60			Very weak to weak grey MUDSTONE with very closely and closely spaced very thin beds and thin laminations of white gypsum. Discontinuities: Subhorizontal and horizontal very closely and closely spaced, some poosible drilling induced.Weathering: None discernible. *From 22.70m to 22.74m: Gypsum.* *From 22.77m to 22.80m: Gypsum.* *23.06m to 23.11m: Gypsum.*		
23.50 - 24.70	84	84	28	NR 9 NI 11			(2.14)	*From 23.96m to 24.06m: Gypsum.* *From 24.04m to 24.12m: Gypsum.* *From 24.25m to 24.31m: Gypsum.* *From 24.57m to 24.58m: Gypsum.*		
24.70 - 26.20	100	84	35	14 NI 80 NI 13 NI 33 7 11			24.84 (1.36)	Very weak to weak red brown MUDSTONE with very closely and closely spaced very thin beds and laminations of gypsum. Discontinuities: Subhorizontal and horizontal, very closely and closely spaced, undulating and planar, smooth. Weathering: None discernible. *From 23.96m to 24.06m: Gypsum.* *From 24.04m to 24.12m: Gypsum.* *From 24.25m to 24.31m: Gypsum.* *From 24.57m to 24.58m: Gypsum.* *From 25.00m to 25.03m: Gypsum.* *From 25.34m to 25.37m: Gypsum.* *From 25.60m to 25.64m: GYpsum.* *Weak red brown fine grained sandstone.*		
26.20 - 27.70	60	49	7	NR 10 NI 16 NI 17			26.20 (0.60) 26.80	Red and grey MARL with gypsum bands (DRiller's description, no core recovery). *From 26.37m to 26.375m: Gypsum.* Weak red brown and locally green grey MUDSTONE and locally green grey I with very closely and closely spaced very thin beds and laminations of gypsum. Discontinuities: Subhorizontal and horizontal, very closely and closely spaced, undulating and planar, smooth. *From 27.06m to 27.12m: Gypsum.*		
~~27.70~~ 27.70 - 28.00	100	0	0	NI 29 NI	50 (25 for 140mm/50 for 75mm) (C)					
28.00 - 29.00	100	83	52	7			(3.20)			
29.00 - 30.00	100	85	51	19 NI 22 NI 9 NI 9			30.00	End of Borehole at 30.000m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
22-08-2018	00:00	8.45	7.80		12.50	200	12.50	200
23-08-2018	00:00	22.70	22.50	7.45	22.70	150	22.50	150

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 12.30m.
Borehole backfilled with bentonite grout.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
12.30	12.20		20	6.70	

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES

	Contract Name: Flixborough EFW Plant, Scunthorpe		Client: Solar 21		Borehole ID: BH5
	Contract Number: 31554	Date Started: 03/09/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL
					Sheet 1 of 3
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
							0.15		MADE GROUND: Tarmac/concrete.		
					D1 0.20 ES2 0.30		(0.35)		MADE GROUND: Light grey and dark brown sandy GRAVEL. Gravel is angular to subrounded fine to coarse slag, brick and concrete.		
					B4 0.50 ES3 0.50		0.50		MADE GROUND: Red brown slightly silty sandy GRAVEL. Gravel is angular to subrounded fine to coarse brick with slag and mudstone. Cobbles of brick also noted.		
					B4a 0.85		(0.50)				
					ES5 1.00		1.00		Soft/very soft light brown, locally mottled grey sandy CLAY.		
1.20					B7 1.20 D6 1.20 N=5 (1,0/1,1,1,2) (S)						
					D8 1.85		(1.70)				
					B10 2.00 U9 2.00						
					D11 2.70		2.70		Soft/very soft grey brown slightly sandy silty laminated CLAY.		
3.00					B13 3.00 D12 3.00 N=4 (1,1/1,1,1,1) (S)						
					D14 3.75						
					U15 4.00						
					D16 4.45		(3.50)				
					D17 4.75						
5.00					B19 5.00 D18 5.00 N=6 (1,1/1,1,2,2) (S)						
					D20 5.75						
					D21 6.20		6.20		Soft, occasionally firm, dark brown slightly sandy organic CLAY with inclusions of fibrous peat.		
					U22 6.50						
					D23 6.95						
					D24 7.25						
8.00					B26 8.00 D25 8.00 N=8 (1,1/1,2,2,3) (S)		(6.00)				
					D27 8.75						
					B29 9.50 U28 9.50						

Continued next sheet

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
03-09-2018	00:00	8.45	7.90		13.00	200	13.00	200
04-09-2018	00:00	21.05	20.60	6.30	21.05	150	21.05	150

Remarks:
Inspection pit 1.20m. Water seepage at 0.60m in inspection pit. Water strike at 12.20m. Borehole backfilled with bentonite grout.

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH5
	Contract Number: 31554	Date Started: 03/09/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 2 of 3
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					D30 10.25						
11.00					B32 11.00 D31 11.00 N=6 (1,1/1,2,1,2) (S) D33 11.75						
					D34 12.20 EW45 12.20		12.20		Medium dense and loose light grey brown silty fine to coarse SAND.		
12.50					D35 12.50 D36 12.50 N=11 (0,0/1,3,3,4) (S) D37 13.25						
14.00					B39 14.00 D38 14.00 N=9 (1,0/0,2,2,5) (S) D40 14.75		(4.10)				
15.50					B42 15.50 D41 15.50 N=14 (1,2/2,2,5,5) (S)						
					D43 16.30		16.30 (0.80)		Grey brown slightly silty gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse mudstone and quartzite.		
17.00					B47 17.00 D44 17.00 N=14 (1,2/2,3,4,5) (S)						
					D46 17.10 D48 17.75		17.10		Firm becoming stiff red and grey sandy slightly gravelly CLAY. Gravel is subangular mudstone.		
18.50					B50 18.50 D49 18.50 N=19 (2,3/3,5,5,6) (S) D51 19.25		(3.00)				
20.00					B54 20.00				Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
03-09-2018	00:00	8.45	7.90		13.00	200	13.00	200
04-09-2018	00:00	21.05	20.60	6.30	21.05	150	21.05	150

Remarks:
Inspection pit 1.20m. Water seepage at 0.60m in inspection pit. Water strike at 12.20m. Borehole backfilled with bentonite grout.

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe		Client: Solar 21			Borehole ID: BH5
	Contract Number: 31554	Date Started: 03/09/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 3 of 3
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing

Depth	TCR	SCR	RQD	FI	Samples / Tests
					D52 20.00 N=46 (5,8/9,11, 13,13) (S) D53 20.10 D55 20.80 D57 20.95
21.00 - 22.00	80	61	0	NR NI 15	
22.00 - 23.50	100	100	74	6 10 NI 20	C1 22.07
23.50 - 24.70	79	100	100	6	C2 23.90
24.70 - 26.30	100	93	73		C3 26.58
26.30 - 27.80	86	94	86	10 6 NI 14	
27.80 - 29.30	100	51	29	7 NI 7 NI	
29.30 - 30.00	100	100	87	9	

Strata Details

Level (mAOD)	Depth (m) (Thickness)	Strata Description
	20.10 (0.95)	Grey brown weathered MUDSTONE with inclusions of gypsum.
	21.05	Red and grey MARL with gypsum bands (Driller's description, no core recovery). From 21.19m to 21.20m: Gypsum.
	21.20 (1.30)	Weak grey MUDSTONE with closely spaced very thin beds and thin laminations of gypsum. Discontinuities: Horizontal, occasionally sub horizontal, very closely to closely spaced, undulating, smooth. From 21.30m to 21.34m: Gypsum. From 21.97m to 21.99m: Gypsum From 22.00m to 22.02m: Gypsum
	22.50 (7.50)	Weak red brown, occasionally green grey, MUDSTONE with very closely and closely spaced very thin beds and thin laminations of white gypsum. Discontinuities: Horizontal to subhorizontal, closely spaced, planar and undulating, smooth. From 22.72m to 22.735m: Gypsum. From 22.86m to 22.875m: Gypsum. From 23.12m to 23.125m: Gypsum. From 24.50m to 24.63m: Gypsum. From 27.60m to 27.68m: Gypsum. From 27.80m to 27.87m: Gypsum. FRom 28.80m to 28.80m: Gypsum.
	30.00	End of Borehole at 30.000m

Groundwater

Water Strike	Backfill/ Installation

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
03-09-2018	00:00	8.45	7.90	
04-09-2018	00:00	21.05	20.60	6.30

Borehole Diameter / **Casing Diameter**

Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
13.00	200	13.00	200
21.05	150	21.05	150

Remarks:
Inspection pit 1.20m. Water seepage at 0.60m in inspection pit. Water strike at 12.20m. Borehole backfilled with bentonite grout.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Flush Information

Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation

Top (m)	Base (m)	Type	Dia (mm)

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES

Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH6
Contract Number: 31554	Date Started: 21/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 1 of 4
Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

CP & Rotary Core Drilling Log

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing

Depth	TCR	SCR	RQD	FI	Samples / Tests
					D1 0.00
					ES2 0.30
					B4 0.50 ES3 0.50
					ES5 1.00
1.20					B8 1.20 D6 1.20 N=4 (1,1/1,1,1,1) (S)
					D7 1.30
					D9 1.85
					U10 2.00
					D11 2.45
					D12 2.75
3.00					B14 3.00 D13 3.00 N=7 (1,1/1,1,2,3) (S)
					D15 3.75
					U16 4.00
					D17 4.45
					D18 4.70
5.00					B20 5.00 D19 5.00 N=5 (1,1/1,1,1,2) (S)
					D21 5.75
					U22 6.50
					D23 6.95
					D24 7.25
8.00					B26 8.00 D25 8.00 N=6 (1,1/1,1,2,2) (S)
					D27 8.75
					B29 9.50 U28 9.50

Strata Details

Level (mAOD)	Depth (m) (Thickness)	Strata Description
	(0.30) 0.30	MADE GROUND: Black tarmacadam with dolomite hardcore.
	(0.30) 0.60	MADE GROUND: Light grey sandy GRAVEL. Gravel is angular to subrounded fine to coarse of slag, concrete and tarmacadam,
	(0.40) 1.00	Firm light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone and possible brick.
	(0.85) 1.85	Soft to firm light brown mottled grey slightly sandy slightly silty CLAY.
	(2.85) 4.70	Soft lightly grey slightly sandy silty CLAY.
	(4.80) 9.50	Very soft occasionally soft brown slightly sandy clayey fibrous PEAT with large wood matter and plant matter. Clay is locally laminated.
		Soft black slightly sandy slightly silty clayey amorphous PEAT.

1 2 3 4 5 6 7 8 9 10

Continued next sheet

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
21-08-2018	00:00	17.45	16.90	10.50
22-08-2018	00:00	21.20	21.00	13.10
31-08-2018	00:00	23.10	22.00	
03-09-2018	00:00	30.00	22.00	22.30

Borehole Diameter		Casing Diameter	
Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
12.00	200	12.00	200
21.20	150	21.00	150

Remarks:

Inspection pit dug to 1.20m. Groundwater encountered at 11.70m. Standpipe installed to 12.00m.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
11.70	11.50		20	6.30	

Flush Information

Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	
1.00	12.00	SLOTTED	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

HBSI RC Issue Number: 3 Issue Date: 10/05/16

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe		Client: Solar 21		Borehole ID: BH6
	Contract Number: 31554	Date Started: 21/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL
					Sheet 2 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					D30 10.25						
							(2.20)				
11.00					B32 11.00 D31 11.00 N=7 (1,1/1,2,2,2) (S)						
					D33 11.70		11.70		Loose brown grey slightly silty fine to medium SAND.	▽	
							(1.55)				
12.50					B35 12.50 D34 12.50 N=5 (3,0/0,0,1,4) (S)						
					D36 13.25		13.25		Loose grey brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone, flint, with small inclusions of wood.		
14.00					B38 14.00 D37 14.00 5 (2,1/,1,2,2) (S)						
					D39 14.75		(2.85)				
					W41 15.00						
15.50					D40 15.50 D42 15.50 N=9 (1,1/1,2,3,3) (S)						
					D43 16.25		16.10		Medium dense light grey red slightly clayey gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, flint, mudstone and occasional coal.		
							(1.10)				
17.00					B45 17.00 D44 17.00 N=17 (2,3/3,4,5,5) (S)		17.20		Firm slightly silty slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse of flint, mudstone, quartzite and occasional coal.		
					D46 17.75		(1.30)				
18.50					D47 18.50 N=15 (1,2/2,3,5,5) (S)		18.50		Medium dense light grey red slightly gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse of mudstone, flint and quartzite.		
							(0.75)				
					D48 19.25		19.25		Light grey red sandy CLAY.		
							(1.15)				
20.00					D50 20.00						

Continued next sheet

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
21-08-2018	00:00	17.45	16.90	10.50	12.00	200	12.00	200
22-08-2018	00:00	21.20	21.00	13.10	21.20	150	21.00	150
31-08-2018	00:00	23.10	22.00					
03-09-2018	00:00	30.00	22.00	22.30				

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 11.70m. Standpipe installed to 12.00m.

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
11.70	11.50		20	6.30	

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	1.00	PLAIN	
					1.00	12.00	SLOTTED	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES	Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH6
	Contract Number: 31554	Date Started: 21/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 3 of 4
CP & Rotary Core Drilling Log	Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing

Depth	TCR	SCR	RQD	FI	Samples / Tests
21.00 21.20				NR	D51 20.00 N=16 (2,2/3,4,4,5) (S) D52 20.40 D53 20.75 D54 20.80 D55 21.00 50 (25 for 97mm/50 for 68mm) (S) D56 21.10 D57 21.20 50 (25 for 42mm/50 for 70mm) (S)
22.00 - 22.50	92	92	50	9 NR	C1 22.17
22.50 - 23.10	88	88	32	11	C2 22.91
23.10 - 24.60	65	45	17	NR 31 NI 17 22 60 NI 8	C3 24.26
24.60 - 26.10	100	81	60	NI 13 NI	C4 25.60
26.10 - 27.60	100	100	89	7	
27.60 - 27.90	100	77	50	NI	
27.90 - 28.80	100	58	29	NI 12 NI 11 NI 8 NI	
28.80 - 30.00	67	9	9	NR NI 9 NI	50 (20,5/50 for 75mm) (C)

Strata Details

Level (mAOD)	Depth (m) (Thickness)	Strata Description
	20.40 (0.40)	Light brown clayey gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of mudstone and flint.
	20.80 (0.30)	Firm light grey red slightly gravelly sandy CLAY with low cobble content of angular mudstone. Gravel is angular to subrounded fine to coarse of mudstone, flint and quartzite.
	21.10 (0.90)	Light grey slightly weathered MUDSTONE.
	22.00 (1.10)	Weak green grey MUDSTONE with very closely and closely spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal and subhorizontal very closely and closely spaced. planar and undulating, smooth.
	23.10 (0.53)	Red and grey marl with gypsum bands (Driller's description, no core recovery).
	23.63	Weak green grey MUDSTONE with occasional very thin beds of gypsum. Discontinuities: Horizontal, very closely spaced. planar smooth.
	23.90 (4.00)	Weak red brown, locally grey, MUDSTONE with very and closely spaced laminations and very thin beds of gypsum. Discontinuities: Horizontal and subhorizontal, predominantly closely spaced, occasionally very closely spaced, planar and undulating, smooth.
	27.90 (0.90)	Very weak to weak green grey and locally red brown MUDSTONE with closely spaced laminations of gypsum. Predominantly recovered none intact.
	28.80 (1.20)	Very weak red brown MUDSTONE with occasional thin bed of gypsum. Predominantly recovered none intact (Probable disturbance caused by CPT testing).
	30.00	

Groundwater: Water Strike | Backfill/ Installation

Continued next sheet

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
21-08-2018	00:00	17.45	16.90	10.50
22-08-2018	00:00	21.20	21.00	13.10
31-08-2018	00:00	23.10	22.00	
03-09-2018	00:00	30.00	22.00	22.30

Borehole Diameter

Depth (m)	Dia (mm)
12.00	200
21.20	150

Casing Diameter

Depth (m)	Dia (mm)
12.00	200
21.00	150

Remarks:
Inspection pit dug to 1.20m. Groundwater encountered at 11.70m. Standpipe installed to 12.00m.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
11.70	11.50		20	6.30	

Flush Information

Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	
1.00	12.00	SLOTTED	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

IAN FARMER ASSOCIATES

Contract Name: Flixborough EFW Plant, Scunthorpe			Client: Solar 21		Borehole ID: BH6
Contract Number: 31554	Date Started: 21/08/2018	Logged By: SP/CL	Checked By: PC	Status: FINAL	Sheet 4 of 4
Easting:	Northing:	Ground Level:		Print Date: 18/10/2018	Scale: 1:50

CP & Rotary Core Drilling Log

SPT Hammer: ALMC1 Energy Ratio: 51%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Samples / Tests	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
					50 (18,7/50 for 75mm) (C)				End of Borehole at 30.000m		

31

32

33

34

35

36

37

38

39

40

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
21-08-2018	00:00	17.45	16.90	10.50	12.00	200	12.00	200
22-08-2018	00:00	21.20	21.00	13.10	21.20	150	21.00	150
31-08-2018	00:00	23.10	22.00					
03-09-2018	00:00	30.00	22.00	22.30				

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	1.00	PLAIN	
					1.00	12.00	SLOTTED	

Remarks:

Inspection pit dug to 1.20m. Groundwater encountered at 11.70m. Standpipe installed to 12.00m.

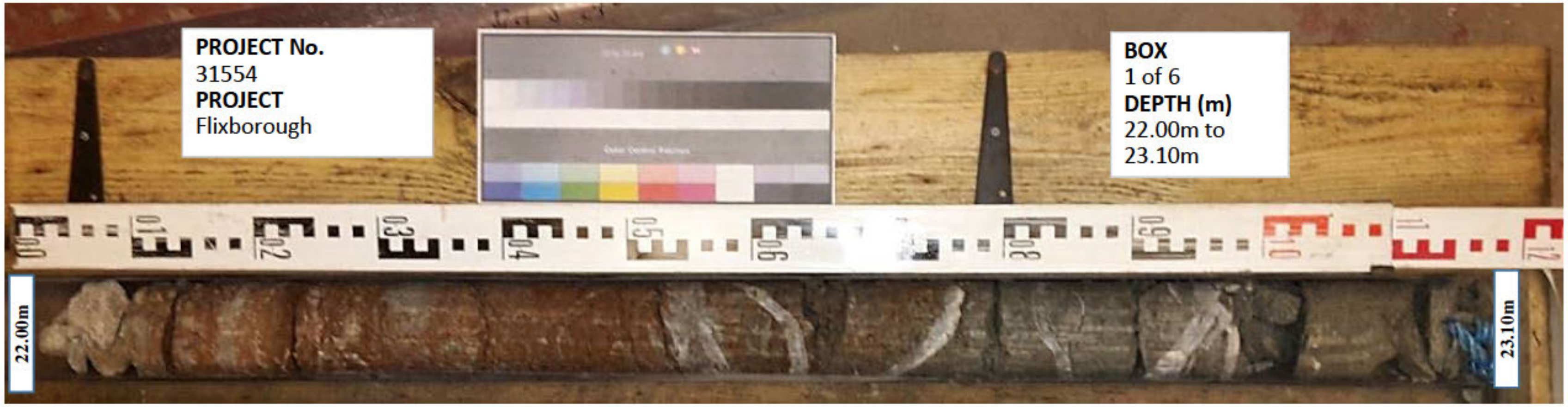
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
11.70	11.50		20	6.30	

Fracture Index reported as number per metre. TCR, SCR and RQD reported in %

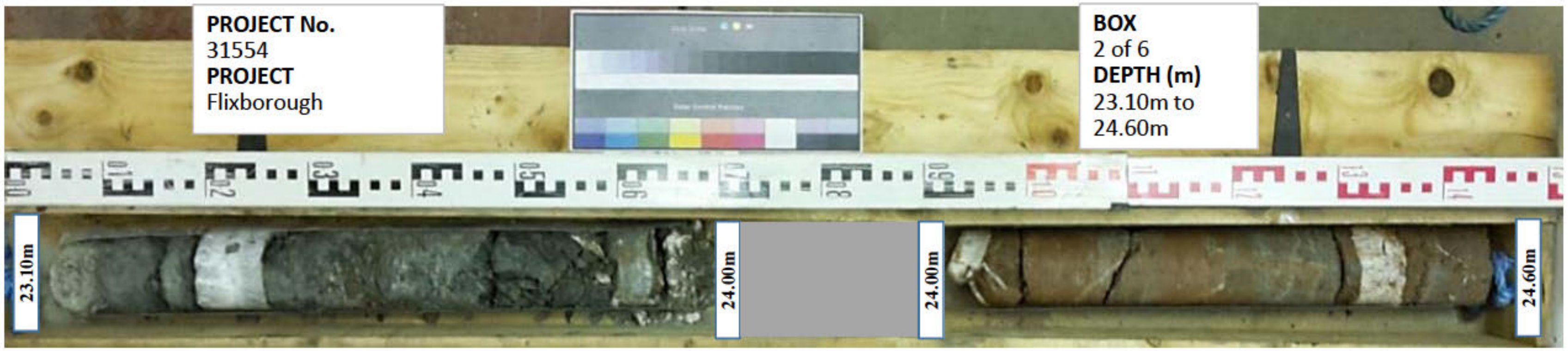
PHOTOGRAPHS OF ROCK CORE

IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH2



Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH2


PROJECT No.
31554
PROJECT
Flixborough

BOX
2 of 6
DEPTH (m)
23.10m to
24.60m


PROJECT No.
31554
PROJECT
Flixborough
BOX
3 of 6
DEPTH (m)
24.60m to
26.10m
Core Loss 24.60m to 24.80m
24.80m
26.10m

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH2

PROJECT No.
31554
PROJECT
Flixborough

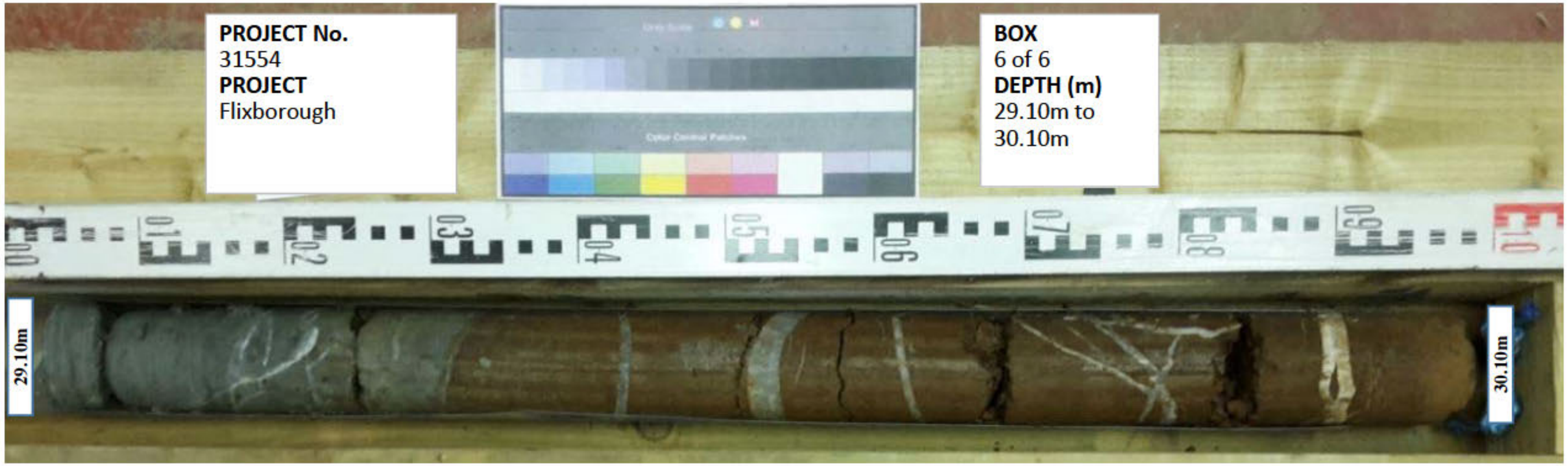
BOX
4 of 6
DEPTH (m)
26.10m to
27.60m

26.10m

27.60m

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH2

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH2




PROJECT No.
31554
PROJECT
Flixborough
BOX
1 of 6
DEPTH (m)
21.80m to
23.00m
21.80m
23.00m

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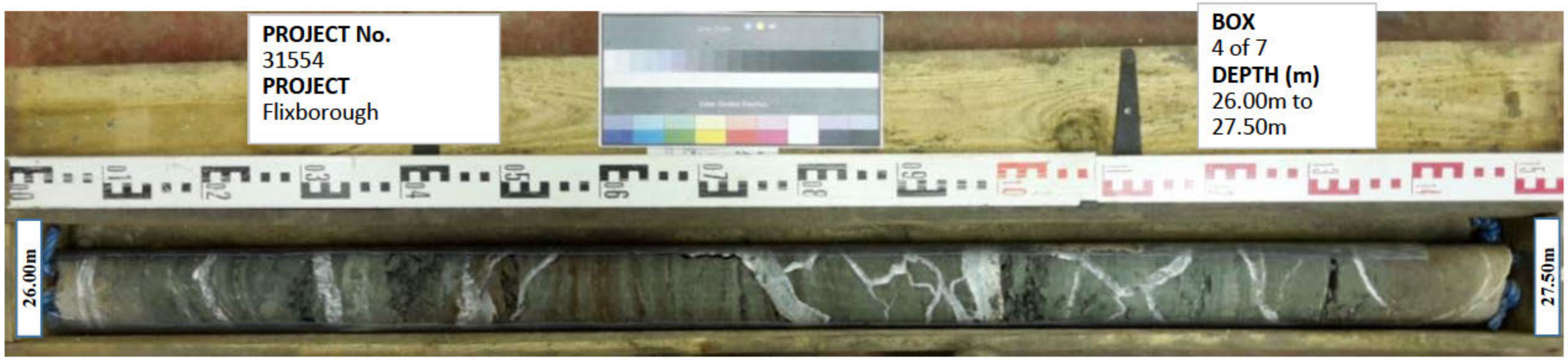
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH3

IAN FARMER ASSOCIATES

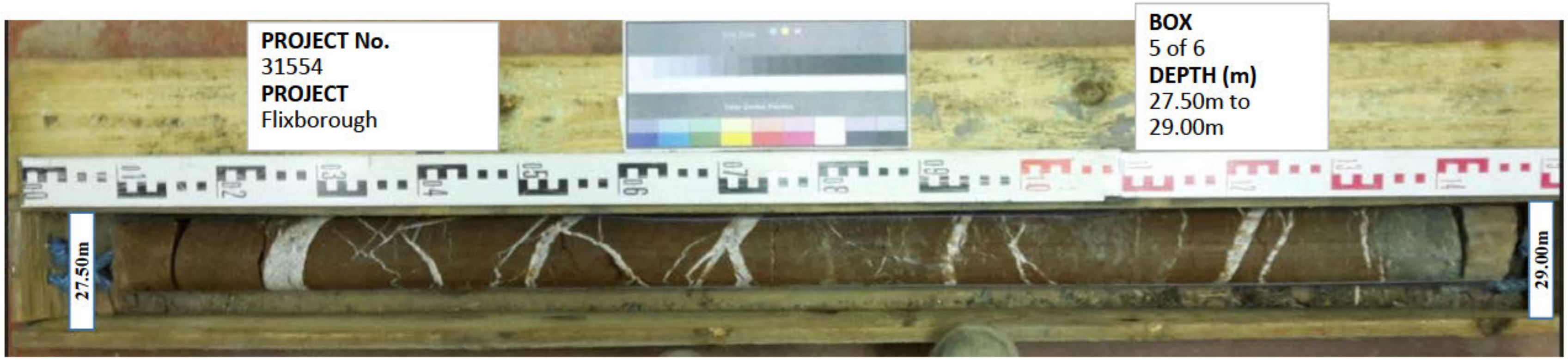
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH3

IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH3



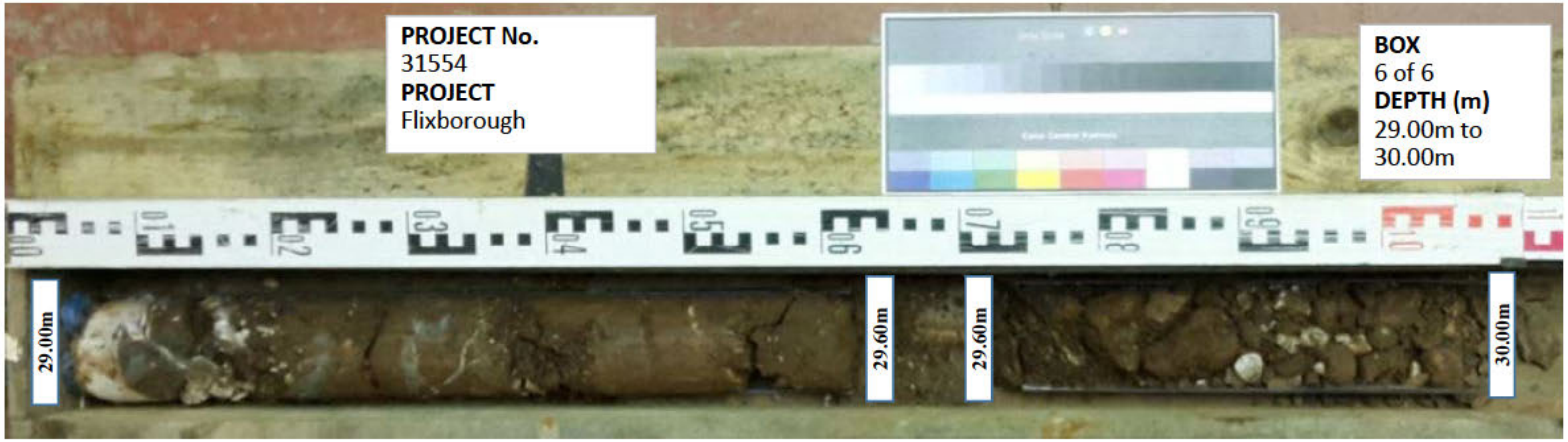
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH3



PROJECT No.
31554
PROJECT
Flixborough

BOX
5 of 6
DEPTH (m)
27.50m to
29.00m

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH3




PROJECT No.
31554
PROJECT
Flixborough
BOX
1 of 7
DEPTH (m)
22.60m to
23.50m
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
22.60m
23.50m

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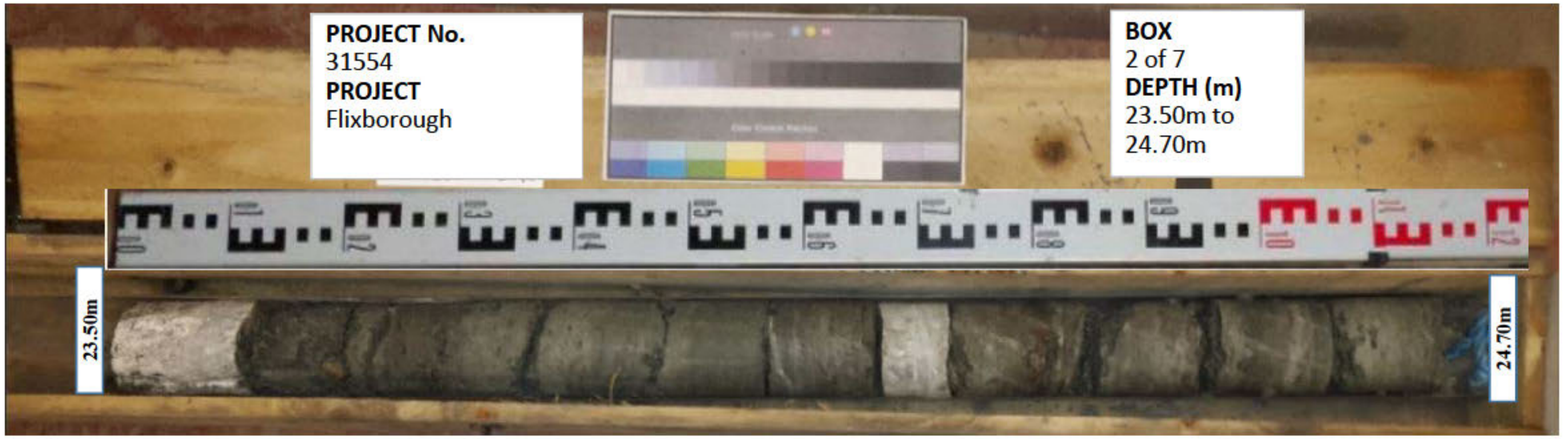
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH4

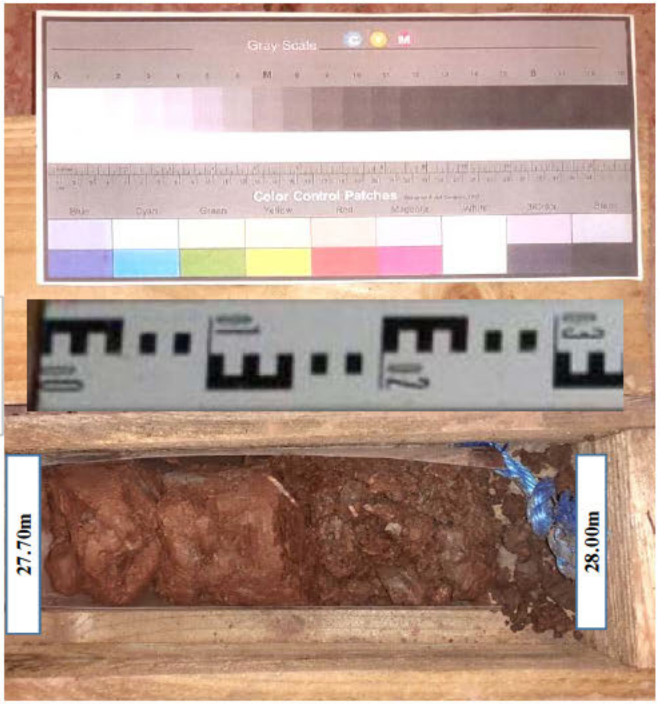



PROJECT No.
31554
PROJECT
Flixborough
BOX
3 of 7
DEPTH (m)
24.70m to
26.20m
24.70m
26.20m

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH4

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH4

PROJECT No.
31554
PROJECT
Flixborough



BOX
5 of 7
DEPTH (m)
27.70m to

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Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH4

PROJECT No.
31554
PROJECT
Flixborough

BOX
6 of 7
DEPTH (m)
28.00m to
29.00m

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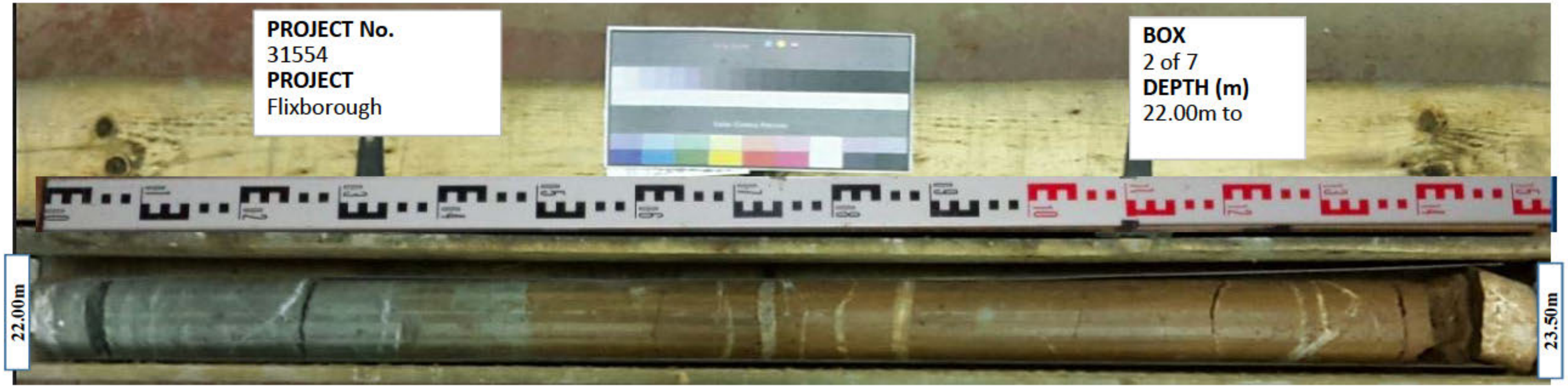
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH4

IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH5

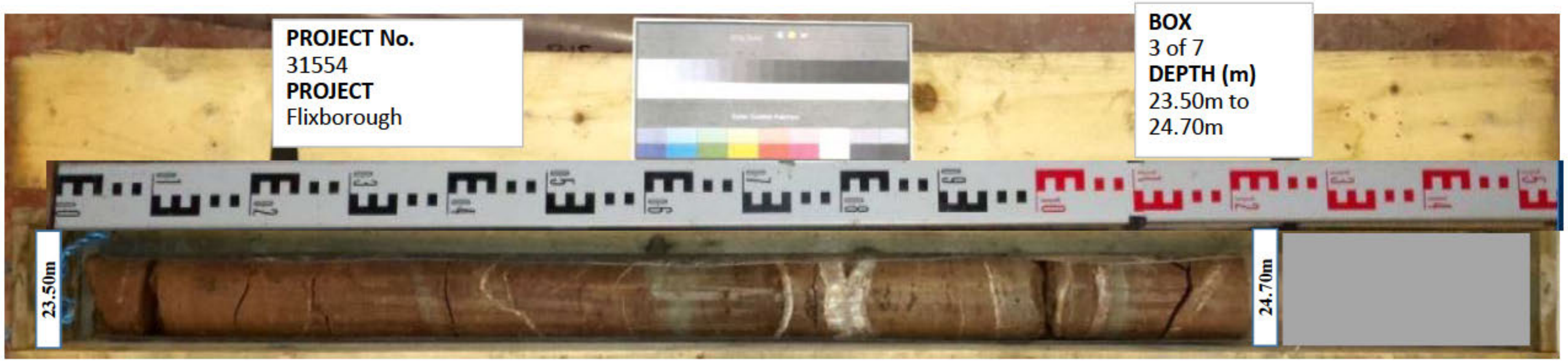
IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH5



IAN FARMER
ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH5



IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH5

PROJECT No.
31554
PROJECT
Flixborough

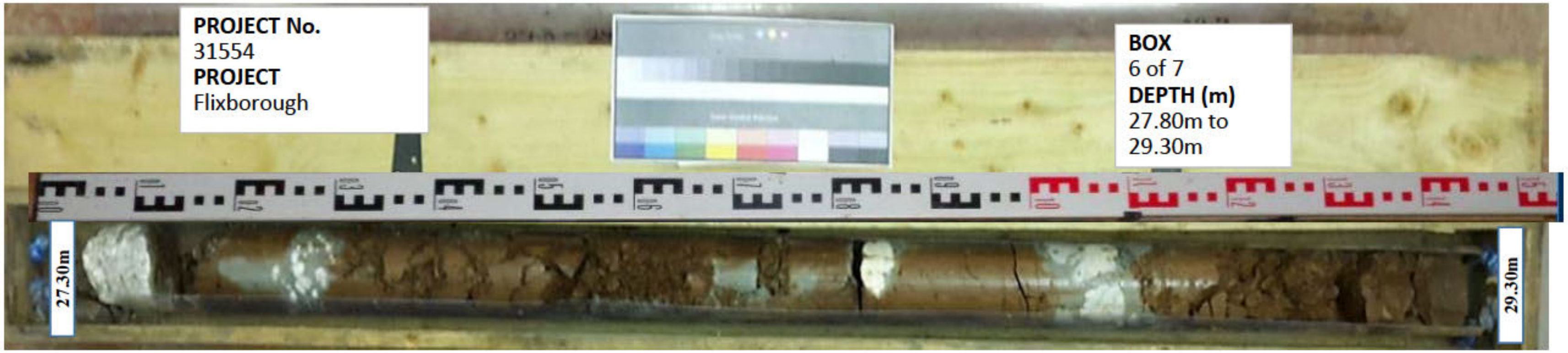
BOX
4 of 7
DEPTH (m)
24.70m to
26.30m

PROJECT No.
31554
PROJECT
Flixborough

BOX
5 of 7
DEPTH (m)
26.30m to
27.80m

IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH5



PROJECT No.
31554
PROJECT
Flixborough

BOX
6 of 7
DEPTH (m)
27.80m to
29.30m

IAN FARMER ASSOCIATES

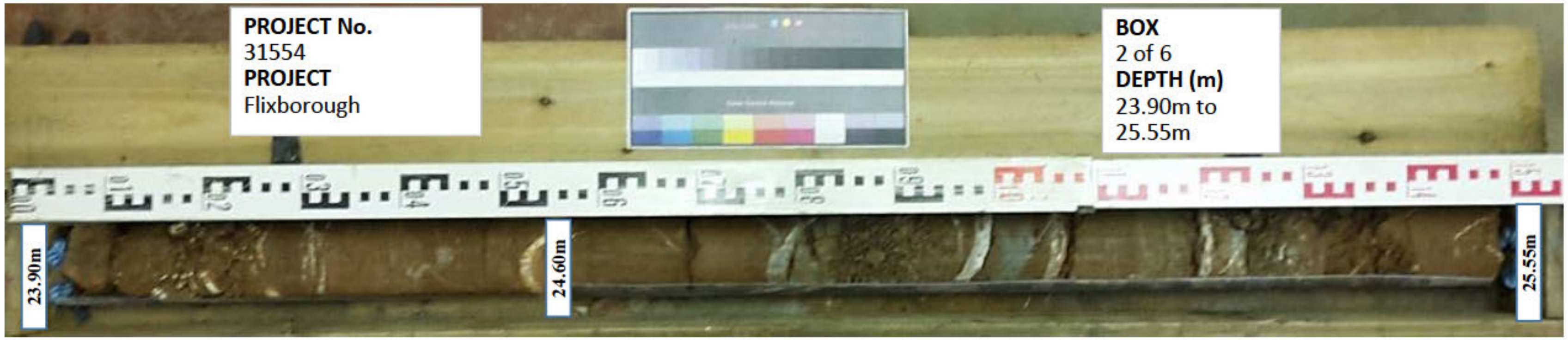
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH5

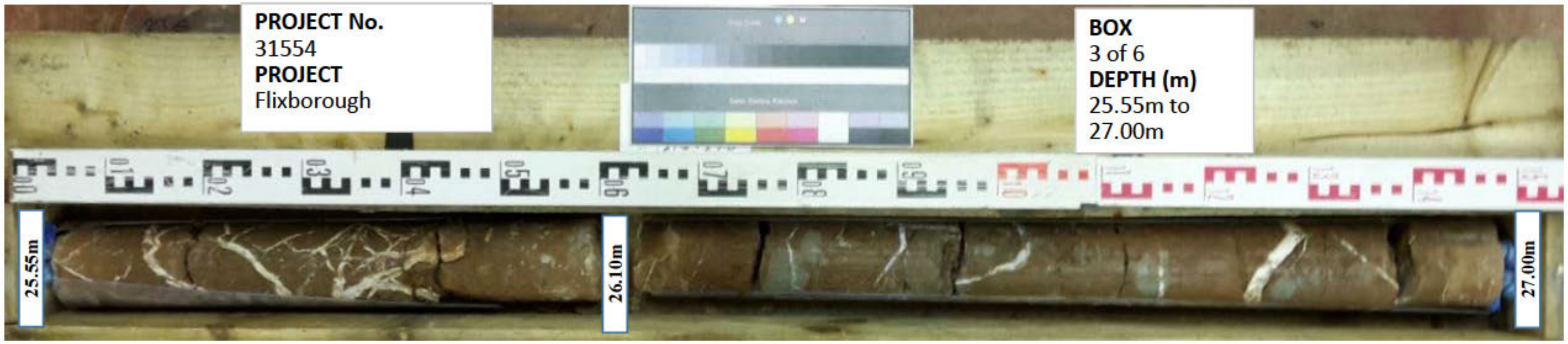
IAN FARMER
ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH6

IAN FARMER ASSOCIATES

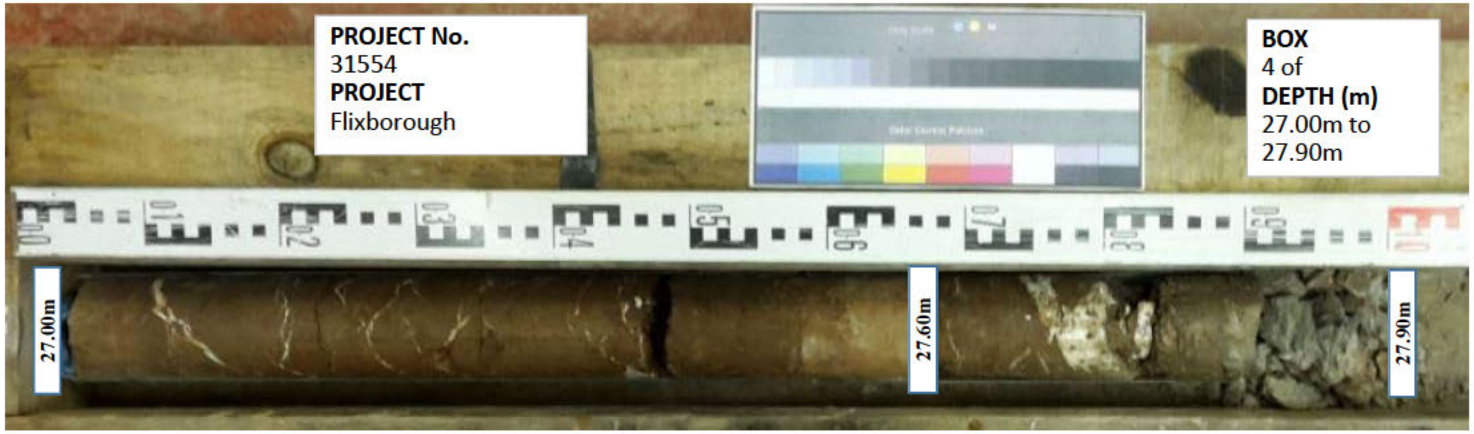
Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH6





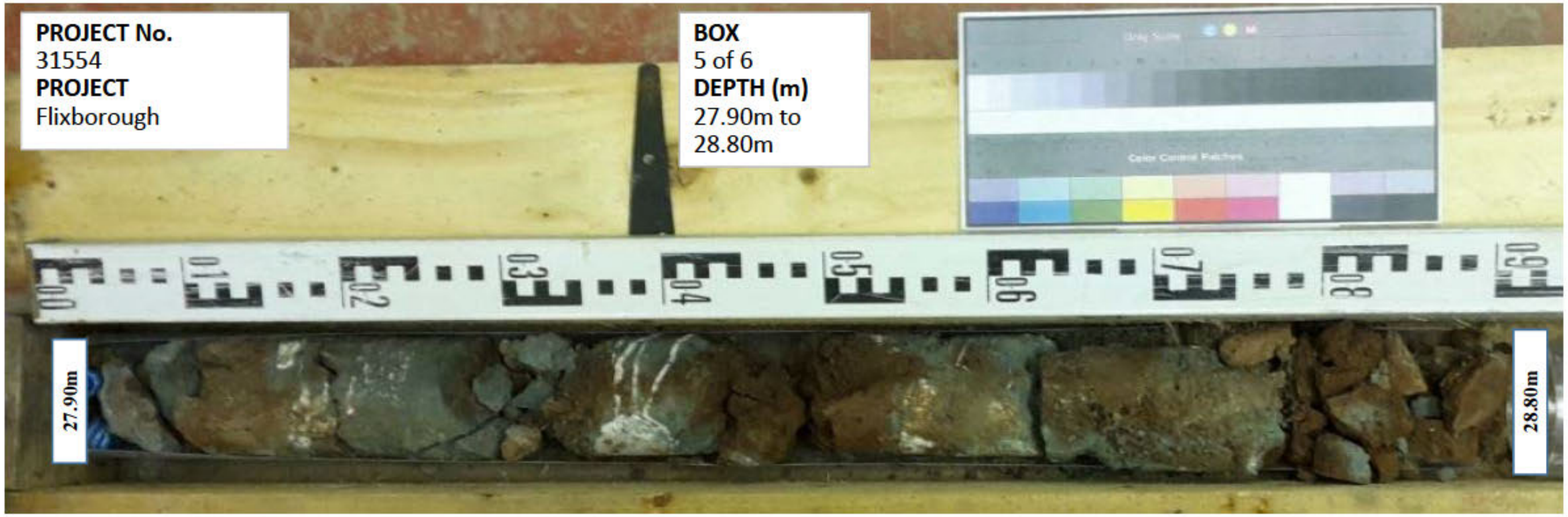
PROJECT No.
31554
PROJECT
Flixborough

BOX
3 of 6
DEPTH (m)
25.55m to
27.00m


PROJECT No.
31554
PROJECT
Flixborough
BOX
4 of
DEPTH (m)
27.00m to
27.90m
27.00m
27.60m
27.90m

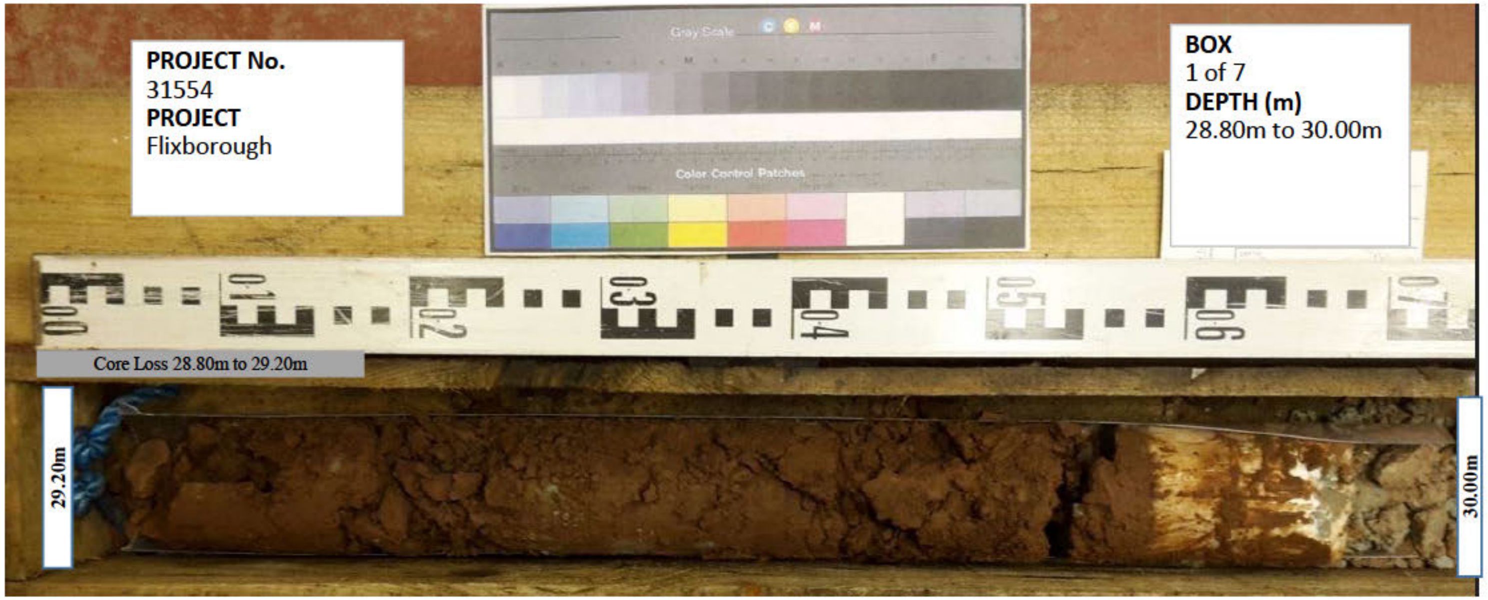
IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH6



IAN FARMER ASSOCIATES

Contract Name: Flixborough
Contract No. 31554
Core Photographs
BH6



GROUND GAS & GROUNDWATER MONITORING RECORDS

IAN FARMER ASSOCIATES

Gas and Groundwater Monitoring Results

Contract No:	31554
Contract Name:	Flixborough
Date:	14/09/2018

Background Readings:	**O_2 % v/v**	20.6	**CO_2 % v/v**	ND	**CH_4 % v/v**	N/D

Weather Conditions	
Ground Conditions (dry/wet etc.)	
Atmospheric Pressure (Start):	
Atmospheric Pressure (Finish):	

Hole No:	**Time (hh:mm)**	**O_2 % v/v**		**CO_2 % v/v**		**CH_4 % v/v**		**CO ppm**		**H_2S ppm**		**VOCs ppm**		**Gas Flow Rate (l/hr)**	**SWL**	**Base of Pipe**	**Comments**
		Peak	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Steady**	**mBGL**	**mBGL**	
BH3																12.00	
BH6																12.00	

Remarks:

ND = Below detection limit of instrument. NR = Not Recorded.

Readings Taken By:	PS
Checked By:	

IAN FARMER ASSOCIATES

Gas and Groundwater Monitoring Results

Contract No:	31554
Contract Name:	Flixborough
Date:	28/09/2018

Background Readings:	**O_2 % v/v**	20.8	**CO_2 % v/v**	ND	**CH_4 % v/v**	N/D
	Weather Conditions	Sunny, Dry				
	Ground Conditions (dry/wet etc.)	Dry				
	Atmospheric Pressure (Start):	1033mb				
	Atmospheric Pressure (Finish):	1033mb				

Hole No:	Time (hh:mm)	O_2 % v/v		CO_2 % v/v		CH_4 % v/v		CO ppm		H_2S ppm		VOCs ppm		Gas Flow Rate (l/hr)	SWL	Base of Pipe	Comments
		Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Steady	mBGL	mBGL	
BH3	14:20	0.8	0.0	N/D	N/D	92.9	92.9	ND	ND	ND	ND	ND	ND	57.8	2.08	12.00	
BH6	14:35	1.0	0.0	19.8	19.1	76.0	75.9	ND	ND	ND	ND	ND	ND	20.4	1.65	12.00	

Remarks:

ND = Below detection limit of instrument. NR = Not Recorded.

Readings Taken By:	**SP**
Checked By:	**CL**

IAN FARMER ASSOCIATES

Gas and Groundwater Monitoring Results

Contract No:	31554
Contract Name:	Flixborough
Date:	09/10/2018

Background Readings:

O_2 % v/v	20.8	**CO_2 % v/v**	ND	**CH_4 % v/v**	N/D

Weather Conditions	Sunny, Dry
Ground Conditions (dry/wet etc.)	Dry
Atmospheric Pressure (Start):	1015mb
Atmospheric Pressure (Finish):	1015mb

Hole No:	**Time (hh:mm)**	**O_2 % v/v**		**CO_2 % v/v**		**CH_4 % v/v**		**CO ppm**		**H_2S ppm**		**VOCs ppm**		**Gas Flow Rate (l/hr)**	**SWL**	**Base of Pipe**	**Comments**
		Peak	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Steady**	**mBGL**	**mBGL**	
BH3	10:48	1.2	0.0	N/D	N/D	91.4	91.4	ND	ND	ND	ND	ND	ND	3.8	2.14	12.00	
BH6	10:25	14.0	0.0	18.4	18.4	75.0	74.8	ND	ND	ND	ND	ND	ND	1.8	1.75	12.00	

Remarks:

ND = Below detection limit of instrument. NR = Not Recorded.

Readings Taken By:	**SP**
Checked By:	**CL**

IAN FARMER
ASSOCIATES

Gas and Groundwater Monitoring Results

Contract No:	31554
Contract Name:	Flixborough
Date:	16/10/2018

Background Readings:	**O_2 % v/v**	20.6	**CO_2 % v/v**	ND	**CH_4 % v/v**	N/D
	Weather Conditions	Clooudy, Dry				
	Ground Conditions (dry/wet etc.)	Slightly wet				
	Atmospheric Pressure (Start):	1019mb				
	Atmospheric Pressure (Finish):	1018mb				

Hole No:	**Time (hh:mm)**	**O_2 % v/v**		**CO_2 % v/v**		**CH_4 % v/v**		**CO ppm**		**H_2S ppm**		**VOCs ppm**		**Gas Flow Rate (l/hr)**	**SWL**	**Base of Pipe**	**Comments**
		Peak	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Peak**	**Steady**	**Steady**	**mBGL**	**mBGL**	
BH3	10:17	1.0	0.0	2.3	N/D	89.9	89.1	ND	ND	ND	ND	ND	ND	2.9	2.08	12.00	
BH6	10:34	9.1	0.0	17.4	17.4	81.0	81.0	ND	ND	ND	ND	ND	ND	1.2	1.69	12.00	

Remarks:

ND = Below detection limit of instrument. NR = Not Recorded.

Readings Taken By:	**SP**
Checked By:	**CL**

December 201

APPENDIX 3

LABORATORY TESTS

APPENDIX 3

GENERAL NOTES ON LABORATORY TESTS ON SOILS

A3.1 GENERAL

A3.1.1 Where applicable all tests are carried out in accordance with the relevant British Standard. The laboratory test procedures are given in the laboratory test reports.

A3.1.2 Any discussion in this report is based on the values and results obtained from the appropriate tests. Due allowance should be made, when considering any result in isolation, of the possible inaccuracy of any such individual result. Details of the accuracy of results are included in this section, where applicable.

A3.2 SOIL CLASSIFICATION

A3.2.1 Classification of soils is usually undertaken by means of the Plasticity Classification Chart, sometimes called the A-Line Chart. This is graphical plot of PI against LL with the A-Line defined as PI = 0.73(LL - 20).

A3.2.2 This line is defined from experimental evidence and does not represent a well-defined boundary between soil types, but forms a useful reference datum. When the values of LL and PI for inorganic clays are plotted on the chart they generally lie just above the A-Line in a narrow band parallel to it, while silts and organic clays plot below this line.

A3.2.3 Clays and silts are divided into five zones of plasticity:

Low Plasticity (L)	LL less than 35
Intermediate Plasticity (I)	LL between 35 and 50
High Plasticity (H)	LL between 50 and 70
Very High Plasticity (V)	LL between 70 and 90
Extremely High Plasticity (E)	LL greater than 90

A3.2.4 In general, clays of high plasticity are likely to have a lower permeability, are more compressible and consolidate over a longer period of time under load than clays of low plasticity. Clays of high plasticity are more difficult to compact as fill material.

REPORT 31554/1

IAN FARMER ASSOCIATES

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F.A.O.

Test Report - 31554 / 1

Site:	Flixborough EFW Plant, Scunthorpe
Job Number:	31554
Originating Client:	Solar 21
Originating Reference:	31554
Date Sampled:	Not Given
Date Scheduled:	07/09/2018
Date Testing Started:	19/09/2018
Date Testing Finished:	26/09/2018
Remarks:	

Authorised By: [redacted]

Tim Robinson
Quality Technician

Date: 26/09/2018

Site: Flixborough EFW Plant, Scunthorpe **Job Number:** 31554

Client: Solar 21 **Page:** 2

Determination of Water Content, Liquid Limit and Plastic Limit and Derivation of Plasticity and Liquidity Index

Borehole / Trial Pit	Depth (m)	Sample	Natural / Sieved	Natural Water Content %	Sample Passing 425 µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Class	Description / Remarks
					Percentage %	Water Content %						
BH2	2.00	U10	Natural	28.9	99	29.0	52	25	27	0.15	CH	Brown sandy CLAY
BH2	19.00	D52	Natural	23.1	68	32.0	40	26	14	0.41	MI	Brown slightly gravelly sandyCLAY
BH3	2.10	U7	Natural	30	88	33.0	38	24	14	0.67	CI	Brown sandy gravelly CLAY
BH3	4.00	U12	Natural	44.4	100	45.0	62	29	33	0.47	CH	Brown sandy organic CLAY
BH4	4.00	U17	Natural	44.5	99	45.0	63	31	32	0.43	CH	Brown sandy CLAY
BH4	20.00	D54	Sieved	37.4	77	47.0	49	34	15	0.88	MI	Red/Brown slightly gravelly SILT
BH5	1.85	D8	Natural	32	99	32.0	46	23	23	0.40	CI	Brown sandy CLAY
BH5	4.45	D16	Natural	35.3	98	36.0	51	33	18	0.17	MH	Brown laminated SILT
BH5	6.50	U22	Sieved	176	95	185.0	88	44	44	3.20	MV	Black organic SILT (PEAT)
BH5	18.50	D49	Natural	28	65	41.0	44	31	13	0.74	MI	Red/Brown gravelly CLAY
BH6	1.20	D6	Natural	28	91	30.0	46	25	21	0.25	CI	Brown sandy CLAY
BH6	6.50	U22	Sieved	79.5	98	81.0	64	34	30	1.58	MH	Brown SILT (PEAT)

Method of Preparation: BS EN ISO 17892 : Part 1 : 2014 : Clause 5.1 Water content test preparation
BS 1377 : Part 1 : 2016 : Clause 8.4.3 Preparation of samples for plasticity tests
BS 1377 : Part 2 : 1990 : Clause 4.2 Preparation of samples for plastic limit tests

Method of Test: BS EN ISO 17892 : Part 1 : 2014 : Clause 5.2 Water content test execution
BS 1377 : Part 2 : 1990 : Clause 4.3 or 4.4 Determination of the liquid limit
BS 1377 : Part 2 : 1990 : Clause 5.3 Determination of the plastic limit and plasticity index

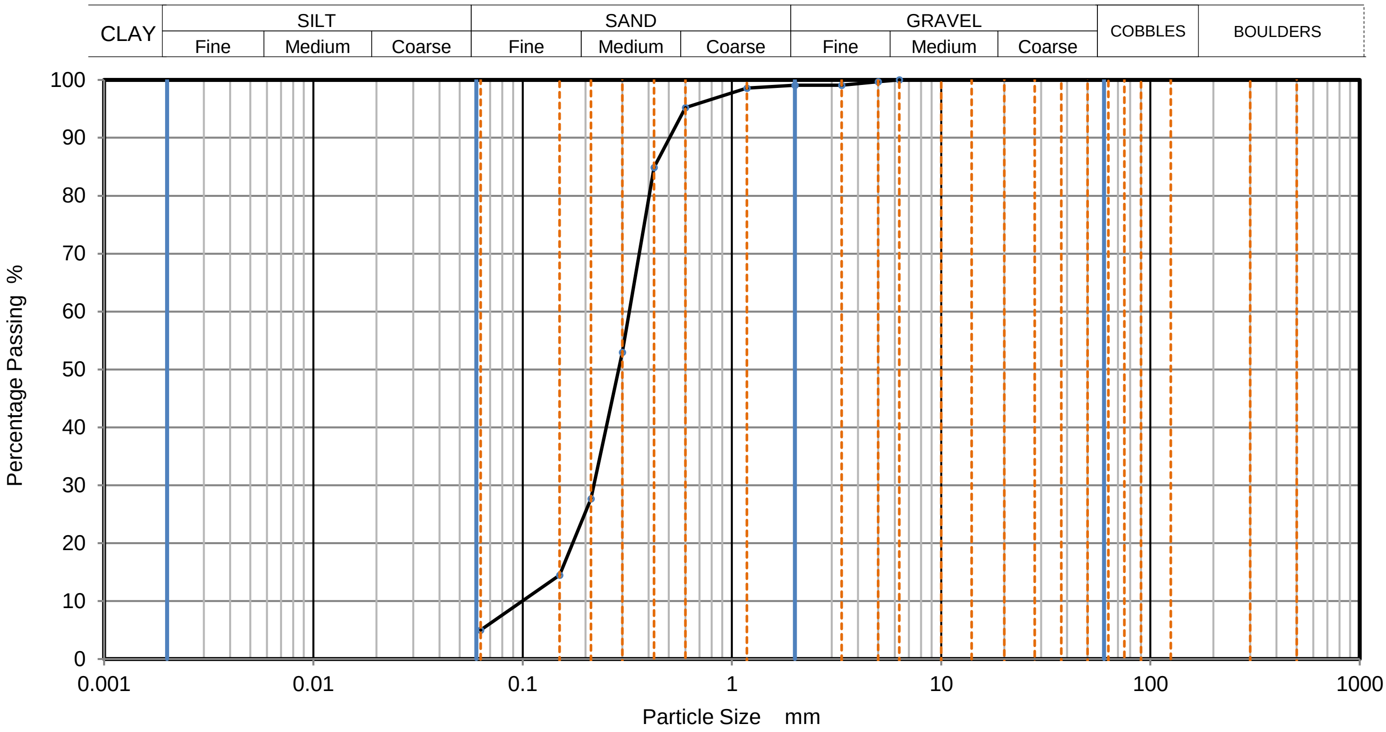
UKAS TESTING 1464

Site: Flixborough EFW Plant, Scunthorpe **Job Number:** 31554

Client: Solar 21 **Page:** 3

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
BH2	14.00	B42	Wet Sieve	Brown slightly silty slightly gravelly SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
6.3	100		
5	100		
3.35	99		
2	99		
1.18	99		
0.6	95		
0.425	85		
0.3	53		
0.212	28		
0.15	15		
0.063	5		

Dry Mass of sample, g	1659

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	94
Fines <0.063mm	5

Grading Analysis		
D100	mm	6.3
D60	mm	0.324
D30	mm	0.219
D10	mm	0.0997
Uniformity Coefficient		3.2
Curvature Coefficient		1.5

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Method of Preparation: BS 1377:Part 1:1990, clause 7 3 Initial preparation
BS 1377:Part 1:1990, clause 7.4.5 Preparation of particle size tests

Method of Test: BS1377:Part 2:1990, clause 9.2 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

IAN FARMER ASSOCIATES

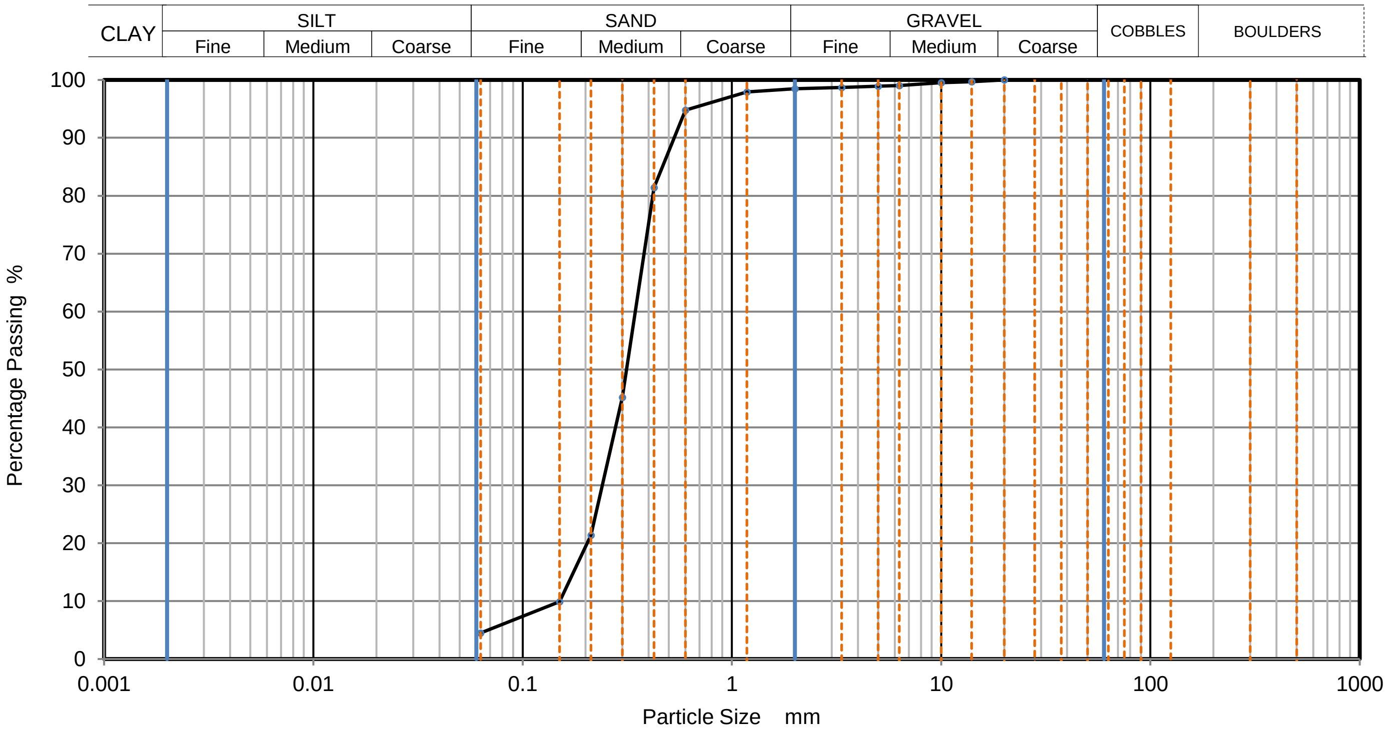
Laboratory Test Report

31554 / 1

Site:	Flixborough EFW Plant, Scunthorpe	**Job Number:**	31554
Client:	Solar 21	**Page:**	4

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
BH4	12.50	B38	Wet Sieve	Brown slightly silty slightly gravelly SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	98		
0.6	95		
0.425	81		
0.3	45		
0.212	21		
0.15	10		
0.063	5		

Dry Mass of sample, g	1612

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	94
Fines <0.063mm	5

Grading Analysis		
D100	mm	20
D60	mm	0.346
D30	mm	0.24
D10	mm	0.15
Uniformity Coefficient		2.3
Curvature Coefficient		1.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Method of Preparation: BS 1377:Part 1:1990, clause 7 3 Initial preparation
BS 1377:Part 1:1990, clause 7.4.5 Preparation of particle size tests

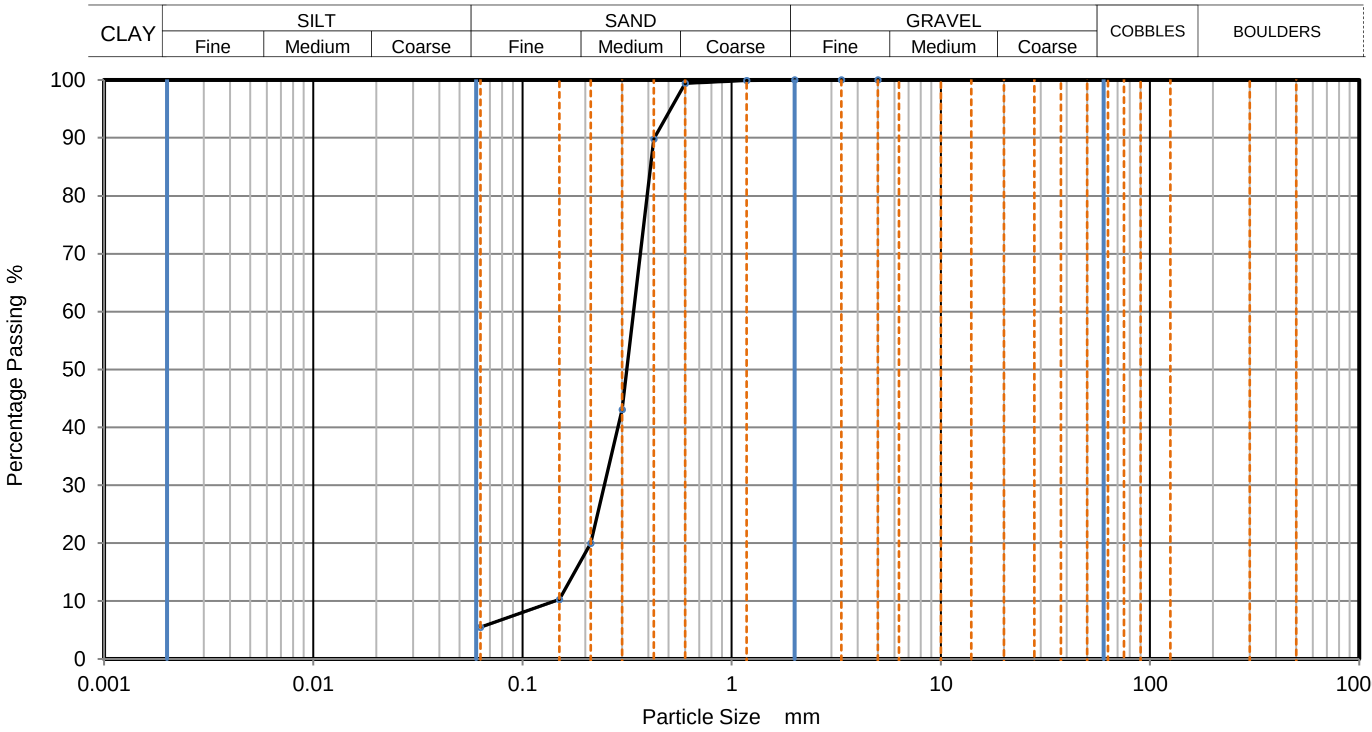
Method of Test: BS1377:Part 2:1990, clause 9.2 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Site:	Flixborough EFW Plant, Scunthorpe	**Job Number:**	31554
Client:	Solar 21	**Page:**	5

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
BH6	12.50	B35	Wet Sieve	Brown slightly silty SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	90		
0.3	43		
0.212	20		
0.15	10		
0.063	6		

Dry Mass of sample, g	1063

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	95
Fines <0.063mm	6

Grading Analysis		
D100	mm	2
D60	mm	0.34
D30	mm	0.246
D10	mm	0.142
Uniformity Coefficient		2.4
Curvature Coefficient		1.3

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Method of Preparation: BS 1377:Part 1:1990, clause 7 3 Initial preparation
BS 1377:Part 1:1990, clause 7.4.5 Preparation of particle size tests

Method of Test: BS1377:Part 2:1990, clause 9.2 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

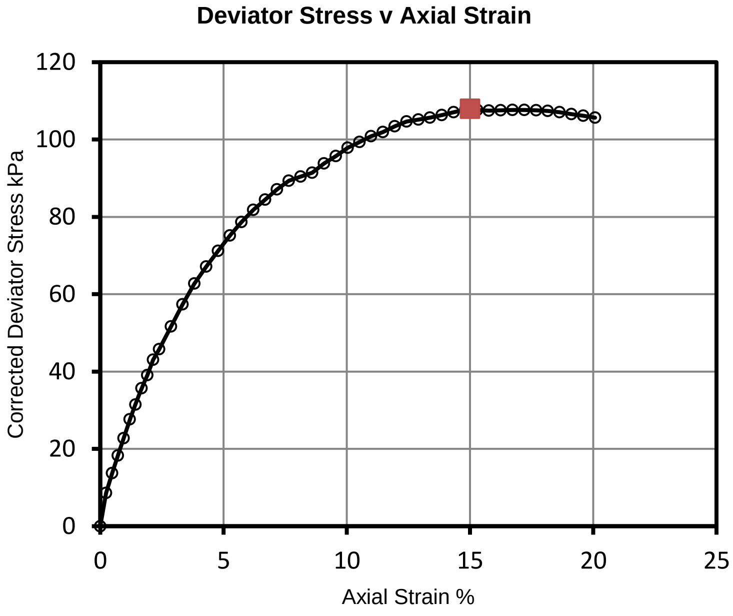
Site: Flixborough EFW Plant, Scunthorpe **Job Number:** 31554

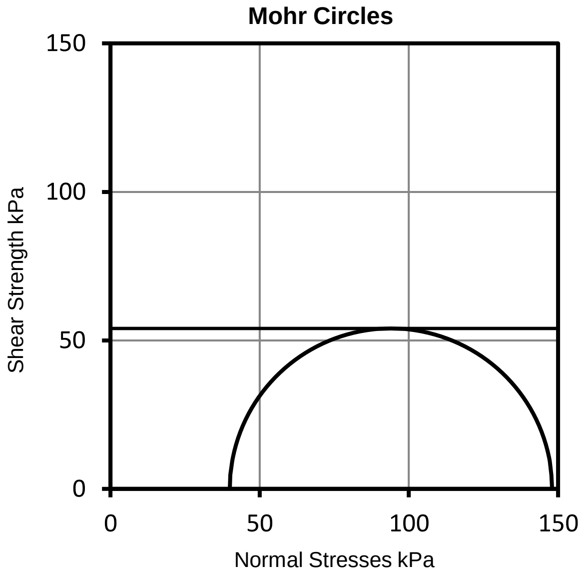
Client: Solar 21 **Page:** 6

Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen (Definitive Method)

Borehole / Trial Pit	Depth (m)	Sample	Description
BH2	2.00	U10	**Brown slightly gravelly sandy CLAY**

Initial Sample	Test Number	1
	Original Length (mm)	450.00
	Depth from Top (mm)	27.11
	Condition	Undisturbed
	Orientation	Vertical
Length (mm)		209.24
Diameter (mm)		102.11
Moisture Content (%)		28.10
Bulk Density (Mg/m3)		2.05
Dry Density (Mg/m3)		1.60
Membrane Thickness (mm)		0.3
Membrane Type		Latex
Rate of Strain (%/min)		1.9
Test Results	Cell Pressure (kPa)	40
	Axial Strain (%)	15
	Membrane Corr. (kPa)	0.88
	Deviator Stress, (σ1 - σ3)f (kPa)	108
	Undrained Shear Strength, cu = ½(σ1 - σ3)f (kPa)	54
	Mode of Failure	Compound





Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Method of Preparation: BS 1377:PT1:1990:8.3 Preparation of undisturbed samples for testing or
BS 1377:PT1:1990:7.7.5.2 Preparation of disturbed samples for testing

Method of Test: BS 1377:PT2:1990:7.2 Determination of density by linear measurement.
BS 1377:PT7:1990:8.4 Determination of undrained shear strength in triaxial compression without measurement of pore pressure (Definitive method)

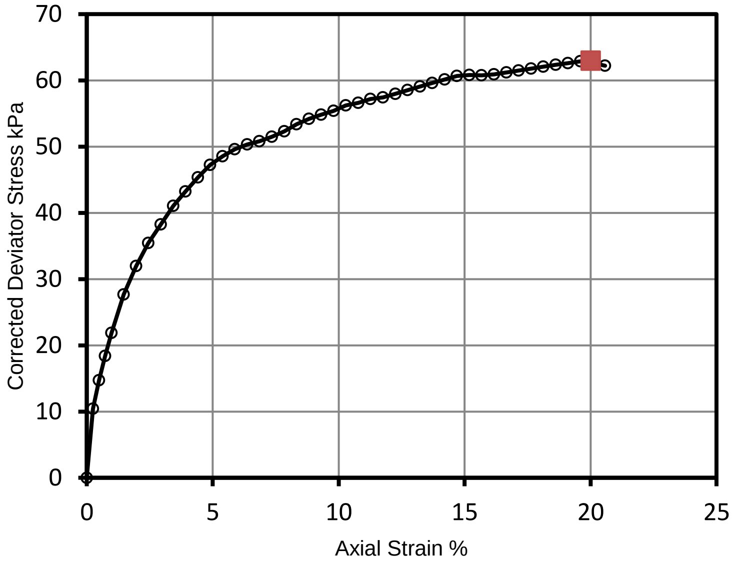
UKAS TESTING 1464

Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen (Definitive Method)

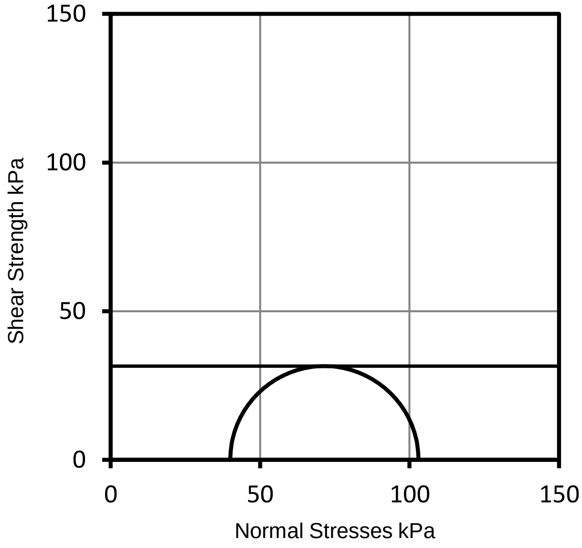
Borehole / Trial Pit	Depth (m)	Sample	Description
BH3	2.10	U7	**Brown gravelly CLAY**

Initial Sample	Test Number	1
	Original Length (mm)	400.00
	Depth from Top (mm)	40.00
	Condition	Undisturbed
	Orientation	Vertical
Length (mm)		204.10
Diameter (mm)		102.19
Moisture Content (%)		30.00
Bulk Density (Mg/m3)		2.11
Dry Density (Mg/m3)		1.62
Membrane Thickness (mm)		0.36
Membrane Type		Latex
Rate of Strain (%/min)		2.0
Test Results	Cell Pressure (kPa)	40
	Axial Strain (%)	20
	Membrane Corr. (kPa)	1.33
	Deviator Stress, (σ1 - σ3)f (kPa)	63
	Undrained Shear Strength, cu = ½(σ1 - σ3)f (kPa)	31
	Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
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Method of Preparation:	BS 1377:PT1:1990:8.3 Preparation of undisturbed samples for testing or BS 1377:PT1:1990:7.7.5.2 Preparation of disturbed samples for testing
Method of Test:	BS 1377:PT2:1990:7.2 Determination of density by linear measurement. BS 1377:PT7:1990:8.4 Determination of undrained shear strength in triaxial compression without measurement of pore pressure (Definitive method)

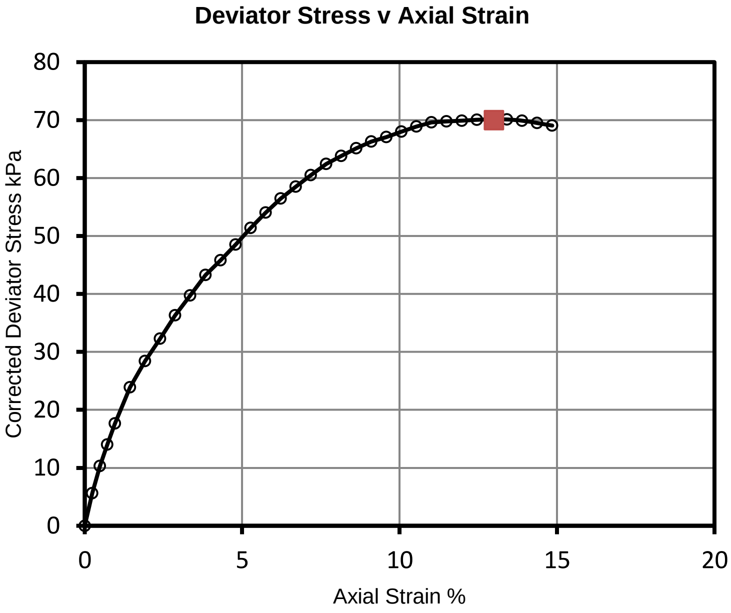
UKAS TESTING 1464

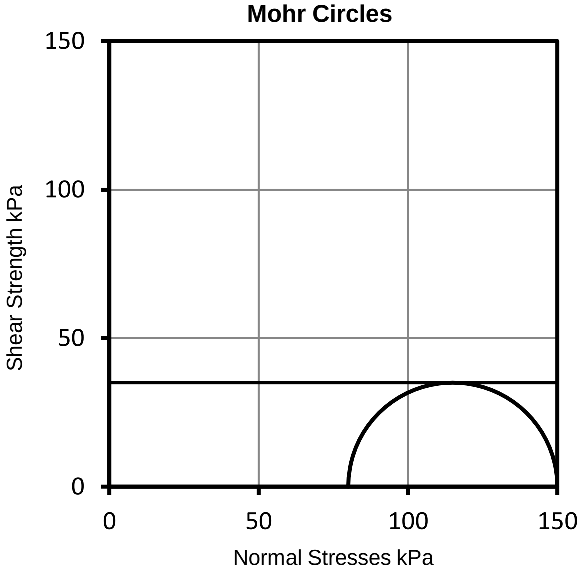
Site:	Flixborough EFW Plant, Scunthorpe	**Job Number:**	31554
Client:	Solar 21	**Page:**	8

Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen (Definitive Method)

Borehole / Trial Pit	Depth (m)	Sample	Description
BH3	4.00	U12	**Brown slightly gravelly organic CLAY**

Initial Sample	Test Number	1
	Original Length (mm)	450.00
	Depth from Top (mm)	30.17
	Condition	Undisturbed
	Orientation	Vertical
Length (mm)		208.78
Diameter (mm)		102.44
Moisture Content (%)		44.60
Bulk Density (Mg/m3)		1.81
Dry Density (Mg/m3)		1.25
Membrane Thickness (mm)		0.31
Membrane Type		Latex
Rate of Strain (%/min)		1.9
Test Results	Cell Pressure (kPa)	80
	Axial Strain (%)	13
	Membrane Corr. (kPa)	0.82
	Deviator Stress, (σ1 - σ3)f (kPa)	70
	Undrained Shear Strength, cu = ½(σ1 - σ3)f (kPa)	35
	Mode of Failure	Plastic





Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Method of Preparation:	BS 1377:PT1:1990:8.3 Preparation of undisturbed samples for testing or BS 1377:PT1:1990:7.7.5.2 Preparation of disturbed samples for testing
Method of Test:	BS 1377:PT2:1990:7.2 Determination of density by linear measurement. BS 1377:PT7:1990:8.4 Determination of undrained shear strength in triaxial compression without measurement of pore pressure (Definitive method)

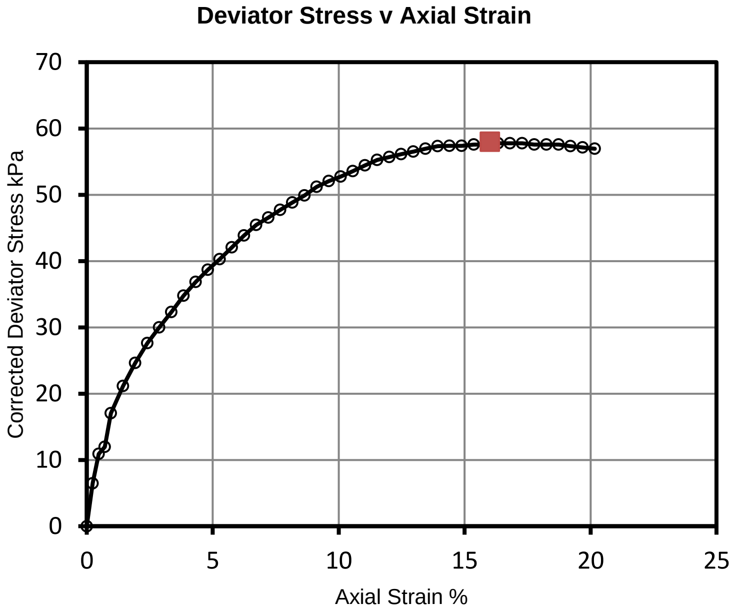
UKAS TESTING 1464

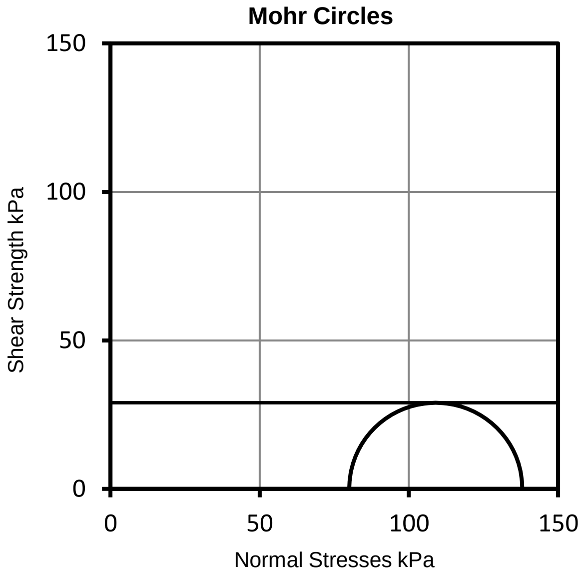
Site:	Flixborough EFW Plant, Scunthorpe	**Job Number:**	31554
Client:	Solar 21	**Page:**	9

Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen (Definitive Method)

Borehole / Trial Pit	Depth (m)	Sample	Description
BH4	4.00	U17	**Brown slightly sandy CLAY**

Initial Sample	Test Number	1
	Original Length (mm)	450.00
	Depth from Top (mm)	42.62
	Condition	Undisturbed
	Orientation	Vertical
Length (mm)		208.22
Diameter (mm)		100.56
Moisture Content (%)		30.60
Bulk Density (Mg/m3)		1.82
Dry Density (Mg/m3)		1.39
Membrane Thickness (mm)		0.29
Membrane Type		Latex
Rate of Strain (%/min)		1.9
Test Results	Cell Pressure (kPa)	80
	Axial Strain (%)	16
	Membrane Corr. (kPa)	0.94
	Deviator Stress, (σ1 - σ3)f (kPa)	58
	Undrained Shear Strength, cu = ½(σ1 - σ3)f (kPa)	29
	Mode of Failure	Plastic





Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Method of Preparation:	BS 1377:PT1:1990:8.3 Preparation of undisturbed samples for testing or BS 1377:PT1:1990:7.7.5.2 Preparation of disturbed samples for testing
Method of Test:	BS 1377:PT2:1990:7.2 Determination of density by linear measurement. BS 1377:PT7:1990:8.4 Determination of undrained shear strength in triaxial compression without measurement of pore pressure (Definitive method)

UKAS TESTING 1464

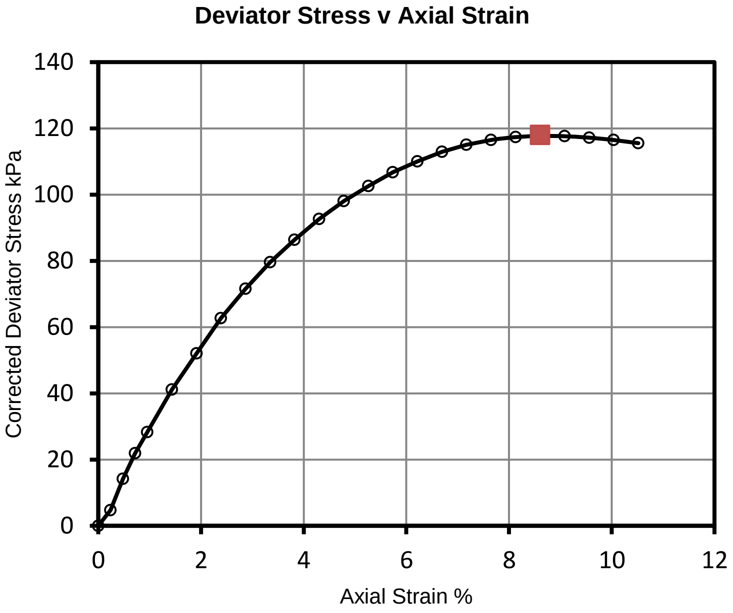
Site: Flixborough EFW Plant, Scunthorpe **Job Number:** 31554

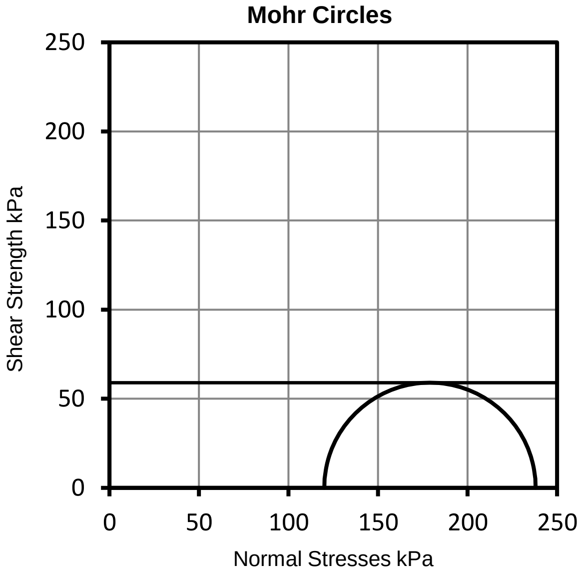
Client: Solar 21 **Page:** 10

Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen (Definitive Method)

Borehole / Trial Pit	Depth (m)	Sample	Description
BH5	6.50	U22	**Black organic CLAY with inclusions of peat.**

Initial Sample	Test Number	1
	Original Length (mm)	450.00
	Depth from Top (mm)	42.18
	Condition	Undisturbed
	Orientation	Vertical
Length (mm)		209.18
Diameter (mm)		102.67
Moisture Content (%)		133.00
Bulk Density (Mg/m3)		1.23
Dry Density (Mg/m3)		0.53
Membrane Thickness (mm)		0.31
Membrane Type		Latex
Rate of Strain (%/min)		1.9
Test Results	Cell Pressure (kPa)	120
	Axial Strain (%)	8.6
	Membrane Corr. (kPa)	0.6
	Deviator Stress, (σ1 - σ3)f (kPa)	118
	Undrained Shear Strength, cu = ½(σ1 - σ3)f (kPa)	59
	Mode of Failure	Plastic





Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
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Method of Preparation: BS 1377:PT1:1990:8.3 Preparation of undisturbed samples for testing or
BS 1377:PT1:1990:7.7.5.2 Preparation of disturbed samples for testing

Method of Test: BS 1377:PT2:1990:7.2 Determination of density by linear measurement.
BS 1377:PT7:1990:8.4 Determination of undrained shear strength in triaxial compression without measurement of pore pressure (Definitive method)

UKAS TESTING 1464

Site: Flixborough EFW Plant, Scunthorpe

Job Number: 31554

Client: Solar 21

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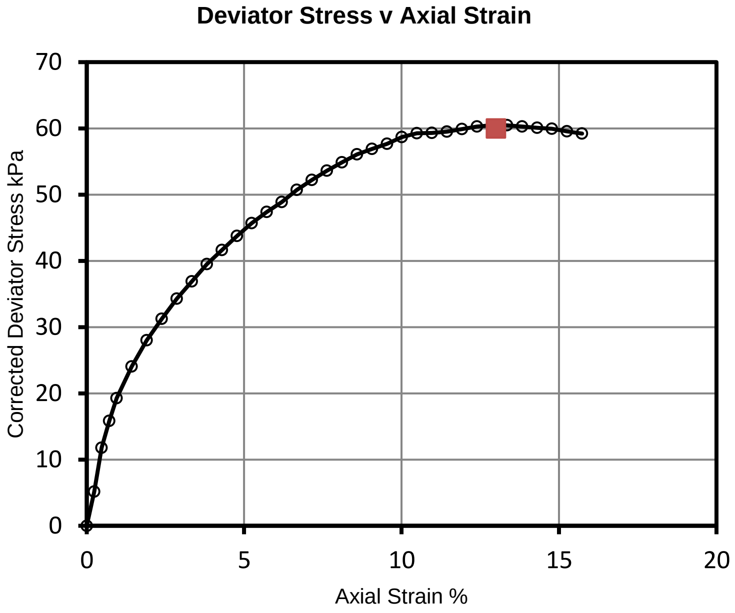
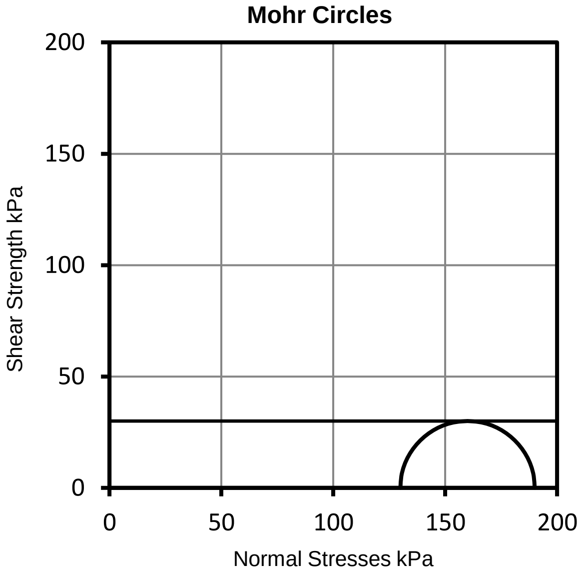
Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen (Definitive Method)

Borehole / Trial Pit	Depth (m)	Sample	Description
BH6	6.50	U22	**Brown organic SILT**

Initial Sample	Test Number	1
	Original Length (mm)	450.00
	Depth from Top (mm)	41.17
	Condition	Undisturbed
	Orientation	Vertical
Length (mm)		209.76
Diameter (mm)		102.50
Moisture Content (%)		97.80
Bulk Density (Mg/m3)		1.42
Dry Density (Mg/m3)		0.72
Membrane Thickness (mm)		0.28
Membrane Type		Latex
Rate of Strain (%/min)		1.9
Test Results	Cell Pressure (kPa)	130
	Axial Strain (%)	13
	Membrane Corr. (kPa)	0.76
	Deviator Stress, (σ1 - σ3)f (kPa)	60
	Undrained Shear Strength, cu = ½(σ1 - σ3)f (kPa)	30
	Mode of Failure	Plastic





Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Method of Preparation: BS 1377:PT1:1990:8.3 Preparation of undisturbed samples for testing or
BS 1377:PT1:1990:7.7.5.2 Preparation of disturbed samples for testing

Method of Test: BS 1377:PT2:1990:7.2 Determination of density by linear measurement.
BS 1377:PT7:1990:8.4 Determination of undrained shear strength in triaxial compression without measurement of pore pressure (Definitive method)

UKAS TESTING 1464

Test Report - 31554 / 1

Site:	Flixborough EFW Plant, Scunthorpe
Job Number:	31554
Originating Client:	Solar 21

All opinions and interpretations contained within this report are outside of our Scope of Accreditation.

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Date: 26/09/2018

REPORT 31544R/1

IAN FARMER
ASSOCIATES

Unit 4, Faraday Close, Pattinson North Industrial Estate, Washington, NE38 8QJ. Tel: 0191 482 8500 Fax: 0191 482 8520
washington@ianfarmer.co.uk [redacted]

F.A.O.

Test Report - 31554R / 1

Site:	Flixborough EFW Plant, Scunthorpe
Job Number:	31554R
Originating Client:	Solar 21
Originating Reference:	31554
Date Sampled:	Not Given
Date Scheduled:	25/09/2018
Date Testing Started:	28/09/2018
Date Testing Finished:	01/10/2018
Remarks:	

Authorised By: [redacted]

Tim Robinson
Quality Technician

Date: 01/10/2018

Site: Flixborough EFW Plant, Scunthorpe **Job Number:** 31554R

Client: Solar 21 **Page:** 2

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Hole No.	Depth m	Sample	Rock Type	Specimen Dimensions2			Bulk Density2 Mg/m3	Water Content 1 %	Uniaxial Compression3				Remarks
				Dia. mm	Length mm	H/D			Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
BH3	23.80	C3	Grey MUDSTONE	83.8	101.2	*1.2	2.09	21.2	as received	0.4171	F	0.4	
BH3	26.00	C5	Grey MUDSTONE	85.8	79.5	*0.9	2.17	20.0	as received	0.3981	MS	0.7	

Notes
1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS
2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density
3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials
above notes apply unless annotated otherwise in the remarks

*Denotes length diameter ratio outside ISRM specification

Mode of failure :
S - Single shear MS - multiple shear
AC - Axial cleavage F - Fragmented

Method of Preparation: International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007

Method of Test: International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007

IAN FARMER ASSOCIATES

Laboratory Test Report

31554R / 1

Site: Flixborough EFW Plant, Scunthorpe

Job Number: 31554R

Client: Solar 21

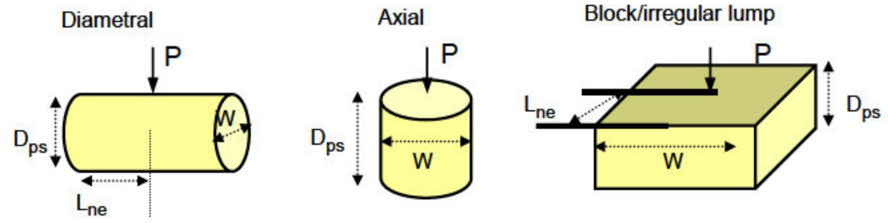
Page: 3

Point Load Strength Index Tests
Summary of Results

Borehole No.	Depth m	Sample	Rock Type and Test condition	Test Type see ISRM: Type (D, A, I, B)	Direction (PL, PD or U)	Failure Valid (Y/N)	Dimensions: Lne mm	W mm	Dps mm	Dps' mm	Force P kN	Equivalent diameter, De mm	Point Load Strength Index: Is MPa	Is (50) MPa	Remarks (including water content if measured)
BH2	24.18	C1	Red/Brown MUDSTONE As received	A	PD	YES		82.5	85.1	74.1	0.3	94.6	0.03	0.05	
BH2	27.6	C3	Grey MUDSTONE	A	PD	YES		85.8	90.5	68.5	0.9	99.5	0.09	0.13	
BH2	29.14	C4	Grey MUDSTONE	A	PD	YES		81.5	118.6	101.6	0.4	111.0	0.04	0.05	
BH3	24.7	C4	Red MUDSTONE	A	PD	YES		85.1	106.6	91.6	0.4	107.5	0.03	0.05	
BH4	22.76	C1	Red MUDSTONE	A	PD	YES		86.2	105.9	63.9	2.0	107.8	0.17	0.24	
BH4	22.88	C2	Grey MUDSTONE	A	PD	YES		86.3	116.7	50.7	0.5	113.2	0.04	0.05	
BH5	26.58	C3	Grey MUDSTONE	A	PD	YES		86.3	91.0	71.0	0.3	100.0	0.03	0.04	
BH6	22.17	C1	Grey MUDSTONE	A	PD	YES		86.2	125.0	101.0	0.6	117.1	0.04	0.06	
BH6	22.91	C2	Grey MUDSTONE	A	PD	YES		83.0	123.9	96.9	0.2	114.4	0.02	0.02	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
PL - Parallel to planes of weakness
PD - Perpendicular to planes of weakness
U - Unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P
Size factor, F = (De/50)0.45 for all tests.

Detailed legend for test and dimensions, based on ISRM



Method of Preparation: ISRM 2007 Suggested method for point load strength index (pages 125 - 132)

Method of Test: ISRM 2007 Suggested method for point load strength index (pages 125 - 132)

IAN FARMER
ASSOCIATES

Test Report - 31554R / 1

Site:	Flixborough EFW Plant, Scunthorpe
Job Number:	31554R
Originating Client:	Solar 21

All opinions and interpretations contained within this report are outside of our Scope of Accreditation.

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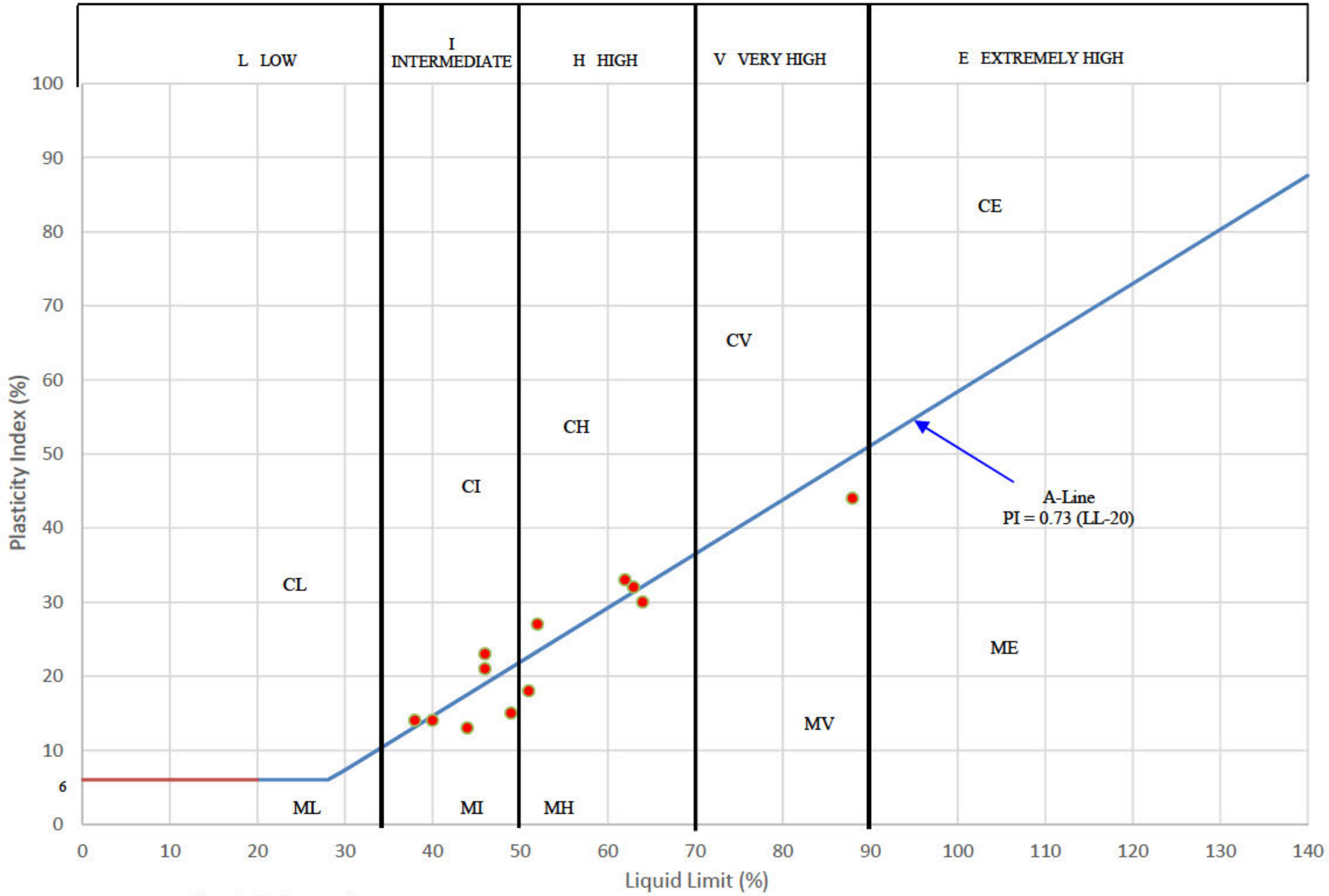
Date: 01/10/2018

PLASTICITY CLASSIFICATION CHART

PLASTICITY CLASSIFICATION CHART

Site: EFW Plant Flixborough near Scarborough



SILTS generally plot below A Line
CLAYS generally plot above A Line

Contract No.
31554

Figure No.
A3.1

APPENDIX 4

CHEMICAL TESTS

Certificate No. 18/07080

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07080
Issue Number: 1 **Date:** 13 September, 2018

Client:
Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager: Chris Lewis
Project Name: Flixborough EFW Plant
Project Ref: 31554
Order No: 93507
Date Samples Received: 05/09/18
Date Instructions Received: 05/09/18
Date Analysis Completed: 13/09/18

Prepared by:	**Approved by:**
[redacted]	[redacted]
Holly Neary-King Sales Executive	Georgia King Admin & Client Services Supervisor

MCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Lab Sample ID	18/07080/1	18/07080/2	18/07080/3	18/07080/4	18/07080/5				Units	Method ref
Client Sample No	3	3	5	5	3					
Client Sample ID	BH2	BH4	BH4	BH6	BH1					
Depth to Top	0.50	0.50	1.00	1.00	0.50					
Depth To Bottom										
Date Sampled	29-Aug-18	22-Aug-18	22-Aug-18	21-Aug-18	24-Aug-18					
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES					
Sample Matrix Code	4A	4A	6AB	6	4A					
% Stones >10mm$_A$	25.4	33.8	6.4	<0.1	26.5				% w/w	A-T-044
Cyanide (total)$_A^{M\#}$	<1	<1	<1	4	-				mg/kg	A-T-042sTCN
Organic matter$_D^{M\#}$	-	-	6.2	2.2	-				% w/w	A-T-032 OM
Arsenic$_D^{M\#}$	<1	<1	10	<1	-				mg/kg	A-T-024s
Cadmium$_D^{M\#}$	1.1	0.7	0.9	0.8	-				mg/kg	A-T-024s
Copper$_D^{M\#}$	<1	2	34	16	-				mg/kg	A-T-024s
Chromium$_D^{M\#}$	84	111	33	26	-				mg/kg	A-T-024s
Chromium (hexavalent)$_D$	-	<1	<1	-	-				mg/kg	A-T-040s
Lead$_D^{M\#}$	5	13	80	41	-				mg/kg	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	-				mg/kg	A-T-024s
Nickel$_D^{M\#}$	1200	381	41	47	-				mg/kg	A-T-024s
Selenium$_D^{\#}$	1	3	<1	<1	-				mg/kg	A-T-024s
Zinc$_D^{M\#}$	24	34	127	98	-				mg/kg	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	-	-	*	-	*					A-T-001
Cyanide (total) (leachable)$_A$	-	-	<0.005	-	<0.005				mg/l	A-T-042wTCN
Arsenic (leachable)$_A^{\#}$	-	-	19	-	<1				µg/l	A-T-025w
Cadmium (leachable)$_A^{\#}$	-	-	<1	-	<1				µg/l	A-T-025w
Copper (leachable)$_A^{\#}$	-	-	7	-	1				µg/l	A-T-025w
Chromium (leachable)$_A^{\#}$	-	-	<1	-	1				µg/l	A-T-025w
Lead (leachable)$_A^{\#}$	-	-	16	-	<1				µg/l	A-T-025w
Mercury (leachable)$_A^{\#}$	-	-	<0.1	-	<0.1				µg/l	A-T-025w
Nickel (leachable)$_A^{\#}$	-	-	2	-	<1				µg/l	A-T-025w
Selenium (leachable)$_A^{\#}$	-	-	1	-	4				µg/l	A-T-025w
Zinc (leachable)$_A^{\#}$	-	-	23	-	4				µg/l	A-T-025w

Envirolab Job Number: 18/07080

Client Project Name: Flixborough EFW Plant

Client Project Ref: 31554

Lab Sample ID	18/07080/1	18/07080/2	18/07080/3	18/07080/4	18/07080/5				**Units**	**Method ref**
Client Sample No	3	3	5	5	3					
Client Sample ID	BH2	BH4	BH4	BH6	BH1					
Depth to Top	0.50	0.50	1.00	1.00	0.50					
Depth To Bottom										
Date Sampled	29-Aug-18	22-Aug-18	22-Aug-18	21-Aug-18	24-Aug-18					
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES					
Sample Matrix Code	4A	4A	6AB	6	4A					
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A$$^\#$	NAD	-	NAD	-	-					A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	-	N/A	-	-					

Envirolab Job Number: 18/07080 **Client Project Name:** Flixborough EFW Plant

Client Project Ref: 31554

Lab Sample ID	18/07080/1	18/07080/2	18/07080/3	18/07080/4	18/07080/5				**Units**	**Method ref**
Client Sample No	3	3	5	5	3					
Client Sample ID	BH2	BH4	BH4	BH6	BH1					
Depth to Top	0.50	0.50	1.00	1.00	0.50					
Depth To Bottom										
Date Sampled	29-Aug-18	22-Aug-18	22-Aug-18	21-Aug-18	24-Aug-18					
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES					
Sample Matrix Code	4A	4A	6AB	6	4A					
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	<0.01	0.03	2.66	<0.01	-				mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.01	0.01	0.04	<0.01	-				mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	<0.02	0.09	5.83	<0.02	-				mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.14	0.47	9.65	<0.04	-				mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.14	0.47	8.06	<0.04	-				mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.17	0.58	7.69	<0.05	-				mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.07	0.22	1.95	<0.05	-				mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.07	0.22	3.07	<0.07	-				mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	0.17	0.54	8.42	<0.06	-				mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.04	0.07	0.69	<0.04	-				mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	0.15	0.75	19.4	<0.08	-				mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	<0.01	0.03	2.52	<0.01	-				mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.09	0.27	2.96	<0.03	-				mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.03	<0.03	4.94	<0.03	-				mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	0.06	0.33	16.7	<0.03	-				mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	0.21	0.70	16.3	<0.07	-				mg/kg	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	1.27	4.78	111	<0.08	-				mg/kg	A-T-019s

Envirolab Job Number: **18/07080**

Client Project Name: **Flixborough EFW Plant**

Client Project Ref: **31554**

Lab Sample ID	18/07080/1	18/07080/2	18/07080/3	18/07080/4	18/07080/5				Units	Method ref
Client Sample No	3	3	5	5	3					
Client Sample ID	BH2	BH4	BH4	BH6	BH1					
Depth to Top	0.50	0.50	1.00	1.00	0.50					
Depth To Bottom										
Date Sampled	29-Aug-18	22-Aug-18	22-Aug-18	21-Aug-18	24-Aug-18					
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES					
Sample Matrix Code	4A	4A	6AB	6	4A					
PAH 16MS (leachable)										
Acenaphthene (leachable)$_{A}$	-	-	0.20	-	0.03				µg/l	A-T-019w
Acenaphthylene (leachable)$_{A}$	-	-	<0.02	-	<0.02				µg/l	A-T-019w
Anthracene (leachable)$_{A}$	-	-	0.05	-	<0.02				µg/l	A-T-019w
Benzo(a)anthracene (leachable)$_{A}$	-	-	0.07	-	<0.02				µg/l	A-T-019w
Benzo(a)pyrene (leachable)$_{A}$	-	-	0.08	-	<0.02				µg/l	A-T-019w
Benzo(b)fluoranthene (leachable)$_{A}$	-	-	0.07	-	<0.02				µg/l	A-T-019w
Benzo(ghi)perylene (leachable)$_{A}$	-	-	0.05	-	<0.02				µg/l	A-T-019w
Benzo(k)fluoranthene (leachable)$_{A}$	-	-	0.04	-	<0.02				µg/l	A-T-019w
Chrysene (leachable)$_{A}$	-	-	0.09	-	<0.02				µg/l	A-T-019w
Dibenzo(ah)anthracene (leachable)$_{A}$	-	-	<0.02	-	<0.02				µg/l	A-T-019w
Fluoranthene (leachable)$_{A}$	-	-	0.23	-	0.06				µg/l	A-T-019w
Fluorene (leachable)$_{A}$	-	-	0.06	-	<0.02				µg/l	A-T-019w
Indeno(123-cd)pyrene (leachable)$_{A}$	-	-	0.05	-	<0.02				µg/l	A-T-019w
Naphthalene (leachable)$_{A}$	-	-	<0.02	-	<0.02				µg/l	A-T-019w
Phenanthrene (leachable)$_{A}$	-	-	0.02	-	<0.02				µg/l	A-T-019w
Pyrene (leachable)$_{A}$	-	-	0.22	-	0.06				µg/l	A-T-019w
Total PAH 16MS (leachable)$_{A}$	-	-	1.23	-	0.15				µg/l	A-T-019w
TPH Banded 13										
>C6-C8$_{A}^{M\#}$	<5	-	-	<5	-				mg/kg	A-T-007s
>C8-C10$_{A}^{M\#}$	<1	-	-	<1	-				mg/kg	A-T-007s
>C10-C12$_{A}^{M\#}$	<1	-	-	<1	-				mg/kg	A-T-007s
>C12-C16$_{A}^{M\#}$	2	-	-	<2	-				mg/kg	A-T-007s
>C16-C21$_{A}^{M\#}$	13	-	-	<2	-				mg/kg	A-T-007s
>C21-C35$_{A}^{M\#}$	34	-	-	5	-				mg/kg	A-T-007s
>C35-C44$_{A}$	17	-	-	3	-				mg/kg	A-T-007s
Total TPH Banded 13$_{A}$	66	-	-	8	-				mg/kg	A-T-007s

REPORT NOTES

General:
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Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.
Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Certificate No. 18/07187

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07187
Issue Number: 1 **Date:** 17 September, 2018

Client:
Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager: Chris Lewis
Project Name: Fixborough EFW Plant
Project Ref: 31554
Order No: 93514
Date Samples Received: 07/09/18
Date Instructions Received: 07/09/18
Date Analysis Completed: 15/09/18

Prepared by:	**Approved by:**
[redacted]	[redacted]
Melanie Marshall Laboratory Coordinator	Danielle Brierley Client Manager

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Envirolab Job Number: 18/07187

Client Project Name: Fixborough EFW Plant

Client Project Ref: 31554

Lab Sample ID	18/07187/1								Units	Method ref
Client Sample No	2									
Client Sample ID	BH3									
Depth to Top	0.50									
Depth To Bottom										
Date Sampled	30-Aug-18									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
% Stones >10mm$_A$	4.9								% w/w	A-T-044
Cyanide (total)$_A^{M\#}$	<1								mg/kg	A-T-042sTCN
Organic matter$_D^{M\#}$	1.0								% w/w	A-T-032 OM
Arsenic$_D^{M\#}$	2								mg/kg	A-T-024s
Cadmium$_D^{M\#}$	1.0								mg/kg	A-T-024s
Copper$_D^{M\#}$	7								mg/kg	A-T-024s
Chromium$_D^{M\#}$	15								mg/kg	A-T-024s
Lead$_D^{M\#}$	15								mg/kg	A-T-024s
Mercury$_D$	0.20								mg/kg	A-T-024s
Nickel$_D^{M\#}$	12								mg/kg	A-T-024s
Selenium$_D^{\#}$	<1								mg/kg	A-T-024s
Zinc$_D^{M\#}$	43								mg/kg	A-T-024s

Envirolab Job Number: **18/07187** **Client Project Name:** **Fixborough EFW Plant**

Client Project Ref: **31554**

Lab Sample ID	18/07187/1								Units	Method ref
Client Sample No	2									
Client Sample ID	BH3									
Depth to Top	0.50									
Depth To Bottom										
Date Sampled	30-Aug-18									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A^{\#}$	NAD									A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A									

Envirolab Job Number: 18/07187 **Client Project Name:** Fixborough EFW Plant

Client Project Ref: 31554

Lab Sample ID	18/07187/1								Units	Method ref
Client Sample No	2									
Client Sample ID	BH3									
Depth to Top	0.50									
Depth To Bottom										
Date Sampled	30-Aug-18									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	0.01								mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.01								mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	0.06								mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.21								mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.16								mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.20								mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.06								mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.08								mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	0.19								mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.04								mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	0.44								mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	0.02								mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.08								mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.03								mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	0.24								mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	0.42								mg/kg	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	2.17								mg/kg	A-T-019s

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A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

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Secondary Matrix Codes:

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E = contains roots/twigs.

Key:

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US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Certificate No. 18/07299

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07299
Issue Number: 1 **Date:** 20 September, 2018

Client:
Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager: Chris Lewis
Project Name: Flixborough EFW Plant
Project Ref: 31554
Order No: 93515
Date Samples Received: 11/09/18
Date Instructions Received: 12/09/18
Date Analysis Completed: 20/09/18

Prepared by:	**Approved by:**
[redacted]	[redacted]
Melanie Marshall Laboratory Coordinator	Georgia King Admin & Client Services Supervisor

Envirolab Job Number: 18/07299 **Client Project Name: Flixborough EFW Plant**

Client Project Ref: 31554

Lab Sample ID	18/07299/1	18/07299/2	18/07299/3	18/07299/4	18/07299/5	18/07299/6	18/07299/7	18/07299/8	Units	Method ref
Client Sample No	24	9	29	8	24	7	4	15		
Client Sample ID	BH2	BH3	BH4	BH5	BH6	BH2	BH3	BH4		
Depth to Top	6.95	2.75	8.75	1.85	7.25	1.20	0.50	3.00		
Depth To Bottom	7.00					1.70	1.00	3.50		
Date Sampled	29-Aug-18	30-Aug-18	23-Aug-18	03-Sep-18	21-Aug-18	29-Aug-18	30-Aug-18	22-Aug-18		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Solid	Soil - D		
Sample Matrix Code	6	6	6AE	3	6	6	7	6		
% Stones >10mm$_A$	<0.1	<0.1	8.5	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	A-T-044
pH BRE$_D^{M\#}$	-	-	-	-	-	8.13	12.63	8.48	pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	-	-	-	-	-	44	41	398	mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	-	-	-	-	-	-	0.76	-	% w/w	A-T-028s
Sulphur BRE (total)$_D$	-	-	-	-	-	-	0.28	-	% w/w	A-T-024s
Organic matter$_D^{M\#}$	18.7	4.0	24.6	2.3	8.0	-	-	-	% w/w	A-T-032 OM

Envirolab Job Number: 18/07299 **Client Project Name: Flixborough EFW Plant**

Client Project Ref: 31554

Lab Sample ID	18/07299/9	18/07299/10							Units	Method ref
Client Sample No	24	55								
Client Sample ID	BH5	BH2								
Depth to Top	7.50	20.50								
Depth To Bottom		21.00								
Date Sampled	03-Sep-18	30-Aug-18								
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	6E	5A								
% Stones >10mm$_A$	<0.1	<0.1							% w/w	A-T-044
pH BRE$_D^{M\#}$	6.86	7.82							pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	3450	418							mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	1.48	-							% w/w	A-T-028s
Sulphur BRE (total)$_D$	6.52	-							% w/w	A-T-024s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
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Certificate No. 18/07300

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07300
Issue Number: 1 **Date:** 19 September, 2018

Client:
Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager: Chris Lewis
Project Name: Flixborough EFW Plant
Project Ref: 31554
Order No: 93515
Date Samples Received: 11/09/18
Date Instructions Received: 12/09/18
Date Analysis Completed: 18/09/18

Prepared by:

[redacted]

Richard Wong
Client Manager

Approved by:

[redacted]

Gill Walker
Director/Laboratory Manager

UKAS TESTING
1247

Envirolab Job Number: 18/07300

Client Project Name: Flixborough EFW Plant

Client Project Ref: 31554

Lab Sample ID	18/07300/1									
Client Sample No	41									
Client Sample ID	BH6									
Depth to Top	15.00									
Depth To Bottom										
Date Sampled	21-Aug-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A								**Units**	**Method ref**
pH BRE (w)$_A$$^\#$	7.41								pH	A-T-031w
Sulphate BRE (w)$_A$$^\#$	90								mg/l	A-T-026w

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APPENDIX 5

DESIGN CONSIDERATIONS

APPENDIX 5

GUIDELINES FOR THE DESIGN OF PILES

FIRST APPROXIMATION OF WORKING LOAD

A5.1 GENERAL

The ultimate carrying capacity, Qu, of a particular pile is taken as the sum of the ultimate shaft friction resistance, Qs, and the ultimate end bearing resistance, Qb. This may be expressed as follows:-

$$Qu = Qs + Qb$$

$$= f.As + q.Ab$$

where f = unit shaft resistance

As = embedded surface area of pile

q = unit end bearing resistance

Ab = effective cross-sectional area of pile base

A5.2 COHESIVE SOILS

A5.2.1 Shaft Resistance

The ultimate shaft resistance, f, for piles in both compression or tension in cohesive soils is determined by applying a factor to the undrained shear strength, Cs, which exists in the soils along the embedded length of the pile, and is given by:-

$$f = \alpha.Cs$$

Where α is an adhesion factor, which for straight-shafted bored piles may be taken as 0.45 to 0.60.

Ultimate unit shaft friction should not exceed 100kPa.

A5.2.2 End Bearing

For piles terminating in cohesive soils, the ultimate unit end bearing resistance q, is given by:-

$$q = Nc.Cb$$

where Cb is the undrained shear strength at the base of the pile

and Nc is a bearing capacity factor

The value of Nc for a cohesive material is variable, depending on the depth of the penetration of the pile into the bearing stratum. Generally, Nc could be taken to have a value of 9, except in the case of large diameter short piles where a lesser value should be used.

A5.3 COHESIONLESS SOILS

A5.3.1 Shaft Resistance

For piles driven in cohesionless soils the ultimate unit shaft resistance, f, may be calculated using the following method, which gives:-

$$f = 0.5\gamma' (D+d)\,Ks \tan \delta$$

where γ' = average effective unit weight of soil surrounding the pile

D = depth to the pile toe or to the base of the granular stratum whichever is the lesser

d = depth to the top of the granular stratum

δ = angle of friction between pile and soil (see below)

Ks = a coefficient (see below)

VALUES OF Ks AND δ

Pile Type	δ	Ks		
		Relative Density		Tension Piles
		Low	High	
Steel	20°	0.5	1.5	0.5
Concrete	0.75ϕ	1.0	2.0	0.5

The value of ϕ may be interpreted from standard penetration tests.

For bored and cast-in-place piles, δ = 22° and Ks = 1 should be used to allow for loosening of the soil during boring.

It has been found that the ultimate unit shaft resistance does not exceed 100kPa and therefore this value should not be exceeded in design.

A5.3.2 End Bearing

The unit ultimate end bearing resistance (q) of piles in cohesionless soils may be calculated as follows:-

$$q = \gamma'.D.Nq$$

where γ' = average effective unit weight of soil surrounding the pile

D = depth to pile toe

Nq = bearing capacity factor

In addition, the ultimate unit base resistance should not exceed a value of 11,000kPa. For bored and cast-in-place piles the value of Nq used should correspond to loose soil conditions.

A5.4 FACTORS OF SAFETY

A5.4.1 Cohesive and Non-cohesive Soils

For cohesive and non-cohesive soils a factor of safety of 3 may be used to obtain the allowable or safe carrying capacity of piles from the ultimate carrying capacity.

APPENDIX 6

CONTAMINATION ASSESSMENT

APPENDIX 6

GENERAL NOTES ON CONTAMINATION ASSESSMENT

A6.1 STATUTORY FRAMEWORK AND DEFINITIONS

A6.1.1 The statutory definition of contaminated land is defined in the Environmental Protection Act 1990, ref. 9.16, which was introduced by the Environment Act 1995, ref. 9.17;

'Land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) pollution of controlled waters is being, or is likely to be, caused.'

A6.1.2 The UK guidance on the assessment of contaminated has developed as a direct result of the introduction of these two Acts. The technical guidance supporting the new legislation has been summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs), a proposed series of twelve documents. Seven were originally published in March 1994, four more were published in April 2002, while the last remaining guidance document, CLR 11, ref. 9.33 was published in 2004. In 2008 CLR reports 7 to 10 were withdrawn by DEFRA and the Environment Agency and updated version of CLR 9 and 10 were produced in the form of Science Reports SR2, ref. 9.24 and SR3, ref. 9.18.

A6.1.3 In establishing whether a site fulfils the statutory definition of 'contaminated land' it is necessary to identify, whether a pollutant linkage exists in respect of the land in question and whether the pollutant linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage,
- presents a significant possibility of significant harm being caused to that receptor,
- is resulting in the pollution of the controlled waters which constitute the receptor, or
- is likely to result in such pollution.

A6.1.4 A *'pollutant linkage'* may be defined as the link between a contaminant *'source'* and a *'receptor'* by means of a *'pathway'*.

A6.2 ASSESSMENT METHODOLOGY

A6.2.1 The guidance proposes a four-stage assessment process for identifying potential pollutant linkages on a site. These stages are set out in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable.

A6.2.2 Stages 1 and 2 develop a *'conceptual model'* based upon information collated from desk based studies, and frequently a walkover of the site. The walkover survey should be conducted in general accordance with CLR 2, ref. 9.38. The formation of a conceptual model is an iterative process and as such, it should be updated and refined throughout each stage of the project to reflect any additional information obtained.

A6.2.3 The extent of the desk studies and enquiries to be conducted should be in general accordance with CLR 3, ref. 9.39. The information from these enquiries is presented in a desk study report with recommendations, if necessary, for further work based upon the conceptual model. CLR 8, ref. 9.40, together with specific DoE 'Industry Profiles' provides guidance on the nature of contaminants relating to specific industrial processes. Although CLR 8 has been withdrawn, no replacement guidance has been published that lists the contaminants likely to be present on contaminated sites and as such the guidance relating to this issue of CLR 8 is considered to still be relevant.

A6.2.4 If potential pollutant linkages are identified within the conceptual model, a Phase 2 site investigation and report will be recommended. The investigation should be planned in general accordance with CLR 4, ref. 9.1. The number of exploratory holes and samples collected for analysis should be consistent with the size of the site and the level of risk envisaged. This will enable a contamination risk assessment to be conducted, at which point the conceptual model can be updated and relevant pollutant linkages can be identified.

A6.2.5 A two-stage investigation may be more appropriate where time constraints are less of an issue. The first stage investigation being conducted as an initial assessment for the presence of potential sources, a second being a more refined investigation to delineate wherever possible the extent of the identified contamination.

A6.2.6 All site works should be in general accordance with the British Standards, BS 5930:1999, ref. 9.3, ISO 1997, ref. 9.4 and BS 10175:2001, ref. 9.2.

A6.2.7 The generic contamination risk assessment screens the results of the chemical analysis against generic guidance values which are dependent on the proposed end-use of the development.

A6.2.8 The end-use may be defined as one of the following ref. 9.22;

- Residential with homegrown produce – domestic low rise and low density housing with gardens where vegetable may be grown for home consumption
- Residential without homegrown produce – domestic low density and low density housing where no gardens are present.
- Allotments – specific areas where vegetables are grown for home consumption.
- Public open space in close proximity to residential housing – includes the predominantly grassed area adjacent to high density housing and the central green area around which houses are developed. This land-use includes the smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting.
- Public open space in use as general parkland – provided for recreational use and may be used for family visits and picnics, children's play area, sports grounds and dig walking.
- Commercial – industrial premises where there is limited exposure to soil.

A6.2.9 Exposure pathways for each type of end-use are given below:

Standard Land Use	**Oral Routes**			**Dermal Routes**		**Inhalation Routes**			
	Direct soil & dust ingestion	**Consumption of homegrown produce**	**Soil attached to homegrown produce**	**Indoor**	**Outdoor**	**Indoor dust**	**Outdoor dust**	**Indoor vapour**	**Outdoor vapour**
Residential with homegrown produce	✓	✓	✓	✓	✓	✓	✓	✓	✓
Residential without homegrown produce	✓	X	X	✓	✓	✓	✓	✓	✓
Allotments	✓	✓	✓	X	✓	X	✓	✓	✓
Public open space – adjacent to dwellings	✓	X	X	✓	✓	✓	✓	X	✓
Public open space – parkland	✓	X	X	X	✓	X	✓	X	✓
Commercial	✓	X	X	✓	X	✓	X	✓	X

A6.2.10 Soils will be compared to Suitable 4 Use Levels (S4ULs) published by LQM ref. 9.20 Assessment Criteria. Where no S4UL is available, the assessment criteria (AC) are generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.06, ref. 9.20. Toxicological and physico-chemical/fate and transport data used to generate the AC has been derived from a hierarchy of data sources as follows:

1. Environment Agency or Department of Environment Food and Rural Affairs

   (DEFRA) documents;

2. Other documents produced by UK Government or state organisations;

3. European institution documents;

4. International organisation documents;

5. Foreign government institutions.

A6.2.11 In the case of the majority of contaminants considered, the toxicological data has been drawn from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), ref. 9.19, where available. Where no TOX report is available reference has been made to the health criteria values, derived for use in Land Quality Press (2006), ref. 9.25, as this is considered to represent a peer reviewed data source. Similarly, fate and transport data has been derived in the first instance from Environment Agency (2003), ref. 9.41 and for contaminants not considered in this document the fate and transport data used in previous versions of the CLEA model has been used.

A6.2.12 Chemical laboratory test results are processed as follows. A statistical analysis of the results is conducted, as detailed in CIEH and CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', ref. 9.20. Individual concentrations are compared to the selected guideline values to identify concentrations of contaminants that are above the selected screening criteria.

A6.2.13 Initially the distribution of the data set is to determine if the data set is, or is not, normally distributed. Where the distribution of the data is shown to be normal, the mean value test is applied to determine whether the mean characteristics of the selected soil unit present a significant possibility of significant harm to human health. Where the data is not normally distributed a method based on the Chebychev Theorem can be applied to test the same hypothesis. The significance of the data is further tested using the maximum value test. This determines whether the highest recorded contaminant concentrations are from the same statistical distribution or whether they may represent a 'hot spot'.

A6.2.14 Where the risk estimation identifies significant concentrations of one or more contaminants, a further risk evaluation needs to be undertaken.

A6.2.15 The risk evaluation will address the potential pollutant linkages between an identified source of contamination and the likely receptors both on and off site.

A6.2.16 The potential receptors include:

1) Humans – current site occupants, construction workers, future site users and neighbouring site users.

2) Controlled Waters – surface water and groundwater resources

3) Plants – current and future site vegetation

4) Building materials

A6.2.17 The potential hazards to be considered in relation to contamination are:

a) Ingestion and inhalation.

b) Uptake of contaminants via cultivated vegetables.

c) Dermal contact

d) Phytotoxicity (the prevention or inhibition of plant growth)

e) Contamination of water resources

f) Chemical attack on building materials and services

g) Fire and explosion

A6.2.18 Dependent on the outcome of the initial, generic contamination risk assessment, further detailed assessment of the identified risks may be required.

A6.3 Generic Guidance Values Used Within Contamination Risk Assessment

Commercial End Use

Commercial	Determinant	Guidance Value (mg/kg)	Guidance Value (mg/kg)	Guidance Value (mg/kg)	Primary Data Source
		1% SOM	2.5% SOM	6% SOM	
PAH	Acenaphthene	29000	30000	30000	LQM/CIEH S4UL
	Acenaphthylene	29000	30000	30000	LQM/CIEH S4UL
	Anthracene	150000	150000	150000	LQM/CIEH S4UL
	Benzo(a)anthracene	49	56	62	LQM/CIEH S4UL
	Benzo(a)pyrene	11	12	13	LQM/CIEH S4UL
	Benzo(b)fluoranthene	13	15	16	LQM/CIEH S4UL

Commercial	Determinant	Guidance Value (mg/kg)	Guidance Value (mg/kg)	Guidance Value (mg/kg)	Primary Data Source
		1% SOM	2.5% SOM	6% SOM	
	Benzo(ghi)perylene	1400	1500	1600	LQM/CIEH S4UL
	Benzo(k)fluoranthene	370	410	440	LQM/CIEH S4UL
	Chrysene	93	110	120	LQM/CIEH S4UL
	Dibenzo(ah)anthracene	1.1	1.3	1.4	LQM/CIEH S4UL
	Fluoranthene	6300	6300	6300	LQM/CIEH S4UL
	Fluorene	20000	20000	20000	LQM/CIEH S4UL
	Indeno(123-cd)pyrene	150	170	180	LQM/CIEH S4UL
	Naphthalene	1200	1900	3000	LQM/CIEH S4UL
	Phenanthrene	6200	6200	6200	LQM/CIEH S4UL
	Pyrene	15000	15000	15000	LQM/CIEH S4UL
Other Organics	Phenol	760	1500	3200	LQM/CIEH S4UL
Metals	Arsenic	640	640	640	LQM/CIEH S4UL
	Beryllium	12	12	12	LQM/CIEH S4UL
	Boron	240000	240000	240000	LQM/CIEH S4UL
	Cadmium	190	190	190	LQM/CIEH S4UL
	Chromium (III)	8600	8600	8600	LQM/CIEH S4UL
	Chromium (VI)	49	49	49	LQM/CIEH S4UL
	Copper	68000	68000	68000	LQM/CIEH S4UL
	Lead	2330	2330	2330	DEFRA C4SL
	Mercury	58	58	58	LQM/CIEH S4UL
	Nickel	980	980	980	LQM/CIEH S4UL
	Selenium	12000	12000	12000	LQM/CIEH S4UL
	Vanadium	9000	9000	9000	LQM/CIEH S4UL
	Zinc	730000	730000	730000	LQM/CIEH S4UL

Commercial	Guidance Value (mg/kg)	Guidance Value (mg/kg)	Guidance Value (mg/kg)	Primary Data Source
	1% SOM	2.5% SOM	6% SOM	
Aliphatic				
EC 5-6	3200 (304)	5900 (558)	12000 (1150)	LQM/CIEH S4UL
EC >6-8	7800 (144)	17000 (322)	40000 (736)	LQM/CIEH S4UL
EC >8-10	2000 (78)	4800 (190)	11000 (451)	LQM/CIEH S4UL
EC >10-12	9700 (48)	23000 (118)	47000 (283)	LQM/CIEH S4UL
EC >12-16	59000 (24)	82000 (59)	90000 (142)	LQM/CIEH S4UL
EC >16-35	1600000	1700000	1800000	LQM/CIEH S4UL
EC >35-44	1600000	1700000	1800000	LQM/CIEH S4UL
Aromatic				
EC 5-7 (benzene)	26000 (1220)	46000 (2260)	86000 (4710)	LQM/CIEH S4UL
EC >7-8 (toluene)	56000 (869)	110000 (1920)	180000 (4360)	LQM/CIEH S4UL
EC >8-10	3500 (613)	8100 (1500)	17000 (3580)	LQM/CIEH S4UL
EC >10-12	16000 (364)	28000 (899)	34000 (2150)	LQM/CIEH S4UL
EC >12-16	36000 (169)	37000	38000	LQM/CIEH S4UL
EC >16-21	28000	28000	28000	LQM/CIEH S4UL
EC >21-35	28000	8000	28000	LQM/CIEH S4UL
EC >35-44	28000	28000	28000	LQM/CIEH S4UL
Aliphatic and Aromatic				
EC >44-70	28000	28000	28000	LQM/CIEH S4UL

BTEX				
Benzene	27	47	90	LQM/CIEH S4UL
Toluene	56000	110000	180000	LQM/CIEH S4UL
Ethylbenzene	5700	13000	27000	LQM/CIEH S4UL
m/p Xylenes	5900	14000	30000	LQM/CIEH S4UL
o Xylene	17000	24000	33000	LQM/CIEH S4UL

SOM = Soil Organic Matter
Values in brackets indicate the vapour saturation limit where this is exceeded by the GAC or SGV

A6.4 Guidance Values Used For Assessment of Risk To Controlled Waters

Contaminant	Units	EQS Freshwater[1]	EQS Saltwater[1]	Water Supply[5]
Alachlor	ug/l	0.7	0.7	
Abamectin	ug/l	0.03	0.01	
Acrylamide	ug/l			0.1
Aluminium	ug/l	10[3]	25	200
Ammonia (unionised)	ug/l	15	21[2]	
Ammonium (as NH4)	mg/l			0.5
Anthracene	ug/l	0.4	0.4	
Antimony	ug/l			5
Arsenic	ug/l	50[2]	25[2]	10
Atrazine	ug/l	2	2	
Azamethiphos	ug/l	0.05	0.05	
Barium	ug/l			1000
Benzene	ug/l	50	50	1
Benzyl-butyl-phthalate	ug/l	7.5[2]	0.75[2]	
Boron	mg/l	2	7	1
Brominated Diphenylether	ug/l	0.0005[2]	0.0005[2]	
Bromine	ug/l	5	10	
Bromoxynil	ug/l	1000	1000	
Cadmium	ug/l	0.45[3]	0.2[2]	5
Calcium	*mg/l*			*250*
Carbon Tetrachloride	ug/l	12[2]	12[2]	
Carbendazin	ug/l	0.15[2]	-	
C10-C13 Chloroalkanes	ug/l	1.4	1.4	
Chlorenvinphos	ug/l	0.3	0.3	
Chlorpyrifos (Chlorpyrifos-ether)	ug/l	0.1	0.1	
Chlorothalonil	ug/l	0.035[2]	-	
Cyclodiene Pesticides (aldrin, Dieldrin, Endrin, Isodrin)	ug/l	Σ=0.01[2]	Σ=0.005[2]	
Chloride	mg/l	250	-	400
Chlorpropham	ug/l	40	40	
Chlortoluron	ug/l	20	-	
Chromium III	ug/l	4.7[2]	-	50
Chromium VI	ug/l	3.4[2]	0.6[2]	
Cobalt	ug/l	100	100	
Copper	ug/l	1[2]	3.76[2]	2
Coumaphos	ug/l	0.1	0.1	
Cyanide (hydrogen cyanide)	ug/l	1[2]	1[2]	50
Cypermethrin	ug/l	0.1[2]	0.1[2]	
Cyfluthrin	ug/l	0.001	0.001	
1,2-Dichloroethane	ug/l			3
2,4-Dichlorophenoxyacetic acid (2,4-D)	ug/l	0.3[2]	0.3[2]	
2,4-Dichlorophenol	ug/l	4.2[2]	0.042[2]	
3,4-Dichloroaniline	ug/l	0.2[2]	0.2[2]	
DDT (total)	ug/l	0.025[2]	0.025[2]	
Diazinon	ug/l	0.01[2]	0.01[2]	
Dibutylphthalate (DBP)	ug/l	40	40	
Dichlorobenzenes (all isomers)	ug/l	200	200	
para, para-DDT	ug/l	0.01[2]	0.01[2]	
Diethylphthalate (DEP)	ug/l	1000	1000	
Dimethylphthalate (DMP)	ug/l	4000	4000	
Dioctylphthalate (DOP)	ug/l	40	40	
Dimethoate	ug/l	0.48[2]	0.48[2]	
Diflubenzuron	ug/l	0.015	0.1	
Doromectin	ug/l	0.01	0.01	
Diuron	ug/l	1.8	1.8	
Endosulfan	ug/l	0.01	0.004	
Epichlorohydrin	ug/l			0.1
EDTA	ug/l	4000	4000	
Ethylbenzene	ug/l	200	200	
Fenchlorphos	ug/l	0.1	0.1	
Flucofuron	ug/l	1	1	
Fluoride	mg/l	3[4]	15	1.5
Fluoranthene	ug/l	1	1	
Formaldehyde	ug/l	50	-	

Contaminant	Units	EQS Freshwater[1]	EQS Saltwater[1]	Water Supply[5]
Glyphosate	ug/l	196[2]	196[2]	
Hexachlorobenzene	ug/l	0.05	0.05	
Hexachlorobutadiene	ug/l	0.6	0.6	
Hexachlorocyclohexane (lindane)	ug/l	0.04	0.02	
Hydrogen Sulphide	ug/l	1	10	
Ioxynil	ug/l	100	100	
Iron	ug/l	1000[2]	1000[2]	200
Isoproturon	ug/l	1	1	
Ivermectin	ug/l	0.001	0.001	
Kjeldahl Nitrogen (as N)	mg/l			1
Lead	ug/l	7.2[2]	7.2[2]	10
Linuron	ug/l	0.5[2]	0.5[2]	
Malachite Green	ug/l	100	100	
Magnesium	*mg/l*			*50*
Manganese	ug/l	123[2]	-	50
Mecoprop	ug/l	18[2]	18[2]	
Methiocarb	ug/l	0.01[2]	-	
Mancozeb	ug/l	20	20	
Maneb	ug/l	30	30	
MCPA	ug/l	120[3]	800	
Methylphenols	ug/l	300	300	
Mevinphos	ug/l	0.02	-	
Monochlorophenols	ug/l	250	250	
Mercury	ug/l	0.07	0.07	1
Naphthalene	ug/l	2.4[2]	1.2[2]	
Nickel	ug/l	20[2]	20[2]	20
NTA	ug/l	10000	30000	
Nitrate (as N)	mg/l			50
Nitrite (as NO2)	mg/l			0.5
Nonylphenol (4-nonylphenol)	ug/l	2	2	
Oils/hydrocarbons	ug/l			10
Pendimethylin	ug/l	0.3[2]	-	
Permethrin	ug/l	0.001[2]	0.0002[2]	
Polycyclic Aromatic Hydrocarbons (PAH)	ug/l			0.1
- Benzo(a)pyrene	ug/l	0.1	0.1	0.01
- Benzo(b)fluoranthene	ug/l	Σ=0.03[2]	Σ=0.03[2]	
- Benzo(k)fluoranthene	ug/l			
- Benzo(ghi)perylene	ug/l	Σ=0.002[2]	Σ=0.002	
- Indeno(123-cd)perylene	ug/l			
Pentachlorobenzene	ug/l	0.007[2]	0.0007[2]	
Pentachlorophenol	ug/l	1	1	
Pesticides (individual)	ug/l			0.1
- Aldrin	ug/l			0.03
- Dieldrin	ug/l			0.03
- Heptachlor	ug/l			0.03
- Heptachlor epoxide	ug/l			0.03
Pesticides (total)	ug/l			0.5
Phenol	ug/l	7.7[2]	7.7[2]	0.5
PCSDs	ug/l	0.05	0.05	
Pirimicarb	ug/l	5	5	
Pendimethalin	ug/l	6	6	
Primaphos-methyl	ug/l	0.05	0.05	
Prochloraz	ug/l	40	40	
Propetamphos	ug/l	0.1	0.1	
Propyzamide	ug/l	1000	1000	
Phosphorous	ug/l			2200
Potassium	mg/l			12
Selenium	ug/l			10
Silver	ug/l	0.1	1	10
Simizine	ug/l	4	4	
Styrene	ug/l	500	500	
Sulcofuron	ug/l	25	25	
Sulphate	mg/l	400	-	250
Surfactants (as lauryl sulphate)	ug/l			200
Tecnazene	ug/l	10	10	
Tetrachloromethane (PCM)	ug/l	2.5[2]	2.5[2]	3

Contaminant	Units	EQS Freshwater[1]	EQS Saltwater[1]	Water Supply[5]
Tetrachloroethylene (PCE)	ug/l	10[2]	10[2]	10
Tetrachloroethane	ug/l	140[2]	-	
Trichloroethylene (TCE)	ug/l	10[2]	10[2]	10
Thiabendazole	ug/l	50	50	
Tin (inorganic)	ug/l	25[2]	10[2]	
Trihalomethanes	ug/l			100
Trichlorobenzenes	ug/l	0.4[2]	0.4[2]	
Toluene	ug/l	74[2]	74[2]	
Tributyl phosphate	ug/l	500	500	
Tributyltin	ug/l	0.0015	0.0015	
Trifluralin	ug/l	0.03[2]	0.03[2]	
Vanadium	ug/l	20[4]	100	
Vinyl chloride	ug/l			0.5
Zinc	ug/l	11.9[2]	7.9[2]	5000

[1] MAC – Maximum Allowed Concentration

[2] AA – Average Annualised

[3] Dependant on pH

[4] Dependant on water hardness

[5] For sample taken at consumers' taps

APPENDIX 7

GAS GENERATION

APPENDIX 7

GENERAL NOTES ON GAS GENERATION

A7.1 GENERAL

A7.1.1 In the past, a series of guidance documents were published by CIRIA, ref. 9.42, providing advice on hazards associated with methane. This earlier guidance was consolidated in CIRIA Document C659 to provide a risk based approach to gas contaminated land. This was subsequently re-issued as CIRIA Document C665, ref. 9.44. In 2007, British Standard, BS8485, ref. 9.45, dealing with ground gas was published. It is recommended that guidance in C665 and BS8485 is adopted to provide a consistent approach in dealing with ground gas contamination, the principal details being as follows.

A7.1.2 This guidance is based on a similar approach to that for dealing with contaminated soil. The presence of hazardous gases could be deemed to be the 'source' in a 'pollutant linkage' that could lead to the conclusion that significant harm is or could be caused to people, buildings or the environment. In such circumstances the land could be deemed 'contaminated', ref. 9.16.

A7.1.3 Should a potential source of gas be identified in the conceptual model, a gas risk assessment should be carried out, sufficient to demonstrate to the local authority that the proposals mitigate any hazards associated with ground gas. The authority enforces compliance with Approved Document Part C of the Building Regulations, ref. 9.46.

A7.2 APPROACH

A7.2.1 A flow chart detailing the approach to assessing a site is given in CIRIA document C665, Figure 1.1. This may be summarised as follows.

- Carry out Phase 1 desk study, including initial conceptual model
- Assess site, potential presence of gas / potential unacceptable risk / identify further action, if necessary
- Monitor gas concentrations
- Assessment of Risk
- Recommendations / remediation
- Validation

A7.3 POLLUTANT LINKAGE ASSESSMENT

A7.3.1 A pollutant linkage assessment is presented in Appendix 3 of the Phase 1 Desk Study Report.

A7.3.2 Using the risk model in the desk study, the pollutant linkage can be identified and a preliminary estimate of risk undertaken. If there is no relevant pollutant linkage identified there is no risk. If there is a very low risk, it is likely that no further assessment is required. If further assessment is necessary, then gas monitoring is required.

A7.4 SITE MONITORING

A7.4.1 For sites with low generation potential, giving consistently low concentrations of soil gas under the worst-case conditions, a limited programme of monitoring would be appropriate. Where high or variable concentrations are anticipated or recorded, an extended programme of monitoring would be appropriate. The following guideline has been proposed, ref. 9.48.

Table A7.1

		Generation potential of source				
Sensitivity of development		**Very low**	**Low**	**Moderate**	**High**	**Very high**
	Low (Commercial)	4/1	6/2	6/3	12/6	12/12
	Moderate (Flats)	6/2	6/3	9/6	12/12	24/24
	High (Residential with gardens)	6/3*	9/6	12/6	24/12	24/24

Notes

1. First number is minimum number of readings and second number is minimum period in months, for example 4/1 – Four sets of readings over 1 month.
2. At least two sets of readings must be at low and falling atmospheric pressure (but not restricted to periods below <1000mb) known as worst case conditions (see Boyle and Witherington, 2006).
3. The frequency and period stated are considered to represent typical minimum requirements. Depending on specific circumstances fewer or additional readings may be required (e.g. any such variation subject to site specific justification). * The NHBC guidance is also recommending these periods/frequency of monitoring (Boyle and Witherington, 2006)
4. Historical data can be used as part of the data set.
5. Not all sites will require gas monitoring however, this would need to be confirmed with demonstrable evidence.
6. Placing high sensitivity end use on a high hazard site is not normally acceptable unless the source is removed or treated to reduce its gassing potential. Under such circumstances long-term monitoring may not be appropriate or required.

A7.4.2 Before taking any readings, zero the instrument, record atmospheric pressure and temperature.

A7.4.3 Gas flow should be recorded, giving the range of pressures, ensuring positive or negative flow is recorded.

A7.4.4 Record gas levels, recording peak and steady. Where steady state not obtained within 3 minutes, record change in concentration, where concentrations are decreasing, always record peak value. For very high concentrations, record for longer period of up to 10 minutes.

A7.5 ASSESSMENT OF RISK AND RECOMMENDATIONS

A7.5.1 The main method of characterising a site is the method described by Wilson and Card, ref. 9.49 and is termed Situation A. This can be used for all types of development except conventional low-rise housing with suspended ground floor and ventilated underfloor void.

A7.5.2 Low rise housing, Situation B, was developed by Boyle and Witherington, ref. 9.50 and was developed for the NHBC for classifying gassing sites for houses with suspended ground floor slab with ventilated void.

A7.5.3 Although the Code of Practice, ref. 9.45, assesses the characteristic gas situation as CIRIA recommend for Situation A, see Table A7.2 below, their solution for gas protection systems is different, see section **Error! Reference source not found.**.

A7.6 SITUATION A - ASSESSMENT

A7.6.1 This system proposed by Wilson and Card, ref. 9.49 was originally developed in CIRIA Report 149, ref. 9.42.

A7.6.2 The method uses both gas concentrations and borehole flow rate for methane and carbon dioxide to define a Characteristic Situation for a site.

A7.6.3 Gas Screening Value (litre/hr) = borehole flow rate (litre/hr) x (gas concentration (%))/100. The GSV is determined for methane and carbon dioxide and the worst case adopted. The Characteristic Situation can then be determined from the table below. The GSV can be exceeded if the conceptual model indicates it is safe to do so, and other factors may lead to a change in the Characteristic Situation.

Table A7.2

Characteristic Situation	Risk Classification	Gas screening value (CH_4 or CO_2(1/hr)[1]	Additional factors	Typical source of generation
1	Very low risk	<0.07	Typically methane $\leq$1% and/or carbon dioxide $\leq$5%. Otherwise consider increase to Situation 2	Natural soils with low organic content "Typical" Made Ground
2	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to Characteristic Situation 3	Natural soil, high peat/organic content. "Typical" Made Ground
3	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures	Mineworking – susceptible to flooding, completed landfill (WMP 26B criteria)
5	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	Very high risk	>70		Recent landfill site

1. Site characterisation should be based on gas monitoring of concentrations and borehole flow rates for the minimum periods defined in Table A7.1
2. Source of gas and generation potential/performance must be identified.
3. If there is no detectable flow use the limit of detection of the instrument.

A7.7 SITUATION A – SOLUTION

A7.7.1 The Characteristic Situation can be used to define the scope of gas protective measures required.

A7.7.2 The CIRIA approach uses the characteristic situation to define the level of gas protection as follows:

Table A7.3

Characteristic situation	Residential building (Not low-rise traditional housing)		Office/commercial/industrial development	
	Number of levels of protection	**Typical scope of protective measures**	**Number of levels of protection**	**Typical scope of protective measures**
1	None	No special precautions	None	No special precautions
2	2	a) Reinforced concrete cast in situ floor slab (suspended non-suspended or raft) with at least 1200g DPM and underfloor venting b) Beam and block or pre-cast concrete and 2000g DPM / reinforced gas membrane and underfloor venting All joints and penetrations sealed	1 to 2	a) Reinforced concrete cast in-situ floor slab (suspended non-suspended or raft) with at least 1200g DPM b) Beam and block or pre cast concrete slab and minimum 2000g DPM/reinforced gas membrane c) Possibly underfloor venting or pressurisation in combination with a) and b) depending on use All joints and penetrations sealed
3	2	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space	1 to 2	All types of floor slab as above. All joints and penetrations sealed. Minimum 2000g/reinforced gas proof membrane and passively ventilated underfloor sub-space or positively pressurised underfloor sub-space
4	3	All types of floor slab as above.	2 to 3	All types of floor slab as above.

Characteristic situation	Residential building (Not low-rise traditional housing)		Office/commercial/industrial development	
		All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated underfloor subspace or positively pressurised underfloor sub-space, oversite capping or blinding and in ground venting layer		All joints and penetration sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility
5	4	Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and ventilated or positively pressurised underfloor sub-space, oversite capping and in ground venting wells or barriers	3 to 4	Reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility. In ground venting wells or barriers
6	5	Not suitable unless gas regime is reduced first and quantitative risk assessment carried out to assess design of protection measures in conjunction with foundation design	4 to 5	Reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and actively ventilated or positively pressurised underfloor sub-space with monitoring facility, with monitoring. In ground venting wells and reduction of gas regime.

1. Typical scope of protective measures may be rationalised for specific developments on the basis of quantitative risk assessments.

2. Note the type of protection is given for illustration purposes only. Information on the detailing and construction of passive protection measures is given in BR414, ref. 9.47.

3. In all cases there should be minimum penetration of ground slabs by services and minimum number of confined spaces such as cupboards above the ground slab. Any confined spaces should be ventilated.

4. Foundation design must minimise differential settlement particularly between structural elements and ground-bearing slabs.

5. Commercial buildings with basement car parks, provided with ventilation in accordance with the Building Regulations, may not require gas protection for characteristic situations 3 and 4.

6. Floor slabs should provide an acceptable formation on which to lay the gas membrane. If a block and beam floor is used it should be well detailed so it has no voids in it that membranes have to span, and all holes for service penetrations should be filled. The minimum density of the blocks should be 600kg/m^3 and the top surface should have a 4:1 sand cement grout brushed into all joints before placing any membrane (this is also good practice to stabilise the floor and should be carried out regardless of the need for gas membrane).

7. The gas-resistant membrane can also act as the damp-proof membrane.

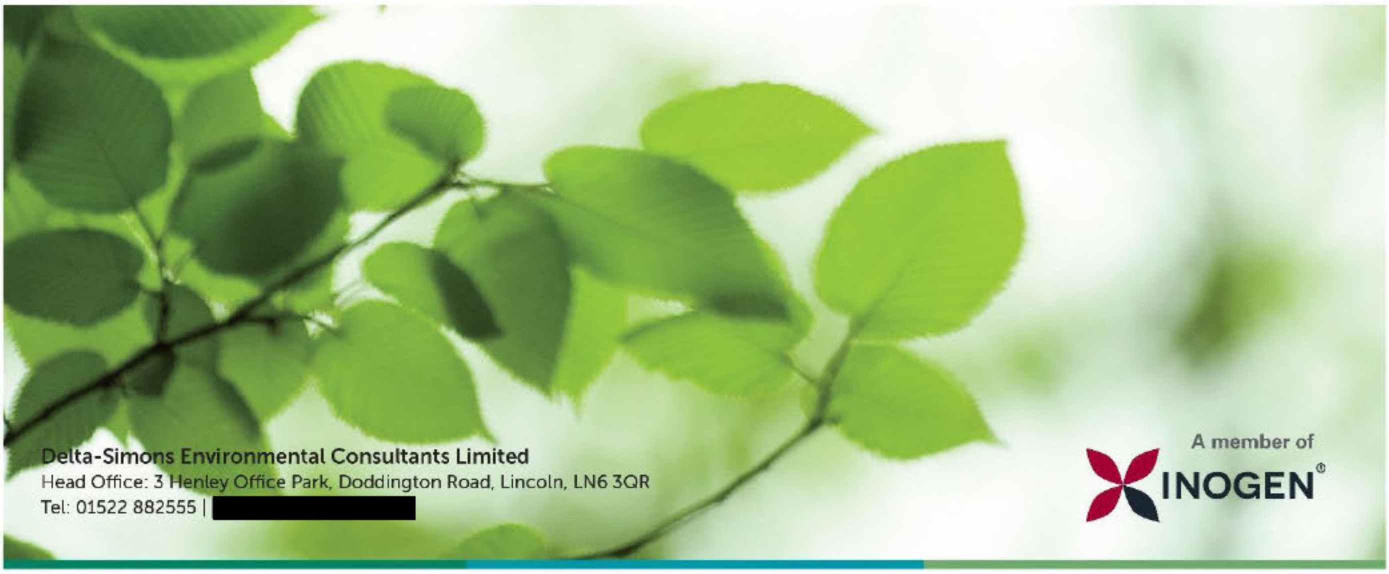
Geo-Environmental Assessment

Former Glanford House, Stather Road, Flixborough Industrial Estate

Presented to **North Lincolnshire Council**

Issued: November 2020

Delta-Simons Project No. 20-1405.01



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Report Details

Client	North Lincolnshire Council
Report Title	Geo-Environmental Assessment
Site Address	Former Glanford House, Stather Road, Flixborough Industrial Estate, Scunthorpe, DN15 8RS
Project No.	20-1405.01
Report Date	November 2020
Delta-Simons Contact	Paul Huteson [redacted]

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1	**Final**	**23rd November 2020**	**-**	[redacted] **Jessica Rowe** **Consultant**	[redacted] **Paul Huteson** **Associate**	[redacted] **Paul Bennett** **Unit Director**

About us

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Executive Summary

Brief	Delta-Simons was instructed by Mason Clark Associates on behalf of North Lincolnshire Council to prepare a undertake a Geo-Environmental Assessment of a parcel of land located off Stather Road, Flixborough Industrial Estate, Scunthorpe, DN15 8RS, prior to divestment.
NQMS	This report has been reviewed by Kelvin Hughes an SQP (number SQP0030) and a declaration made under the National Quality Mark Scheme (declaration number 1120-C9762).
Site Setting	The Site currently comprises a vacant parcel of land, following the demolition of an office building (Glanford House) and is located within the southern area of the wider Flixborough Industrial Estate.
Ground Conditions	The ground conditions generally comprised a veneer of Macadam/concrete underlain by Made Ground of sandy gravelly clay and gravelly sands with concrete, clinker, brick and limestone gravel. The underlying natural strata comprised firm becoming very soft with depth clays with peat, variable sands, gravels and clays at depth. Firm to very stiff grey clay was identified at depth, considered to represent the Mercia Mudstone Group.
Land Contamination Assessment	Human Health Detectable concentrations of heavy metals, PAHs and petroleum hydrocarbons have been identified within shallow soils, however, are below the respective GAC for a commercial end use. Controlled Waters Elevated heavy metals have been identified during groundwater monitoring within a single groundwater sample, on one occasion. Given the historical and current industrial land use of the surrounding area, elevated heavy metals within the underlying groundwater are not considered to originate on-Site and are likely indicative of the general groundwater quality within this area. In addition, PFAS have not been identified above the laboratory detection limit within groundwater collected from the Site. As such, significant groundwater contamination has not been identified that would represent a significant risk in respect to the divestment of the Site. However, additional groundwater monitoring may be required to support a future planning application and groundwater risk assessment. Built Environment The Site can provisionally be classified as Design Sulphate Class DS4 and Aggressive Chemical Environment Class AC-3s. Ground Gas Preliminary ground gas monitoring indicates the Site can be provisionally classified as CS2 (Low Risk), where ground gas protection measures will be required in any new buildings. Additional monitoring is likely to be required to support any future planning application for the Site.
Geotechnical Assessment	The Made Ground is considered to be too unpredictable, variable, weak and compressible in its existing condition for conventional shallow foundations at the Site, identified to a maximum extend of 2.00 m bgl. In addition, the underlying Alluvium deposits were recorded to have very low resistance to penetration, as such, it is not considered that traditional strip or pad foundations would be suitable.

	A piled foundation solution using traditional bored or continuous flight auger (CFA) piles transferring loads to competent geology may be suitable. Before confirming the suitability of piles advices should be sought from a specialist piling contractor.
Recommendations	Based on the findings of this Report, the following additional recommendations and development abnormals are considered appropriate, should the Site be proposed for redevelopment for a commercial end use; ▲ Additional groundwater monitoring may be required as part of any future planning application; ▲ Additional ground gas monitoring is likely to be required as part of any future planning application; ▲ Testing of existing macadam for the presence of coal tar and for off-Site disposal purposes; ▲ Additional, unidentified localised areas of contamination may exist at the Site and an appropriate 'hotspot' protocol should be in place for groundworkers to act upon should such contamination be identified during the construction process; ▲ Groundworkers who are required to perform sub-surface work at the Site should be made aware of the known contaminants in soil and groundwater and the possibility of encountering additional localised low levels of contamination. Therefore, good standards of personal hygiene should be observed and appropriate levels of PPE utilised where necessary; ▲ Confirmation should be sought from the Local Water Authority as to whether they will require upgraded pipework to be installed for new service installations; ▲ A clean cover layer will be required for any proposed landscaped areas, the details of which should be agreed with the Local Authority with reference to the final detailed development design and included within a RMS; ▲ Elevated costs above standard inert rates should be anticipated for disposal of engineering arisings from the Made Ground to include landfill tax. Waste classification testing (including WAC testing) is likely to be required to facilitate off-Site disposal of ground materials; and ▲ A Remediation Method Statement (RMS) and subsequent Validation Report will likely be required as part of the planning requirements for future planning.
Limitations and Uncertainties	▲ Additional groundwater monitoring may be required as part of any future planning application ▲ Additional ground gas monitoring is likely to be required as part of any future planning application. ▲ Testing of existing macadam for the presence of coal tar and for off-Site disposal purposes
This is intended as a summary only. Further detail and the limitations of the assessment are provided within the main body of the Report.	

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Appendices

1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Mason Clark Associates on behalf of North Lincolnshire Council (the "Client") to prepare a Geo-Environmental Assessment for a parcel of land located off Stather Road, Flixborough Industrial Estate, Scunthorpe, DN15 8RS (the "Site").

1.2 Context & Purpose

The aim of the study was to complete a geo-environmental assessment of the Site prior to disinvestment to inform potential purchasers with regard to ground conditions. The investigation has obtained information regarding ground conditions, from which risks to end-users, the environment and structures have been assessed, with mitigation measures suggested where necessary.

The investigation has also gathered geotechnical information to inform comment on the preliminary design of foundations and infrastructure. The report provides recommendations for further work (where appropriate) based on the findings of the investigation.

No proposed development plan is available at this stage however given the nature of the surrounding area a commercial end use is assumed for the purpose of this assessment.

1.3 Scope of Works

The scope of the investigation and layout of this report has been designed with consideration of guidance on Land Contamination: Risk Management pages of the GOV.UK web pages, the relevant requirements of the National Planning Policy Framework 2019 (NPPF) (paragraphs 170 & 178-180)[1] and the Planning Practice Guidance (Land Affected by Contamination)[2].

The project was carried out to an agreed brief as set out in Delta-Simons' proposal dated 12th August 2020. The scope of works is outlined in Section 3.2.1.

Specific sections of this Report may generally follow guidance set out in Eurocode 7 for a Ground Investigation Report (GIR), as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007. Eurocode 7 includes specific guidance on the number and spacing of investigation positions, methods of investigation and sample quality to be achieved which may not have been met by this investigation. The Report also includes information which may support a Geotechnical Design Report (GDR) as defined in BS EN 1997-1:2004; however, unless otherwise explicitly stated, the investigation has not been undertaken in accordance with Eurocode 7 and the preliminary geotechnical interpretation, assessments, risk register and recommendations presented within this Report may not meet the full requirements of a GDR.

1.4 Existing Information

Delta-Simons has previously undertaken a Preliminary Risk Assessment (PRA) for the Site;

- Preliminary Geo-Environmental Risk Assessment, Former Glanford House, Stather Road, Flixborough Industrial Estate, Delta-Simons Project No. 20-1405.01, dated November 2020.

For full details of the Site and environmental setting the previous PRA should be read in conjunction with this Report. A summary of the current Site status, environmental setting and key historical features is presented in Section 2.1.

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[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

[2] https://www.gov.uk/guidance/land-affected-by-contamination

1.5 National Quality Mark Scheme (NQMS)

This report has been reviewed by Kelvin Hughes, a Suitably Qualified Person (SQP) number SQP0030 as part of the NQMS. A declaration made (Declaration number 1120-C9762) to confirm that the report meets the necessary technical and regulatory standards and:

- The work has been planned, undertaken and written up by competent people who have relevant experience and/or qualifications in their respective disciplines;
- The underlying data has been collected in line with established good practice procedures and its collection has been subject to control via established quality management systems;
- The data has been processed, analysed and interpreted in line with established good practice and any specific advice provided by the relevant regulatory authorities or regulatory bodies;
- The reports set out recommendations or conclusions that are substantiated by the underlying data and are based upon reasonable interpretations; and
- Any limitations in the data or uncertainties in the analysis are clearly identified along with the possible consequences of such limitations.

A copy of the declaration form is provided as Appendix A.

1.6 Limitations

The assessment is limited to the issues agreed within the proposal for the works. Notes on limitations associated with this assessment are provided in Appendix A. In addition, due to the evolving regulatory climate specific to Per Fluoro Alkyl Substances (PFAS), Delta-Simons scope of work is not intended to be conclusive as it relates to the identification of any PFAS related issues. While Delta-Simons may advise its client if Delta-Simons becomes aware of the use of PFAS at the subject property, Delta-Simons makes no representation nor accepts any liability that any or all PFAS issues have been identified and/or revealed to its client through its scope of work, as presented herein.

Furthermore, there are the following specific limitations that apply to this assessment:

- A service pit containing utilities was noted beneath the existing floor slab at DS106, no damage was caused to the utilities. The borehole was relocated to DS106A, however, encountered refusal on concrete at 0.72 m bgl as such was relocated and achieved target depth within DS106B; and
- Groundwater samples were only collected from CP102 during the monitoring events given the small quantities of water (generally <10cm) within DS101 and DS109.

2.0 Site Details

2.1 Site Setting

A summary of the current Site status, environmental setting and key historical features is presented below. This has been summarised from the existing Delta-Simons PRA listed in Section 1.4 which should be consulted for further detail.

<table>
<tr><td rowspan="2">Co-ordinates</td><td rowspan="2">Centred approximately at National Grid Reference 486230, 414380.</td><td>Elevation</td><td>4.00 m AOD</td></tr>
<tr><td>Area</td><td>0.66 Ha</td></tr>
<tr><td>Site Location</td><td colspan="3">The Site is located off Stather Road, Flixborough Industrial Estate, approximately 4.5 km north west of Scunthorpe town centre. A Site Location Map is included as Figure 1.</td></tr>
<tr><td>Current Site Use</td><td colspan="3">The Site currently comprises a vacant parcel of land, following the demolition of an office building (Glanford House). It is understood from the Client that demolition took place in March 2020. Hardstanding, the former floor slab and likely relict foundations remain in-Situ</td></tr>
<tr><td>Environmental Setting</td><td colspan="3">From the British Geological Survey (BGS) Geology of Britain Viewer the Site is indicated as being underlain by superficial Alluvium deposits (Clay, Silt, Sand and Gravel). The bedrock geology is mapped as the Mercia Mudstone Group (Mudstone). Given the historical development, Made Ground is likely to be present overlying the Alluvium.
The EA classify the superficial Alluvium deposits as A Secondary A Aquifer and the Mercia Mudstone bedrock as a Secondary B Aquifer. The Site is not located within a Groundwater Source Protection Zone (SPZ).
The nearest surface water feature is the River Trent located approximately 160 m west and is noted to be tidal. The river is classified as Quality C from a monitoring point located approximately 400 m south west of the Site. There are no licensed abstraction records from groundwater within 1km of the Site or from surface water within 500 m of the Site.
There is an entry on the Substantial Pollution Incident Register listed for the Site, dated June 2006. The entry was classified as a Category 2 – Significant Incident with relation to air impact. The impact to land and water was classified as Category 4 – no impact, no further information is provided.</td></tr>
<tr><td>Key Historical Features</td><td colspan="3">Historically the Site remained undeveloped and likely in agricultural use until mapping dated 1966, when two potentially residential buildings are noted in the southern area of the Site. By the map edition dated 1981 the buildings are no longer present and assumed demolished and a large building, consistent with the footprint of Glanford House is noted to occupy the central area of the Site. A further small building is noted in the north eastern corner of the Site in the 1989 map edition, considered to represent the electrical sub-station noted during the investigation. The Site remains consistent until present day mapping and aerial imagery, however it is known that the demolition of the former building was undertaken in March 2020.
The Site is located within an area of former industrial use including a large chemical works (Nypro UK) with associated tanks, settling tanks, sludge bed, mineral railway and gas holders. At its closest the chemical works was located approximately 70 m west of the Site from the 1946 map edition until the 1985 map edition and comprised numerous settling tanks.</td></tr>
</table>

	The historical presence of the Nypro UK industrial facility on the Flixborough Industrial Estate is well documented, due to the large explosion, caused by the ignition of a cloud of leak cyclohexane gas, which destroyed the Nypro facility in June 1974. From readily available online resources it is understood that the Nypro UK plant was rebuilt following the explosion but closed a few years later and was subsequently demolished in 1981. The current Site is located to the south of the former Nypro UK facility. The Nypro incident lead to a large fire and that may have caused dispersal of contamination over the area. Also, it is not known how firefighting water was treated nor if it is distributed over the wider surrounding local area and if Per- and Polyfluorinated Alkyl Substances (PFAS) was used. The Nypro site has been reported to have been remediated, likely in the 1990's. It is not known what work was undertaken and therefore its adequacy relating to today's standards is not known. Within 250 m of the Site there are a number of warehouses, works and a factory with associated tanks following the demolition of the chemical works. From aerial imagery dated 1999 an area of land directly adjacent to the west of the Site is noted to be in use for the storage of potential coal/coke. By aerial imagery dated August 2018 stockpiles can no longer be seen and the area is in use for the storage of steel
Summary of Previous Reports	Delta-Simons has previously undertaken a PRA for the Site; ▲ Preliminary Geo-Environmental Risk Assessment, Former Glanford House, Stather Road, Flixborough Industrial Estate, Delta-Simons Project No. 20-1405.01, dated October 2020. Potential sources of contamination identified as part of the desk study comprised; ▲ Potential Made Ground/infill materials beneath the Site associated with historical development; ▲ On-Site electrical sub-station in the north eastern corner; ▲ Organic deposits within the underlying natural alluvium and the potential for hazardous ground gas generation; ▲ Potentially contaminated soils and/or groundwater at the Site from historical and current off-Site industrial land use including the former Nypro UK Facility and particularly the 1974 incident, including PFAS; and ▲ An off-Site potentially infilled pond located 15 m west of the Site. ▲ The macadam in the car parks and roadways should be tested and if found to contain coal tar will need special consideration as to their re-use or disposal. Widespread contamination is considered unlikely and the preliminary risk assessment identified a **Low to Moderate** risk of soil/groundwater contamination and hazardous ground gas at the Site. There are potential geotechnical development risks at the Site associated with Made Ground, potentially shallow groundwater and the presence of soft/compressible alluvium with organic material. An intrusive investigation was recommended to assess the presence, depth and nature of Made Ground and to advise on preliminary foundation design and the risk to controlled waters including a ground gas risk assessment.

2.2 Preliminary Conceptual Site Model

A summary of the preliminary Conceptual Site Model is presented below.

Key Contaminants and CSM Aspects	Historically the Site comprised agricultural land prior to two phases of development comprising likely residential houses in the southern area of the Site and subsequently the former office building (Glanford House) which has recently been demolished to floor slab level in March 2020. The Site is situated within an industrial area including the historical Nypro UK Facility to the north of the Site. On-Site potential sources of contamination include: ▲ Made Ground/potential infill materials associated with the historical development of the Site; ▲ Coal tars within the macadam car parks and roads; ▲ Contamination relating to the Nypro facility incident which may have been deposited through the air, by flooding during the or immediately after the event or flowing below the Site; ▲ On-Site electrical sub-station in the north eastern corner; ▲ Organic deposits within the underlying Alluvium deposits. The off-Site historical and current industrial land use is considered to represent potential sources of contamination. The EA classify the superficial Alluvium deposits as a Secondary A Aquifer and the underlying bedrock of the Mercia Mudstone Group as a Secondary B Aquifer. The Site is not located within a SPZ. The proposed end-use is currently unknown, however is likely to be for a commercial end-use given the surrounding area.

3.0 Site Investigation

3.1 Intrusive Investigation

Delta-Simons undertook intrusive investigation work from 1st September to 8th September 2020.

3.1.1 Health & Safety Considerations

A utilities clearance specialist attended the Site on 1st September 2020 to trace services on and around the Site prior to excavation of exploratory hole locations.

An initial assessment of the Site identified a low risk in relation to Unexploded Ordnance (UXO) and so no specific precautionary measures were required for the works.

Future Contractors should undertake their own assessment of UXO risk in relation to their specific proposed scope of works.

3.2 Scope of Ground Investigation and Rationale

3.2.1 Scope

The ground investigation comprised the following items:

- Service avoidance exercise undertaken by Midland Survey Ltd;
- Supervision of all works by a Delta-Simons Geo-Environmental engineer. All intrusive locations were logged in general accordance with BS 5930:2015+A1:2020 Code of Practice for Site Investigations;
- Drilling of 12 No. dynamic sampler boreholes (DS101 to DS106, DS106A, DS106B, DS107 to DS110) to a maximum depth of 3.00 m bgl;
- Drilling of 3 No. Cable Percussive Boreholes (CP101 to CP103) to a maximum depth of 25.00 m bgl;
- The excavation of 6 No. shallow pits for plate load California Bearing Ratio tests (CBR101 to CBR106) tests;
- Collection of groundwater samples on three occasions; and
- Groundwater and ground gas monitoring on three occasions.

3.2.2 Rationale

Location	Rationale	Key Contaminants of Concern
CP101 to CP103	To provide Site coverage and geotechnical information to advise on foundation design.	Asbestos, PAHs, heavy metals, petroleum hydrocarbons, PCBs, sulphates
DS101 to DS110	To provide Site coverage.	
DS101, DS109 and CP102	Enable the collection of groundwater samples and to provide information on the gassing regime beneath the Site.	Heavy metals, petroleum hydrocarbons, VOC, sVOCs sulphates, PFAS hazardous ground gas
CBR101 to CBR106	To provide geotechnical information on soils for pavement design.	-

3.3 Ground Investigation Factual Data

The investigation locations were surveyed in by the appointed surveying contractor to an accuracy of approximately +/- 0.1m. The intrusive locations are shown on Figure 3.

Delta-Simons engineer verified borehole logs are presented as Appendix B, the SPT Calibration Certificates, in accordance with *BS EN ISO 22476-3:2005 (incorporating corrigendum No. 1 2007), Geotechnical investigation and testing - Field testing - Part 3: Standard penetration test for SPT trip hammers* are provided in Appendix C.

3.4 In-Situ Testing and Sampling

SPT tests were undertaken in all dynamic sampler boreholes at 1.00 m centres and at 1.50 m intervals from in the cable percussion boreholes. The results of these tests are presented in the borehole logs included as Appendix C. Corrected SPT values are shown on Figure 4.

California bearing ratio (CBR) testing was undertaken using a 455 mm diameter plate and an 8-tonne wheeled JCB 3CX as kentledge. Test results are presented in Appendix D.

Sampling comprised disturbed tub and jar samples as detailed on the borehole logs. Groundwater sampling was undertaken using disposable bailers and amber bottles and glass vials.

3.5 Geotechnical Laboratory Testing

A selection of soil samples were submitted to the UKAS accredited laboratory for a range of geotechnical testing, the results of which are included in Appendix D.

The programme of geotechnical testing undertaken on samples obtained from the natural soils is presented within the table below. The purpose of the laboratory testing was to assess the classification properties of the soils encountered in order to inform the outline geotechnical design advice.

Analysis	**No. Tested**	**Rationale**
Moisture content	28	To enable geotechnical assessment of cohesive soils
Plastic and liquid limits	10	To enable geotechnical assessment of cohesive soils
Particle size distribution	13	To enable geotechnical assessment of granular soils

3.6 Environmental Sampling, In-Situ Testing and Laboratory Analysis

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Samples were stored in accordance with Delta-Simons' quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination. Records of the samples taken as part of the site investigation works, including their depths and location, are included within the exploratory hole records in Appendix C.

On-Site Photoionisation Detector (PID) screening was undertaken on samples to assess the potential for volatile contaminants and assist sample scheduling. Where detected the results are included within the exploratory hole records in Appendix C.

Groundwater samples were collected from CP102 only given the limited groundwater (approximately 10cm) within DS101 and DS109 available for sampling on 8th, 15th September and 16th November 2020. The groundwater samples were collected using a dedicated disposable bailer.

Samples analysed for environmental purposes were placed in chilled cool boxes on site and transported to the laboratory for analysis on completion of the site investigation works/groundwater sampling visit.

The rationale for chemical analysis is presented in the table below and the results of the chemical laboratory testing are included in Appendix E and F.

Analytes	**No. of Samples Tested**		**Rationale**
	Soil	**Ground-water**	
Asbestos	13	-	Common potential contaminant – Analysed in all samples of Made Ground.
pH, As, Cd, Cu, Cr, Hg, Pb, Ni, Zn	16	1	Potential contaminants of concern, common to many sites.

Analytes	**No. of Samples Tested**		**Rationale**
	Soil	**Ground-water**	
pH, As, Cd, Cu, Cr, Hg, Pb, Ni, Zn,Se	-	1	Potential contaminants of concern, common to many sites.
Speciated Polycyclic Aromatic Hydrocarbons (PAH)	16	-	Potential contaminants of concern, common to many sites.
Total Petroleum Hydrocarbons, Criteria Working Group Method (TPHCWG), Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	16	3	Potential contaminants of concern, common to many sites.
Volatile and Semi-Volatile Organic Compounds (VOC and SVOC)	1	2	Targeting samples where a positive PID reading was identified and to assess the potential within groundwater.
Polychlorinated Biphenyls (PCB)	2	-	Potential contaminant of concern given the electrical sub-station.
Leachable As, Cd, Cu, Cr, Hg, Pb, Ni, Zn, speciated Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons, Criteria Working Group Method (TPHCWG)	4	-	To assess the potential for contaminants of concern to leach from the Made Ground into groundwater.
pH, sulphate	25	1	To assess potential for chemical attack on buried concrete.
Total Organic Carbon (TOC)	21	-	To assess the presence of organic material within natural deposits.
PFAS standard suite	-	1	To assess the potential for contamination associated with the 1974 Nypro UK incident and PFAS in firefighting floodwater, which may have migrated on to the Site.

3.7 Monitoring Programme

Three rounds of groundwater level and ground gas monitoring were undertaken within DS101, DS109 and CP102 between 8th September and 21st September 2020. Measurements of the depth to groundwater within the monitoring wells were taken using an electronic dip meter. The groundwater level monitoring sheets are included as Appendix G.

To characterise the ground gas regime at the site, an infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO2), methane (CH4) and oxygen (O2) in percentage by volume. Initial and steady state concentrations were recorded. The atmospheric pressure before and during monitoring, together with the weather conditions, was recorded. All monitoring results obtained to date together with the temporal conditions are contained within Appendix G.

4.0 Ground Summary

4.1 Introduction

The sections below summarise the ground and groundwater conditions encountered during the Site investigation.

4.2 Ground Model

A summary of the observed ground conditions at the Site is provided below.

Summary of Observed Ground Conditions

Strata	**Typical Strata Description**	**Depth Range of Strata Base (m)**	**Maximum Proven Thickness (m)**	**Comments**
Made Ground	Made Ground was encountered within all locations and generally comprised concrete or macadam underlain by gravelly sand/gravelly clay with brick, flint, clinker and limestone.	*0.5-2.0*	*2.00*	*A service pit was identified within DS106.* *Concrete obstruction encountered within DS106A at 0.72 m bgl.*
Alluvium	Below the Made Ground alluvium was generally identified as very soft to firm clay with decayed rootlets. At depth the Alluvium was identified as clayey pseudo-fibrous peat and variable sands and gravels.	*18.5-22.0*	*23.80*	-
Mercia Mudstone Group	Mercia Mudstone was identified within the deeper boreholes as firm to very stiff slightly silty sandy/gravelly clay.	*Depth not proven*	*3.00*	-

4.3 Visual and Olfactory Evidence of Contamination - Soils

No visual or olfactory evidence of potential gross contamination was observed during the investigation.

4.4 Groundwater

4.4.1 Strikes During Investigations

Groundwater strikes recorded as excavation progressed during the Site investigation range from 2.10 m bgl to 12.00 m bgl (1.18 m AOD to 7.90 m AOD). The groundwater strikes during drilling are summarised below.

Exploratory Hole	**Water strike during drilling (m bgl)**	**Water strike during drilling (m AOD)**	**Stratum**	**Comment**
DS105	2.10	1.64	Alluvium	-
DS106B	2.60	1.18		-
CP101	12.00	-7.90		Rose to 10.10 m bgl after 20 minutes
CP102	11.80	-7.74		Rose to 6.78 m bgl after 20 minutes
CP103	6.00	-2.47		Rose to 4.55 m bgl after 20 minutes
	11.00	-7.47		Rose to 5.50 m bgl after 20 minutes

4.4.2 Levels During Monitoring Programme

Groundwater levels were monitored on a total of three occasions between 8th September and 21st September 2020. Monitoring data is provided in Appendix G and summarised in the table below.

Exploratory Hole	Response Zone		Water level during monitoring Max to Min Range		Stratum
	m bgl	m AOD	m bgl	m AOD.	
DS101	1.50 - 3.00	-	2.93-03.00	-	Alluvium
DS109	0.50 - 3.00	3.11 - 0.61	1.40 - 1.51	2.10 - 2.21	Made Ground
CP102	2.00 - 15.00	2.06 - 10.94	2.76 - 3.09	0.97 - 1.30	Alluvium

Groundwater levels during monitoring varied between 1.41 m bgl and 3.09 m bgl. Monitoring Rounds 1 and 2 were undertaken at high and low tides and monitoring Round 3 was undertaken approximately 35 minutes after high tide. Given the lack of variation in groundwater levels, it is unlikely that the groundwater body beneath the Site is tidally influenced.

4.5 Visual and Olfactory Evidence of Contamination - Groundwater

No visual or olfactory evidence of potential gross contamination was observed during the groundwater sampling.

4.6 Material Properties

The table below summarises the factual material properties based upon the results of in-situ and laboratory test data and where appropriate provides derived geotechnical parameters.

Parameter	Made Ground	Alluvium	Mercia Mudstone Group
Moisture Content - w	-	21% - 260% (Peat)	-
Liquid Limit - wL	-	39% - 77%	-
Plastic Limit - wP	-	19% - 31%	-
Plasticity Index - IP	-	20% - 46%	-
Uncorrected SPT N Value	2 - 4	0-35	50
Corrected[1] SPT (N60)	2 - 4	0-37	53
California Bearing Ratio (CBR)	>13.90 %	2.3% - 6.4%	-

Notes:
1. SPT N values corrected for energy delivered to drive rods utilising the determined energy ratio (Er): N60 = (Er x N)/60 after BS EN ISO 22476-3:2005

4.7 Geochemical Testing

Geochemical analysis was undertaken on 25 soil samples of Made Ground, Alluvium and Mercia Mudstone, tested for selective contaminants (BRE Special Digest 1:2005 (3rd Edition), Concrete in Aggressive Ground, the results of which are summarised in the table below.

Tests	No. of Tests	Minimum	Maximum
Soil - pH	25	7.3	12.2
Soil - Total Sulphur	25	0.036%	3.11%
Soil – Acid Soluble Sulphate	25	0.027%	<1.11%
Soil - Water Soluble Sulphate	25	52.0 mg/L	1144 mg/L
Soil – Organic Content	21	0.6%	37%

Tests	**No. of Tests**	**Minimum**	**Maximum**
Water – pH	1	6.9	
Water - Sulphate	1	342 mg/L	

4.8 Ground Gas Data

Gas monitoring results are presented in Appendix G and are summarised in the table below, a total of three rounds of gas monitoring was undertaken over a period of three weeks.

Barometric pressures ranged from 1017mB (visit 3) to 1023mB (visit 1).

Exploratory Hole	**Steady Gas Concentration (%v/v)**						**Steady Flow Rate (l/hr)**		**Response Zone (m bgl)**		**Stratum**	**Flooded**
	Methane		**Carbon Dioxide**		**Oxygen**							
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**From**	**To**		
DS101	<0.1	<0.1	1.3	1.9	17.4	19.4	<0.1	<0.1	1.5	3.0	Alluvium	N
DS109	<0.1	<0.1	<0.1	0.1	20.2	20.9	<0.1	<0.1	0.5	3.0	Made Ground	N
CP102	3.0	42.3	1.0	6.7	5.9	15.0	<0.1	0.1	2.0	15.0	Alluvium	N

5.0 Geotechnical Assessment

5.1 Summary of Development Proposals

This investigation has been undertaken prior to disinvestment, as such no proposed development plans are available. Given the industrial use of the surrounding area, it is considered likely that the Site may be in commercial/industrial use in the future. Consequently, the information provided below should be treated as preliminary and will be subject to review once a development scheme has been finalised.

5.2 Foundations

5.2.1 Spread Foundations

The Made Ground is considered to be too unpredictable, variable, weak and compressible in its existing condition for conventional shallow foundations at the Site, identified to a maximum depth of 2.00 m bgl. In addition, firm becoming very soft silty clays were identified beneath the Made Ground with N values at 1.0 m bgl ranging between 0 and 22 and between 0 and 8 at 2.0 m bgl. The resistance to penetration was noted to decrease with depth to approximately 4.5 m bgl. As such, it is not considered that traditional strip or pad foundations would be suitable for the anticipated development given the depth of Made Ground and underlying compressible natural geology.

Alternative foundations, such as a piled solution should be explored.

5.2.2 Volume Change Potential

The volume change potential should be considered in any foundation schedule for structures and services located within the influence zone of trees or bushes (proposed, existing or to be removed) and appropriate precautions and/or founding depths should be designed accordingly. In cohesive soils, foundations will therefore need to be designed in accordance with NHBC Standard Chapter 4.2 ‘*Building Near Trees’*.

The underlying Alluvium deposits are identified to have a moderate to very high volume change potential in accordance with NHBC guidance.

5.2.3 Piling

A piled foundation solution using traditional bored or continuous flight auger (CFA) piles transferring loads to competent geology may be suitable, utilising both skin friction and end bearing capacity. It is likely that CFA piles terminating in dense sands and gravels at depth would provide sufficient capacity for the expected development.

Before confirming the suitability of piles advices should be sought from a specialist piling contractor.

The precise method of pile installation and applicability of proprietary systems, diameters and depths required would need to be informed based on the results of this investigation, by discussions with a suitably experienced piling contractor.

It is recommended that during groundworks all relict foundations are removed. Pile probing at each pile location should be considered to confirm the absence of obstructions prior to piling.

Normal static and dynamic load testing (including uplift tests) should be considered to achieve satisfactory quality control/assurance in accordance with good practice.

There will be a requirement for the placement of a suitably engineered piling mat, which should be designed and validated by a suitably qualified and experienced engineer.

5.2.4 Floor Slabs

Where the Made Ground is greater than 600mm thick the NHBC recommends that floor slabs are suspended.

It is recommended that a stabilisation/ground improvement solution (if appropriate) be adopted to support a ground bearing slab. Alternatively, a suspended floor slab could be adopted, transferring loads to foundations.

The precise ground improvement technique/proprietary methods, suitability of the ground, suitability of fill materials and allowable bearing capacity that can be achieved would need to be confirmed by discussions with a suitably experienced contractor whose design should be warranted.

5.3 Roads and Pavements

CBR values for the natural Alluvium deposits ranged between 2.3% and 6.4%. See Appendix C for further details. CBR is dependent on the condition of the strata and could be different upon excavation to the formation subject to seasonal conditions. Clay soils are likely to be frost susceptible.

The use of a geotextile is recommended where variable ground conditions are encountered or across changes in strata to protect against potential differential settlement.

5.4 Excavations & Obstructions

It is expected that conventional mechanical excavators will readily remove the Made Ground and Alluvium likely to be encountered in shallow excavations although a breaker may be required to remove any existing concrete hardstanding and any relict foundations/structures.

All shallow foundation or services excavations at the Site should be considered unstable, therefore, temporary support of all excavations should be considered when excavating on-Site.

5.5 Groundwater

Groundwater was encountered during drilling between depths of 2.10 m bgl and 12.00 m bgl and during return monitoring between 1.41 m bgl and 3.09 m bgl. Groundwater is likely to be encountered in excavations below 1.50 m bgl and appropriate groundwater control may be necessary, however, treatment prior to disposal to sewer may be required.

5.6 Chemical Attack on Buried Concrete

Water soluble sulphate concentrations were generally found to be low to high across the Site. As such the Site can provisionally be classified as Design Sulphate Class DS4 and Aggressive Chemical Environment Class AC-3s.

6.0 Generic Quantitative Risk Assessment

6.1 Introduction

The presence of hazardous substances in or on a Site is generally only of concern if an actual or potential unacceptable risk exists. Legislation and guidance on the assessment of contaminated sites, consistent with UK best practice, acknowledges the need for a tiered risk-based approach. A Preliminary Risk Assessment is presented in Section 2.2. This section represents a Generic Quantitative Risk Assessment (GQRA) being a comparison of site contaminant levels against Generic Assessment Criteria.

6.2 Human Health GQRA

The assessment of risks in relation to human health has been undertaken using Generic Assessment Criteria (GAC) as detailed within the appropriate tables. Risks from soil, groundwater and Non-Aqueous Phase Liquids (NAPL) have been considered. The GAC are predominantly based on long term (chronic) risk to health. However, in the limited circumstances where short-term (acute) risks are more pronounced, these GAC have been utilised to ensure a thorough and conservative initial assessment is undertaken.

The end use scenario adopted for the assessment is a commercial/Industrial end use, considered appropriate based on the current surrounding land use. No proposed development plans have been provided.

6.2.1 Risks from Soil Sources

The soil and groundwater chemical data has been compared against a commercial/industrial end use GAC for 1% soil organic matter (SOM) content.

The primary exposure pathways considered in the risk assessment are as follows:

- Ingestion of soil and indoor dust and/or oral background exposure;
- Inhalation of dust (background and indoor);
- Direct dermal contact; and
- Inhalation of vapour (background and indoor).

Heavy metals, TPH and PAHs have been identified above the laboratory detection limit, however, are not above the applied GAC for a commercial end use.

Two samples of Made Ground from CP103 (0.2-0.25m) and DS105 (0.30-0.35) have identified Aliphatic TPH EC16-EC21 and EC21-EC35 above solubility limits, however no evidence of free phase product was noted during the investigation.

VOCs, SVOCs and PCBs have not been identified above the laboratory detection limit.

Asbestos has not been identified within the samples tested.

None of the contaminant concentrations reported in soil exceeded the relevant Generic Assessment Criteria (GAC). Therefore, the soil contaminant concentrations are not considered likely to represent a risk to human health for any future proposed commercial development.

The soil analysis results are considered further in the Conceptual Site Model (CSM) presented in Section 8.0 with regard to potential contaminant linkages.

6.2.2 Risks from Groundwater Sources

Based on a likely commercial/industrial use, the soil and groundwater chemical data has been compared against a commercial/industrial end use GAC to assess risks from groundwater sources to indoor air and subsequent vapour inhalation indoors.

VOCs, SVOCs and TPHs have not been identified above the laboratory detection limit during either monitoring round. As such, the risk from groundwater sources is considered very low.

The water analysis results are considered further in the Conceptual Site Model (CSM) presented in Section 8.0 with regard to potential contaminant linkages.

6.2.3 Risks from Non-Aqueous Phase Liquids (NAPL)

Soil and groundwater exposure models used in generating Generic Assessment Criteria do not account for the potential for NAPL to represent a source of risk to human health, principally due to the production of vapours. Whilst it is possible to calculate theoretical soil saturation limits, in reality, due to co-solubility effects, these are not an appropriate indicator of the presence of NAPL. In order to assess the presence of NAPL, for petroleum hydrocarbons, an assessment criterion of 5,000 mg/kg has been applied based on professional experience.

The following has been identified in relation to NAPL at the Site:

- No observations of NAPL were made within the soils observed during drilling;
- No concentrations of Total Petroleum Hydrocarbons in excess of 5,000 mg/kg were recorded;
- No NAPL was measured during groundwater monitoring works.

On this basis, there is no evidence of NAPL being present on the Site.

6.3 Controlled Waters/Water Environment GQRA

The approach adopted to assessing risks to Controlled Waters/Water Environment is based principally on considering the concentrations of contaminants identified within the groundwater samples obtained in comparison to relevant GAC.

Given the ‘prevent and limit’ approach of the Water Framework Directive (2000/60/EC) and the identified receptors, a range of Water Quality Standards (WQS) have been applied as Generic Assessment Criteria (GAC), these include Water Framework Directive standards and thresholds (WFD), the Freshwater Environmental Quality Standards (EQS), the UK Drinking Water Quality Standards (DWQS), WHO Guidelines for Drinking Water Quality or SEPA resource protection values which have been used as initial conservative GAC to assess whether groundwater contamination requires further assessment or discussion in terms of the risks to controlled waters. Where specific water quality standards are not available, Delta-Simons has adopted surrogate values based on professional judgement (DS GAC).

6.3.1 Leachate Testing

Four soil samples have been scheduled for leachable heavy metals, PAHs and TPH. The results of which have been compared to the relevant applied GAC. Laboratory results above relevant detection limits are summarised in the table below with a comparison to the GAC applied.

Contaminant	**No. Samples**	**Max Conc. (µg/l)**	**GAC (µg/l)**	**GAC Source**	**No. Exceed GAC**	**Exceedances Location (m) = concentration/ µg/l**	**Area of Site of Exceedance**
Metals and Metalloids							
Chromium III	4	8.1	4.7	WFD 2015	1	CP102 (0.60-0.65) = 8.1	Central
Copper		6.2	2.12	WFD 2015	1	CP102 (0.60-0.65) = 8.1	
Lead		4.4	2.54	WFD 2015	3	DS101(0.40-0.45) = 3.5 DS09 (0.40-0.45) = 3.6 CP102 (0.60-0.65) = 4.4	Central, north western and south western
Nickel		1.8	8.48	WFD 2015	0	-	-
Zinc		4.6	23.1	WFD 2015			

Notes: Shaded = Maximum concentration exceeds GAC.
WFD 2015 = Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Leachable concentrations of chromium, copper and lead have been identified from shallow Made Ground above stringent WFD guidance values. PAHs and TPH have not been identified above the laboratory detection limit.

Given the cohesive nature of the shallow Alluvial deposits the risk for heavy metals to leach into the underlying groundwater is considered low. In addition, laboratory leachate testing is not representative of real-life conditions and therefore represents a worst-case scenario. Furthermore, the Site is likely to be proposed for a commercial end use and extensive hardstanding would be expected further limiting infiltration ad mobilisation of contamination.

The leachate analysis results are considered further in the CSM presented in Section 8.0 with regard to potential contaminant linkages.

6.3.2 Groundwater Testing

Groundwater contaminant concentrations that exceed the applied GAC are then considered in the context of the Site's environmental setting as to whether further qualitative or quantitative assessment is required as described in subsequent sections. Laboratory results above relevant detection limits are summarised in the table below with a comparison to the GAC applied.

Contaminant	**No. Samples**	**Max Conc. (µg/l)**	**GAC (µg/l)**	**GAC Source**	**No. Exceed GAC**	**Exceedance Location (Round)**	**Area of Site of Exceedance**
Metals and Metalloids							
Arsenic	2	7.6	10	WFD 2015	0	--	-
Cadmium		0.02	0.53	WFD 2015			
Chromium III		15.0	4.7	WFD 2015	1	CP102 (Round 2)	Central
Copper		29.0	2.12	WFD 2015			
Nickel		8.5	8.48	WFD 2015			
Zinc		6.9	23.1	WFD 2015	0	-	
Selenium	1	6.8	10	WFD 2015			

Notes: Shaded = Maximum concentration exceeds GAC.
WFD 2015 = Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Elevated concentrations of chromium, copper and nickel have been identified during the second round of monitoring only.

VOCs, SVOCs and TPHs have not been identified above the laboratory detection limit during either round.

PFAS have not been identified above the laboratory detection limit.

The River Trent is considered to represent the closest significant receptor due to its proximity to the Site; 160 m west. Given the historical and current industrial land use of the surrounding area, elevated heavy metals within the underlying groundwater are not considered significant and likely consistent with background levels in this industrial part of Flixborough. As such, significant groundwater contamination has not been identified that would represent a significant risk in respect to the divestment of the Site. However, additional groundwater monitoring may be required to support a future planning application and groundwater risk assessment.

The groundwater analysis results are considered further in the revised CSM presented in Section 8.0 with regard to potential contaminant linkages.

6.4 Built Environment

6.4.1 Potable Water Supply Pipes

The investigation requirements for the selection of potable water pipe material are set out in UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010). This report has very specific and onerous investigation requirements and as such the detailed investigation of each utility route was not within the scope of this investigation.

A preliminary review of the results indicates that a relevant linkage is unlikely to exist associated with organic contaminants and therefore contaminant polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes may be suitable for use on the development.

It should be noted that at the time of this investigation the future routes of water supply pipes had not been established, hence the investigation and sampling strategy is not likely to be considered fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling/analytical strategy may be required at a later date once the route(s) of the supply pipe(s) are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

6.4.2 Building Materials

Risks to building materials associated with aggressive ground conditions is addressed in Section 5.6.

6.5 Waste Classification

This investigation was not undertaken to classify materials in terms of waste disposal. Where waste disposal is proposed then a specific and detailed investigation in accordance with Environment Agency Guidance WM3 would typically be required.

Should soils be required to be disposed of from Site, the results of the chemical analysis should be forwarded to the proposed receiving facility who will determine whether they will accept the waste from Site. Further investigation such as testing of the existing macadam for the presence of coal tar in addition to specific waste acceptance criteria (WAC) analysis may be required.

7.0 Bulk Ground Gas Risk Assessment

7.1 Ground Gas Conceptual Site Model

7.1.1 Sources

Historically the Site has comprised agricultural land prior to development in the southern and central areas of the Site.

The Made Ground generally comprises soft gravelly clay and sand and gravel mixtures. The gravel content included brick, coal, clinker and limestone. The Made Ground is therefore considered to represent a potential source of ground gas, although the volume of putrescible material appears to be low.

The natural Alluvial soils beneath the Site comprised organic peat layers, considered to represent a potential source of ground gas.

Surrounding historical and current land uses, which include many former industrial facilities, may represent localised off-site sources of ground gases.

7.1.2 Receptors

The principal receptors under consideration are future residents. Other receptors include adjacent site occupiers and future maintenance/construction workers.

7.1.3 Pathways

The underlying geology is likely to be of variable permeability with respect to ground gases. The Made Ground is heterogeneous and likely to allow preferential migration locally. The underlying Alluvium deposits predominately comprised clays at shallow depth with granular sands and gravels at depth. The shallow clays may limit vertical and migration from below.

The most significant pathways with respect to future residents relate to the potential for gases to enter future dwellings. At present, no gas protections measures are assumed. Consequently, ingress into proposed buildings may be possible through voids in the floor including service entry points and cracks.

Future maintenance/construction workers may come into contact with hazardous ground gases via entry into below ground confined spaces such as excavations or service entries/inspection points.

7.2 Duration & Extent of Monitoring

Gas monitoring has been undertaken on three occasions between 8th September and 21st September 2020.

The monitoring completed at the Site is considered preliminary and additional monitoring may be required subject to development, if proposed and satisfy a future planning application.

Barometric pressures during the gas monitoring period ranged from 1017 mBar to 1023 mBar. The final monitoring round was undertaken during falling atmospheric pressure.

7.3 Ground Gas Risk Assessment

7.3.1 Background

Based on a likely commercial/industrial end use, the following documents have been consulted when assessing the gas regime at the site:

- British Standards Institute (BSI, 2015): Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, BS:8485.

The presence of a source of hazardous gas within the ground does not necessarily indicate a risk will be present. Consideration of recorded gas flows together with source concentrations can allow an initial assessment to be made of the potential both for generation and subsequent migration of gas. A Characteristic Situation (CS) is derived from an assessment of the ground gas data and forms the basis of determining mitigation measures.

7.3.2 Gas Screening Value (GSV)

The Gas Screening Value (gas concentration as a fraction x maximum recorded flow) is used to provide an initial assessment of risks to future site users. The GSVs calculated for the monitoring wells are presented in the following table.

Location	**Maximum Methane (%v/v)**	**Maximum Carbon Dioxide (%v/v)**	**Maximum Flow Rate (l/hr)**	**GSV/Characteristic Situation**		**Flooded well (Frequency)**
				GSV	**CS**	
DS101	<0.1	1.9	<0.1	0.0423	CS1	N
DS109	<0.1	0.1	<0.1			N
CP102	42.3	6.7	0.1			N

It is considered that the elevated methane and carbon dioxide concentrations are sourced from the organic peat deposits identified within CP102. Given elevated concentrations have not been identified within DS109 (installed within the Made Ground) and DS101 (installed within shallow Alluvium) the shallow cohesive deposits may be limiting the vertical migration of ground gas.

In accordance with BSI guidance and using maximum recorded parameters and the calculated GSV's the Site can be provisionally classified as a Characteristic Situation 1 (CS1). However, given a significant elevated value of methane was identified within CP102 on each monitoring event (likely sourced from the identified peat) recording a maximum value of 42.3% v/v and carbon dioxide of 6.7% v/vv above the threshold value of 1%v/v and 5% v/v, respectively. Consideration should be given to increasing the characteristic situation to a CS2. For the basis of this assessment, ground gas protection measures consummate with CS2 for a commercial end use should be allowed for, subject to further monitoring once the final development scheme is known. Additional monitoring is likely to be required to support a planning application for the Site.

7.4 Radon

The Site is located within an area where radon protective measures are not required.

8.0 Revised Conceptual Site Model

A revised CSM is presented in the table below and has been formulated taking into account all of the available data from the Delta-Simons intrusive investigation, suitable for a Site with a commercial end use.

Revised Conceptual Site Model

Source	**Pathways**	**Receptors**	**Risk**	**Mitigation**
Detectable concentrations of heavy metals, PAHs and petroleum hydrocarbons within shallow soils. Elevated leachable concentrations of chromium, copper and lead from shallow Made Ground. Potential contamination in areas not directly investigated.	Direct contact, ingestion and/or inhalation of soil/dust/vapour	Human health – future Site users	**Low Risk**	Detectable concentrations of heavy metals, PAHs and petroleum hydrocarbons have been detected within shallow soils, however, are below the respective GAC for a commercial end use. The risk to future Site users would be mitigated through likely hardstanding and the implementation of a clean cover system in landscaped areas (if proposed). Evidence of elevated concentrations of volatile contaminates have not been identified in soil samples from the Site. As such, the vapour risk to future Site users is considered to be very low. Additional investigation may be required subject to the final development scheme to support a planning application.
		Human health – construction workers	**Low Risk**	Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils and asbestos through toolbox talks. Safe working procedures should be implemented, good standards of personal hygiene should be observed and appropriate levels of PPE/RPE provided and utilised. A 'hotspot' protocol should be in place for groundworkers to act upon during any future redevelopment of the Site. These recommendations should be captured in Site health and safety documentation and in maintenance plans.
	Vertical migration of contaminants into groundwater	Secondary A Aquifer	**Low Risk**	Elevated leachable concentrations of chromium, copper and lead have been identified within shallow Made Ground. Given the cohesive nature of the shallow Alluvial deposits the risk for heavy metals to leach into the underlying groundwater is considered low. In addition, laboratory leachate testing is not representative of real-life conditions and therefore represents a worst-case scenario. The elevated chromium, copper and nickel identified during a single monitoring round from CP102 is considered typical of the wider groundwater quality for this industrial area. Significant groundwater contamination has not been identified that would represent a significant risk in respect to the divestment of the Site. However,

Revised Conceptual Site Model				
Source	**Pathways**	**Receptors**	**Risk**	**Mitigation**
				additional groundwater monitoring may be required to support a future planning application and groundwater risk assessment. Furthermore, existing and likely proposed hardstanding across the Site will mitigate the risk of mobilisation of contamination from areas not directly investigated and vertical migration to the underlying Secondary A Aquifer is considered low.
	Direct infiltration in water supply pipes	Service conduits	**Moderate Risk**	Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate plastic pipes. Assessment of the risk to water pipes for any new supply will have to be undertaken as a requirement of the statutory undertakers who should be provided with a copy of this Assessment and provide recommendations for upgrading of potable water supply pipes, if considered necessary.
Marginally, elevated chromium, copper and nickel from groundwater samples collected from the Site on a single occasion.	Lateral migration of contaminants in groundwater across and off-Site.	River Trent	**Low Risk**	Elevated chromium, copper, and nickel have been identified during groundwater monitoring within a single groundwater sample, on one occasion. The River Trent is considered to represent the closest significant receptor due to its proximity to the Site; 160 m west. Given the historical and current industrial land use of the surrounding area, elevated heavy metals within the underlying groundwater are not considered to originate on-Site and are likely indicative of the general groundwater quality within this area, however additional groundwater investigation is likely to be required as part of a future planning application.
Potential Sources of contamination located off-Site	Lateral migration of contaminants in groundwater on to the Site.	Future Site users	**Very Low Risk**	Potential sources of contamination have been identified in the immediate vicinity of the Site, principally associated with the areas industrial use and historical chemical works incident. Given significant contamination has not been identified in groundwater collected from the Site that may represent a concern to Human Health, the risk of off-Site sources of contamination impacting the Site is considered to be very low.
Made Ground deposits on Site. Organic peat deposits within the underlying alluvium.	Indoor exposure / explosive hazard via enclosed space accumulation of ground gas	Future Site users and buildings	**Low Risk**	Based upon the results of the ground gas monitoring undertaken at the Site to date and significant potential sources of ground gas identified from desktop assessment the Site has been classified as Characteristic Situation 2 (CS2) – Low Risk. As such, ground gas protection measures will be required, subject to further monitoring and once the final development scheme is known. Further monitoring will likely be required as part of any future planning application.
Potentially unidentified 'hotspots' of contamination, which may be present in areas of the Site that have not been directly investigated	All pathways	All receptors	**Low Risk**	As with all redevelopment works, a 'hotspot' protocol should be in place for groundworkers to act upon during any future redevelopment of the Site.

9.0 Conclusions & Recommendations

9.1 Geotechnical Summary

The Made Ground is considered to be too unpredictable, variable, weak and compressible in its existing condition for conventional shallow foundations at the Site, identified to a maximum depth of 2.00 m bgl. In addition, firm becoming very soft silty clays were identified beneath the Made Ground with N values at 1.0 m bgl ranging between 0 and 22 and between 0 and 8 at 2.0 m bgl. The resistance to penetration was noted to decrease with depth to approximately 4.5 m bgl. As such, it is not considered that traditional strip or pad foundations would be suitable for the anticipated development given the depth of Made Ground and underlying compressible natural geology.

A piled foundation solution using traditional bored or continuous flight auger (CFA) piles transferring loads to competent geology may be suitable, utilising both skin friction and end bearing capacity. It is likely that CFA piles terminating in dense sands and gravels at depth would provide sufficient capacity for the expected development.

Before confirming the suitability of piles advices should be sought from a specialist piling contractor.

Water soluble sulphate concentrations were generally found to be low to high across the Site. As such the Site can provisionally be classified as Design Sulphate Class DS4 and Aggressive Chemical Environment Class AC-3s.

9.2 Contamination Issues

The investigation has been carried out in order to provide information on the quality of the soil and groundwater beneath the Site in the context of land contamination and provide information on the ground gas regime beneath the Site prior to disinvestment. For the purpose of this assessment a likely commercial/industrial end use has been assumed.

9.2.1 Human Health

Detectable concentrations of heavy metals, PAHs and petroleum hydrocarbons have been detected within shallow soils, however, are below the respective GAC for a commercial end use.

The risk to future Site users would be mitigated through hardstanding and the implementation of a clean cover system in landscaped areas.

Evidence of elevated concentrations of volatile contaminants have not been identified in soil samples from the Site. As such, the vapour risk to future Site users is considered to be very low.

Although no asbestos containing materials (ACM) were identified in the samples analysed a significant area of hardstanding remains. ACM may be present within the Made Ground currently on-Site in areas not directly investigated or below hardstand areas. Should development be proposed, groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils through toolbox talks and in particular the potential presence of asbestos and an appropriate protocol to mitigate exposure of the workforce and general public should be in place. The Contractor will need to prepare a risk assessment which identifies a safe system of work to handle the asbestos containing soils which is likely to include asbestos awareness training, a protocol for unexpected finds (should gross asbestos material be identified) as well as safe working procedures such as damping down of excavations and stockpiles in line with general dust generation mitigation. The risk assessment will need to identify the appropriate levels of PPE and/or RPE required. This recommendation should be captured in Site health and safety documentation and in maintenance plans.

Preliminary ground gas monitoring indicates the Site can be provisionally classified as CS2- Low Risk, where ground gas protection measures will be required in any new buildings. Additional monitoring is likely to be required to support any future planning application for the Site.

9.2.2 Controlled Waters

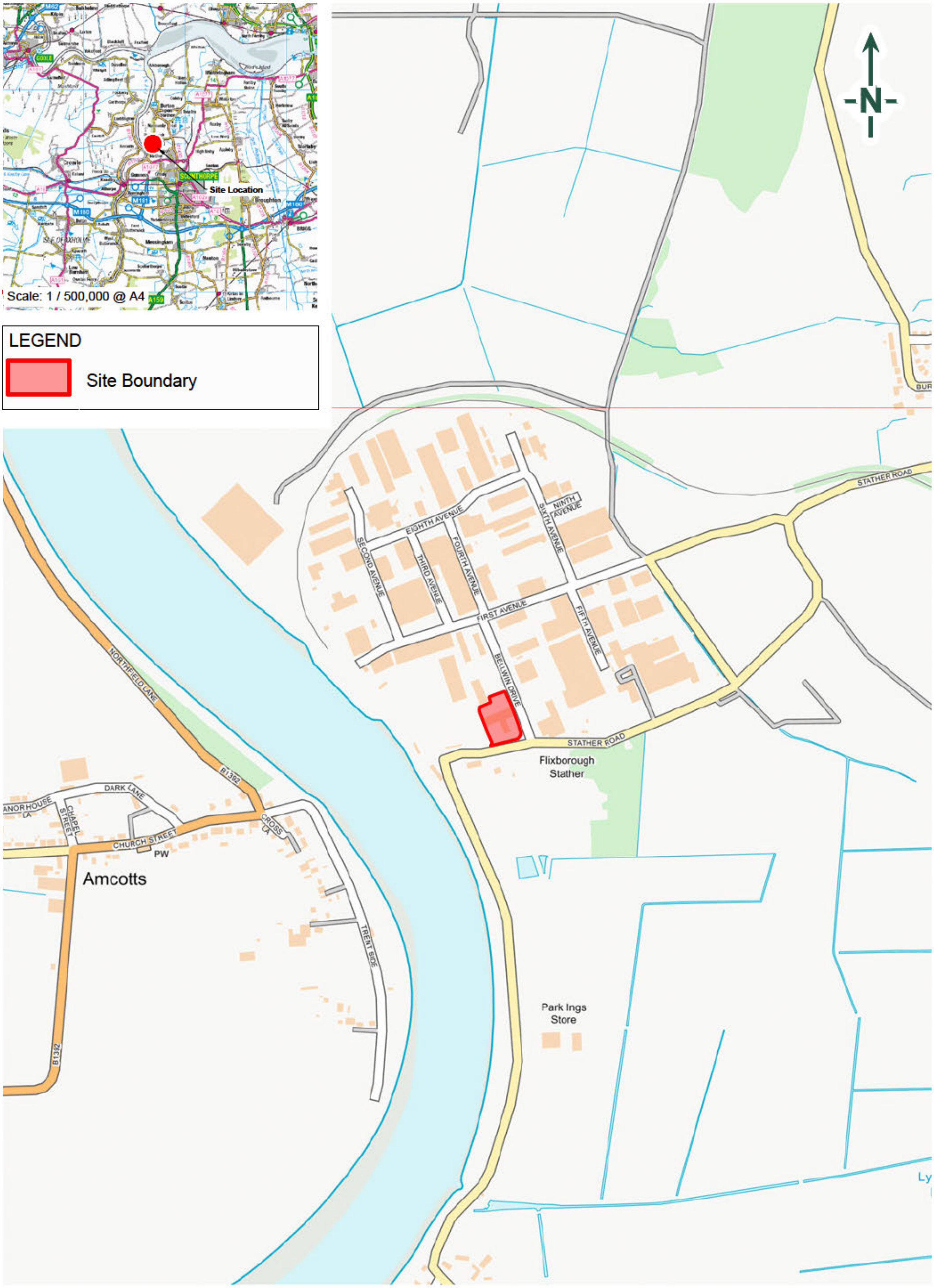
Elevated chromium, copper, and nickel have been identified during groundwater monitoring within a single groundwater sample, on one occasion. PFAS have not been identified above the laboratory detection limit. The River Trent is considered to represent the closest significant receptor due to its proximity to the Site; 160 m west. Given the historical and current industrial land use of the surrounding area, elevated heavy metals within the underlying groundwater are not considered to originate on-Site and are likely indicative of the general groundwater quality within this area. As such, significant groundwater contamination has not been identified that would represent a significant risk in respect to the divestment of the Site. However, additional groundwater monitoring may be required to support a future planning application and groundwater risk assessment.

9.3 Recommendations for Supplementary Work and Development Abnormals

Based on the findings of this Report, the following additional recommendations and development abnormals are considered appropriate, should the Site be proposed for redevelopment for a commercial end use;

- Additional groundwater monitoring may be required as part of any future planning application;
- Additional ground gas monitoring is likely to be required as part of any future planning application;
- Testing of existing macadam for the presence of coal tar and for off-Site disposal purposes;
- Additional, unidentified localised areas of contamination may exist at the Site and an appropriate ‘hotspot’ protocol should be in place for groundworkers to act upon should such contamination be identified during the construction process;
- Groundworkers who are required to perform sub-surface work at the Site should be made aware of the known contaminants in soil and groundwater and the possibility of encountering additional localised low levels of contamination. Therefore, good standards of personal hygiene should be observed and appropriate levels of PPE utilised where necessary;
- Confirmation should be sought from the Local Water Authority as to whether they will require upgraded pipework to be installed for new service installations;
- A clean cover layer will be required for any proposed landscaped areas, if proposed, the details of which should be agreed with the Local Authority with reference to the final detailed development design and included within a RMS. This will also include liaison with specialist asbestos consultant to advise on appropriate risk assessment and mitigation of risk posed by asbestos within soils;
- Elevated costs above standard inert rates should be anticipated for disposal of engineering arisings from the Made Ground to include landfill tax. Waste classification testing (including WAC testing) is likely to be required to facilitate off-Site disposal of ground materials; and
- A Remediation Method Statement (RMS) and subsequent Validation Report will likely be required as part of the planning requirements for future development.

Figure 1 – Site Location Map



Scale: 1 / 10,000 @ A4

Contains OS data © , Crown Copyright and Database Right (2020)

deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Site Location Map
Former Glanford House
Flixborough

DRAWN BY: JR
SCALE: To Scale@A4
CHECKED BY: PH
REVISION: 1
DATE: 28th August 2020
PROJECT NO: 20-1405
FIGURE NO: 1

Figure 2 – Approximate Intrusive Location Plan

Contains Data from, © 2020 Landmark Information Group Ltd

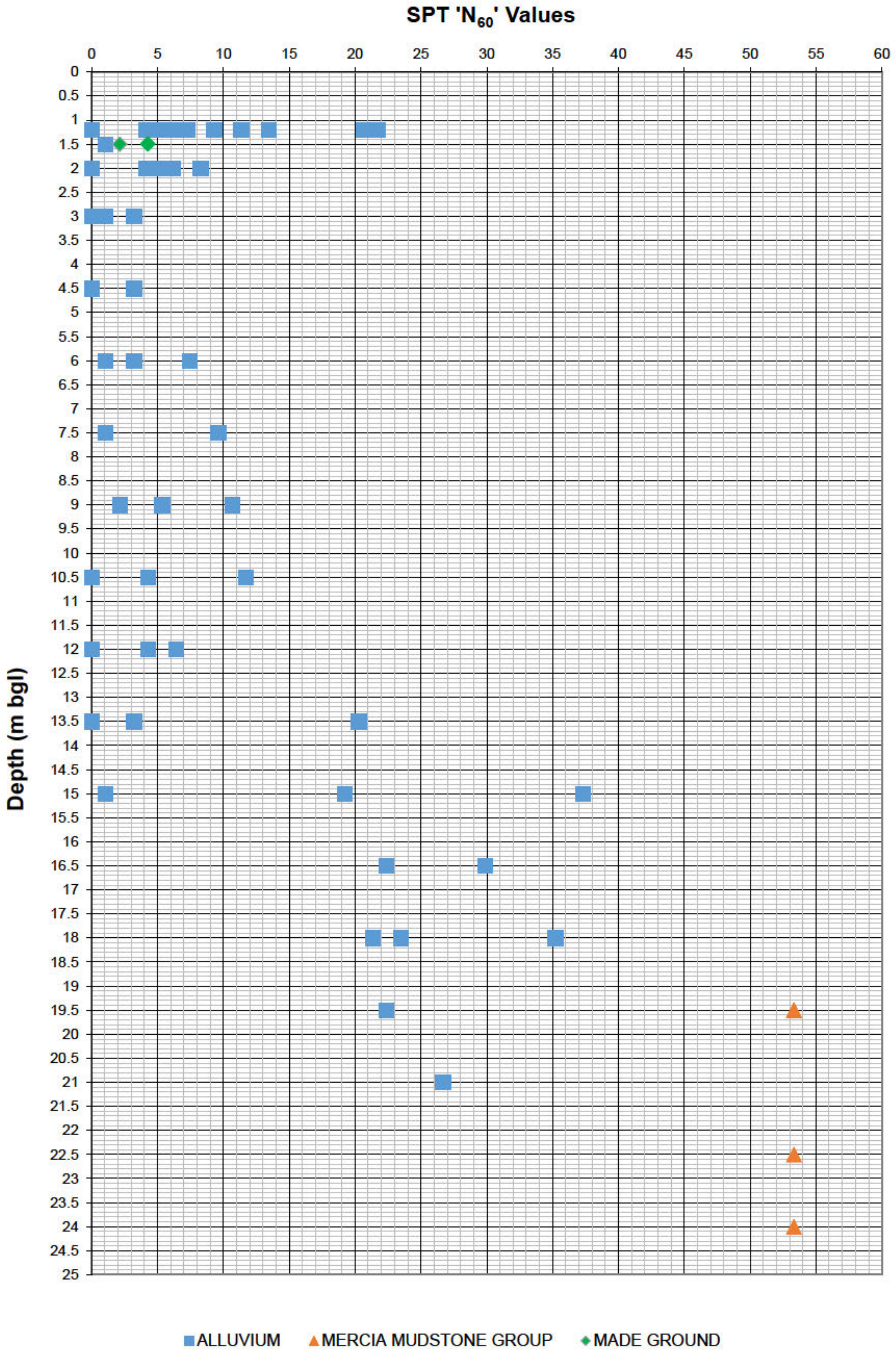
Contains OS data © , Crown Copyright and Database Right (2020)

deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Approximate Intrusive Location Plan
Glanford House
Flixborough

DRAWN BY: JR	SCALE: Not to Scale	PROJECT NO: 20-1405.01
CHECKED BY: PH	REVISION: 1	FIGURE NO: 2
DATE: 02 October 2020		

Figure 3 – Corrected SPT Plot



deltasimons

TITLE:

Corrected SPT N_{60} Values versus Depth Plot - Former Glanford House, Flixborough

DWN: JR

PROJECT NO.: 20-1405.01

DATE: Sep-20

Figure: 3

Appendix A - NQMS Declaration Form

NQMS SQP Declaration of Document Adequacy

Project

Project Name	Geo-environmental Assessment, Former Glanford House
Project Address	Former Glanford House, Stather Road, Flixborough Industrial Estate, Scunthorpe, DN15 8RS
NQMS Declaration Reference	1120-C9762

Summary Description of Project / Proposed development
Delta-Simons was instructed by Mason Clark Associates on behalf of North Lincolnshire Council to prepare a undertake a Geo-Environmental Assessment of a parcel of land located off Stather Road, Flixborough Industrial Estate, Scunthorpe, DN15 8RS, prior to divestment.

The Site currently comprises a vacant parcel of land, following the demolition of an office building (Glanford House) and is located within the southern area of the wider Flixborough Industrial Estate. The ground conditions generally comprised a veneer of Macadam/concrete underlain by Made Ground of sandy gravelly cla[redacted]ands with concrete, clinker, brick and limestone gravel. The underlying natur[redacted]g very soft with depth clays with peat, variable sands, gravels and clays at depth. Firm to very stiff grey clay was identified at depth, considered to represent the Mercia Mudstone Group.

There were no concertations of metals or hydrocarbons that exceeded the Generic Assessment Criteria for Human Health. Goodwater contamination, including PFAS from fire fighting during the 1974 incident on the nearby site has not been identified that would represent a significant risk in respect to the divestment of the Site. However, additional groundwater monitoring may be required to support a future planning application and groundwater risk assessment. Ground gas monitoring has been carried out indicating CS2 although further testing is required for design purposes.

? Additional [redacted]g may be required as part of any future planning application
? Additional is likely to be required as part of any future planning application
? Testing of existing macadam for the presence of coal tar and for off-Site disposal purposes

Document

Document Title	Geo-Environmental Assessment, Former Glanford House, Flixborough Industrial Estate
Document Type	Geo-environmental Assessment
Document Reference	20-1405.01
Document Date	November 2020
Document Author / Publishing Organisation	Delta Simons Environmental Consultants
Named Client	North Lincolnshire Council

National Quality Mark Scheme for Land Contamination Management

[redacted]

[redacted]

Regulator's Contact Details

Local Authority Details

Local Authority Name	N/A
Contact Name	N/A
Contact Telephone	N/A
Contact Email	N/A
Contact Role	N/A

Regulator Details

Regulator	N/A
Contact Name	N/A
Contact Telephone	N/A
Contact Email	N/A
Contact Role	N/A

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Chartered or Professional Institution	The Geological Society
Chartered or Professional Institution Membership Reference	1002343

[redacted]

National Quality Mark Scheme for Land Contamination Management

Declaration

I, Kelvin Hughes, confirm that I am the person described in the SQP Details section and hold current valid registration as a Suitably Qualified and Experienced Person Registration No. SQP0030 with the NQMS.

I have reviewed the document described in the Document Details section, in relation to the project and site described in the Site Details section, and I am satisfied that:

1. The work has been carried out by appropriately capable people with reference to the Brownfield Skills Framework.
2. That the work carried out is, to the best of my knowledge, undertaken with reasonable skill and care, and the information and data reported:
   i. describe an appropriate scope and objectives and
   ii. accord with relevant good practice guidance and standards and
   iii. are based upon appropriately robust science and
   iv. are factually correct and
   v. have been appropriately reviewed.
3. That all specialist aspects have been reviewed by an appropriately qualified/competent person with relevant skills and experience in that specialist area.
4. That the interpretation and conclusions [redacted]
5. That proposals to mitigate actual potenti [redacted] e.
6. I am competent to sign this Declaration and that
   a. I am fully aware and comply with the Code of Conduct of The Geological Society through which I hold Chartership 1002343.
   b. The work of this review and Declaration are within the limits of my knowledge, competence and professional capacity.

Note: The document that has been reviewed was prepared by the organisation named for the benefit of the named Client who has reliance upon it. Any professional liability arising from any proven negligent act or omission by the Company carrying out the work and publishing the document rests with that Company and not with the SQP or the NQMS.

Signed: [redacted]

Date: 20-11-20

Name: Kelvin Hughes
[Block capitals]

1120-C9762

National Quality Mark Scheme for Land Contamination Management

Appendix B – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Due to the evolving regulatory climate specific to Per Fluoro Alkyl Substances (PFAS), the scope of works is not intended to be conclusive as it relates to the identification of any PFAS related issues. While Delta-Simons may advise its Client if Delta-Simons becomes aware of the use of PFAS at the subject property, Delta-Simons makes no representation nor accepts any liability that any or all PFAS issues have been identified and/or revealed to its client through its scope of work, as presented herein.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix C – Borehole Logs, SPT Calibrations Certificate

KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

▨	Topsoil	✕	Made Ground	▩	Bituminous Material
⁛	Concrete	┄	Clay	×	Silt
⁘	Sand	∴	Gravel	ψ	Peat
∘	Cobbles	○	Boulders	☰	Mudstone
×	Siltstone	⁞	Sandstone	▤	Limestone
▤	Chalk	■	Coal	△	Breccia
○	Conglomerate	+	Igneous	≈	Metamorphic
▩	Pyroclastic (volcanic ash)	◊	Gypsum	☰	Shale
•	Ironstone	☰	Bedrock (Unidentified)		Void

INSTALLATION/BACKFILL LEGENDS

⁘	Sand	∴	Gravel	■	Bentonite/Grout
▨	Arisings	⁛	Concrete	‖	Plain Pipe
☷	Slotted Pipe				

Legend symbols in general accordance with BS 5930:1999+A2:2010 and standard industry practice.

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KEY TO BOREHOLE AND TRIAL PIT LOGS

SAMPLE TYPES

ACM	Asbestos Containing Material Sample
B	Bulk Disturbed Sample
BLK	Block Sample
C	Core Sample
CBR	Undisturbed Sample for California Bearing Ratio Test – 154mm diameter
D	Disturbed Sample - Tub
ES	Soil Sample for Environmental Testing
EW	Water Sample for Environmental Testing
G	Gas Sample
U	Undisturbed Driven Tube Sample – 70/102mm diameter, 450mm long
W	Water Sample

TEST TYPES

CPT	Cone Penetrometer Test (kN/m^2)
FID	Flame Ionisation Detector Test (ppm)
HV	In-Situ Hand Sheer Vane Test (kN/m^2)
PID	Photoionisation Detector Test (ppm)
SPT (S)	Standard Penetration Test – Split Spoon Sampler
SPT (C)	Standard Penetration Test – Solid 60 Degree Cone

CORE DETAILS

If	Fracture Spacing (mm) – Minimum, Average, Maximum
NI	Non-Intact where >25 fracture spacings per metre
TCR	Total Core Recovery (%)
SCR	Solid Core Recovery (%)
RQD	Rock Quality Designation (%)
AF	Air Flush Return (%)
WF	Water Flush Return (%)

WATER COLUMN DETAILS

2.00 ▼	Water Strike
1.00 ▽	Water Level

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Project No: **20-1405.01**
Hole ID: **CP101**
Page: **1 of 2**
Project: **Former Glanford House, Flixborough**

Cable Percussive Borehole Log

Date: **07/09/2020 - 08/09/2020**
Client: **North Lincolnshire Council**

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type	Sample Details Ref	Test Details Depth (m)	Test Details Results	Backfill
MADE GROUND: Concrete with 20 mm rebar reinforcement at 0.24 m bgl.		0.36	(0.36)	3.74								
MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse flint, brick, clinker and limestone.		2.00	(1.64)	2.10			0.70 - 0.75 1.30 1.30 1.50 - 1.95		ES B D D	0.70 1.50	PID=0.3ppmv SPT(S)N=2 (3,2/1,0,0,1)	
Soft grey CLAY. (ALLUVIUM)		3.00	(1.00)	1.10			2.00 2.00		B D			
Very soft dark bluish grey CLAY. Decayed organic rootlets throughout. (ALLUVIUM)		7.00	(4.00)	-2.90			3.00 3.00 - 3.45 4.50 - 4.95 6.00 - 6.45		B D D D	3.00 4.50 6.00	SPT(S)N=1 (1,0/0,1,0,0) SPT(S)N=3 (1,0/1,0,1,1) SPT(S)N=3 (0,0/1,1,0,1)	
Spongy dark brown clayey silty pseudo-fibrous PEAT. (ALLUVIUM)			(5.00)				7.00 7.00 7.50 - 7.95 9.00 - 9.45		B D D D	7.50 9.00	SPT(S)N=1 (0,0/0,0,0,1) SPT(S)N=2 (0,0/1,0,0,1)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 12.00 m bgl, rose to 10.10 m bgl after 20 minutes. 4. Backfilled with arisings.

Water Stike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
08/09/2020		12.00 m	20 min	10.10 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486242.34 N414356.71	**4.10**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project No: **20-1405.01**	Hole ID: **CP101**	Page: **2 of 2**	
Project: **Former Glanford House, Flixborough**			
Date: **07/09/2020 - 08/09/2020**	Client: **North Lincolnshire Council**		

Cable Percussive Borehole Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type	Sample Details Ref	Test Details Depth (m)	Test Details Results	Backfill
Spongy dark brown clayey silty pseudo-fibrous PEAT. (ALLUVIUM)						10.10 △						
							10.50 - 10.95		D	10.50	SPT(S)N=4 (1,1/1,1,1,1)	
		12.00		-7.90	200	12.00 ▼						
Loose dark brownish grey fine to coarse SAND. (ALLUVIUM)							12.00 12.00 - 12.45		B D	12.00	SPT(S)N=4 (0,2/1,0,1,2)	
			(2.80)									
							13.50 - 13.95		D	13.50	SPT(S)N=3 (0,1/1,0,1,1)	
		14.80		-10.70								
Medium dense to dense dark brown fine to coarse SAND. (ALLUVIUM)							14.80 14.80 15.00 - 15.45		B D D	15.00	SPT(S)N=35 (2,3/4,8,10,13)	
			(2.70)									
							16.50 - 16.95		D	16.50	SPT(S)N=28 (1,2/4,7,9,8)	
		17.50		-13.40								
Medium dense dark brown fine to coarse SAND and sub-rounded fine to coarse flint GRAVEL. (ALLUVIUM)							17.50 17.50		B D			
			(1.00)				18.00 - 18.45		D	18.00	SPT(S)N=22 (2,2/4,5,5,8)	
		18.50		-14.40								
Firm becoming stiff grey mottled brown slightly gravelly sandy very silty CLAY. Gravel is sub-angular fine to medium mudstone. (MERCIA MUDSTONE GROUP)												
			(1.50)									
							19.50 - 19.86		D	19.50	SPT(S)50 (4,10/50 for 210mm)	
		20.00		-15.90	150							
Borehole complete at 20.00 m bgl.							20.00 20.00		B D			

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 12.00 m bgl, rose to 10.10 m bgl after 20 minutes. 4. Backfilled with arisings.

Water Stike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
08/09/2020		12.00 m	20 min	10.10 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486242.34 N414356.71	**4.10**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project No:	**20-1405.01**	Hole ID: **CP102**	Page: **1 of 3**
Project:	**Former Glanford House, Flixborough**		
Date:	**03/09/2020 - 07/09/2020**	Client:	**North Lincolnshire Council**

Cable Percussive Borehole Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Type	Ref	Test Details Depth (m)	Results	Backfill
MADE GROUND: Concrete with 10 mm rebar reinforcement 0.15 m bgl and 0.20 m bgl.		0.30	(0.30)	3.76								
MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse flint, brick, clinker and limestone.		1.20	(0.90)	2.86			0.60 - 0.65		ES	0.60	PID=0.0ppmv	
Firm reddish brown CLAY. (ALLUVIUM)		2.00	(0.80)	2.06			1.20 - 1.25 1.50 1.50 - 1.95		ES B D	1.20 1.50	PID=0.3ppmv SPT(S)N=3 (1,1/0,1,1,1)	
Soft orangish brown mottled grey CLAY. (ALLUVIUM)		4.50	(2.50)	-0.44			2.00 2.00 3.00 - 3.45		B D D	3.00	SPT(S)N=1 (1,0/0,1,0,0)	
Soft dark blueish grey very silty CLAY. Decayed rootlets throughout. (ALLUVIUM)		6.50	(2.00)	-2.44			4.50 4.50 - 4.95 6.00 - 6.45		B D D	4.50 6.00	SPT(S)N=0 (0,0/0,0,0,0) SPT(S)N=0 (1,0/0,0,0,0)	
Spongy dark brown slightly clayey pseudo-fibrous PEAT. (ALLUVIUM)			(5.30)			6.78	6.50 6.50 7.50 - 7.95 9.00 - 9.45		B D D D	7.50 9.00	SPT(S)N=7 (1,1/2,1,1,3) SPT(S)N=9 (1,2/2,2,2,3)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 11.80 m bgl, rose to 6.78 m bgl after 20 minutes. 4. Installed with a 63 mm HDPE standpipe to 15.00 m bgl.

Water Stike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
03/09/2020		11.80 m	20 min	6.78 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486223.56 N414383.19	**4.06**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project No: **20-1405.01**	Hole ID: **CP102**	Page: **2 of 3**	
Project: **Former Glanford House, Flixborough**			
Date: **03/09/2020 - 07/09/2020**	Client: **North Lincolnshire Council**		

Cable Percussive Borehole Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details			Test Details		Backfill
							Depth (m)	Type	Ref	Depth (m)	Results	
Spongy dark brown slightly clayey pseudo-fibrous PEAT. (ALLUVIUM)							10.50 - 10.95		D	10.50	SPT(S)N=10 (1,2/1,2,3,4)	
		11.80		-7.74		11.80						
Very loose dark grey slightly silty slightly clayey fine to coarse SAND. (ALLUVIUM)					200		11.80 11.80 12.00 - 12.45		B D D	12.00	SPT(S)N=0 (0,0/0,0,0,0)	
		12.45	(0.65)	-8.39								
Loose to medium dense dark grey slightly silty fine to coarse SAND. (ALLUVIUM)							13.50 - 13.95		D	13.50	SPT(S)N=6 (1,0/0,1,2,3)	
			(3.55)									
							15.00 - 15.45		D	15.00	SPT(S)N=19 (1,1/2,3,6,8)	
		16.00		-11.94								
Medium dense dark grey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded of mixed lithologies. (ALLUVIUM)							16.00 16.00		B D			
							16.50 - 16.95		D	16.50	SPT(S)N=18 (1,2/3,3,5,7)	
			(5.00)				18.00 - 18.45		D	18.00	SPT(S)N=20 (2,2/3,4,5,8)	
							19.50 - 19.95		D	19.50	SPT(S)N=21 (1,1/1,3,7,10)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 11.80 m bgl, rose to 6.78 m bgl after 20 minutes. 4. Installed with a 63 mm HDPE standpipe to 15.00 m bgl.

Water Stike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
03/09/2020		11.80 m	20 min	6.78 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486223.56 N414383.19	**4.06**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project No:	**20-1405.01**	Hole ID: **CP102**	Page: **3 of 3**
Project:	**Former Glanford House, Flixborough**		
Date:	**03/09/2020 - 07/09/2020**	Client: **North Lincolnshire Council**	

Cable Percussive Borehole Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details			Test Details		Backfill
							Depth (m)	Type	Ref	Depth (m)	Results	
Medium dense dark grey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded of mixed lithologies. (ALLUVIUM)	▨	21.00		-16.94	150							■
Medium dense dark brown fine to coarse SAND. (ALLUVIUM)	▨	22.00	(1.00)	-17.94			21.00 - 21.45		D	21.00	SPT(S)N=25 (2,4/4,5,8,8)	■
Very stiff grey mottled brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular fine to medium mudstone. (MERCIA MUDSTONE GROUP)	▨	24.00	(2.00)	-19.94			22.00		B			■
							22.00		D			
							22.50 - 22.79		D	22.50	SPT()50 (4,12/50 for 140mm)	
Very stiff dark grey slightly silty sandy CLAY interbedded with hard white GYPSUM. Sand is fine. (MERCIA MUDSTONE GROUP)	▨	25.00	(1.00)	-20.94			24.00 - 24.30		D	24.00	SPT()50 (5,15/50 for 145mm)	■
Borehole complete at 25.00 m bgl.							25.00		B			
							25.00		D			

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 11.80 m bgl, rose to 6.78 m bgl after 20 minutes. 4. Installed with a 63 mm HDPE standpipe to 15.00 m bgl.

Water Stike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
03/09/2020		11.80 m	20 min	6.78 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486223.56 N414383.19	**4.06**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project No: **20-1405.01**	Hole ID: **CP103**	Page: **1 of 2**	
Project: **Former Glanford House, Flixborough**			
Date: **01/09/2020 - 02/09/2020**	Client: **North Lincolnshire Council**		

Cable Percussive Borehole Log

Description of Strata	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water
MADE GROUND: Macadam.	0.20	(0.20)	3.33		
MADE GRROUND: Dark grey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium macadam and sandstone.	0.40	(0.20)	3.13		
Firm orangish brown slightly sandy CLAY. Sand is fine to medium. (ALLUVIUM)	2.00	(1.60)	1.53		
Soft orangish brown mottled grey slightly silty CLAY. (ALLUVIUM)	3.50	(1.50)	0.03		
Soft grey CLAY. (ALLUVIUM)	4.00	(0.50)	-0.47		
Spongy dark brown slightly clayey pseudo-fibrous PEAT. (ALLUVIUM)	6.80	(2.80)	-3.27		4.55 ▽ 5.50 ▽ 6.00 ▼
Soft light blueish grey slightly silty sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to medium of mixed lithologies. (ALLUVIUM)	8.50	(1.70)	-4.97		
Loose light blueish grey slightly clayey slightly silty slightly gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium of mixed lithologies. (ALLUVIUM)	10.00	(1.50)	-6.47		

Sample Details			Test Details	
Depth (m)	Type	Ref	Depth (m)	Results
0.20		D	0.20	PID=11.3ppmv
0.20 -		ES		
0.25		B	0.50	PID=2.9ppmv
0.40		ES		
0.50 -		D		
0.55				
0.80				
1.20 -		D	1.20	PID=3.9ppmv
1.25		ES		
1.20 - 1.65			1.50	SPT(S)N=4 (1,0/1,1,1,1)
2.00		B		
2.50 - 2.55		ES	2.50	PID=1.3ppmv
3.00 - 3.45		D	3.00	SPT(S)N=3 (1,0/0,1,1,1)
3.50		B		
4.00		B		
4.20 - 4.25		ES	4.20	PID=0.4ppmv
4.50 - 4.95		D	4.50	SPT(S)N=0 (0,0/0,0,0,0)
6.00 - 6.45		D	6.00	SPT(S)N=1 (1,0/0,0,0,1)
6.80		B		
7.50 - 7.95		D	7.50	SPT(S)N=9 (1,2/1,2,2,4)
8.50		B		
9.00 - 9.45		D	9.00	SPT(S)N=5 (1,0/1,1,1,2)
10.00		B		

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 6.00 m bgl and 11.00 m bgl, rose to 4.55 m bgl and 5.50 m bgl after 20 minutes, respectively. 4. Backfilled with arisings.

Water Strike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
01/09/2020		6.00 m	20 min	4.55 m		
01/09/2020		11.00 m	20 min	5.50 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486222.96 N414422.91	**3.53**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project: **Former Glanford House, Flixborough**			
Date: **01/09/2020 - 02/09/2020**	Client: **North Lincolnshire Council**		

Cable Percussive Borehole Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type	Sample Details Ref	Test Details Depth (m)	Test Details Results	Backfill
Soft dark grey slightly silty CLAY. Occasional decayed rootlets. (ALLUVIUM)		11.50	(1.50)	-7.97		11.00	10.50 - 10.95		D	10.50	SPT(S)N=11 (1,2/2,2,3,4)	
Firm grey mottled brown SILT/CLAY. Sand is fine to coarse. (ALLUVIUM)		12.00	(0.50)	-8.47	200		11.50		B			
Very loose dark reddish brown fine to coarse SAND. (ALLUVIUM)		16.00	(4.00)	-12.47			12.00 12.00 - 12.45 13.50 - 13.95 15.00 - 15.45		B D D D	12.00 13.50 15.00	SPT(S)N=0 (0,0/0,0,0,0) SPT(S)N=0 (1,0/0,0,0,0) SPT(S)N=1 (0,0/0,0,0,1)	
Medium dense dark reddish brown fine to coarse SAND and sub-angular to sub-rounded fine to coarse GRAVEL of mixed lithologies. (ALLUVIUM)		18.00	(2.00)	-14.47			16.00 16.50 - 16.95		B D	16.50	SPT(S)N=21 (1,2/4,4,6,7)	
Dense dark bluish grey silty fine SAND. (ALLUVIUM)		19.50	(1.50)	-15.97			18.00 18.00 - 18.45		B D	18.00	SPT(S)N=33 (3,5/9,7,9,8)	
Very stiff dark reddish brown slightly sandy clayey SILT. (MERCIA MUDSTONE GROUP)		20.00	(0.50)	-16.47	150		19.50 - 19.87		D	19.50	SPT(S)50 (4,10/50 for 220mm)	
Borehole complete at 20.00 m bgl.							20.00		B			

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 6.00 m bgl and 11.00 m bgl, rose to 4.55 m bgl and 5.50 m bgl after 20 minutes, respectively. 4. Backfilled with arisings.

Water Strike			Water Level		Chiselling	
Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)
01/09/2020		6.00 m	20 min	4.55 m		
01/09/2020		11.00 m	20 min	5.50 m		

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E486222.96 N414422.91	**3.53**	**Borehole Surveys**	**Dando 150**	**MK**	**JR**	**PH**	**1:52**

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Project No:	**20-1405.01**
Hole ID:	**DS101**
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Project:	**Former Glanford House, Flixborough**
Date:	**01/09/2020**
Client:	**North Lincolnshire Council**

Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to caorse flint, brick and concrete. Rootlets throughout. (TOPSOIL)		0.20	(0.20)								
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse flint, brick and concrete. Rare concrete cobble.		1.20	(1.00)				0.40 - 0.45	ES	0.40	PID=0.0ppmv	
									1.20	SPT(S) N=13 (2,2/4,4,3,2)	
Firm dark brown sandy silty CLAY. Sand is fine to coarse. Rare fine decayed roots. (ALLUVIUM)		2.00	(0.80)				1.40 - 1.45	ES	1.40	PID=0.0ppmv	
							1.80 - 2.00	B			
									2.00	SPT(S) N=4 (1,1/1,1,1,1)	
Soft orangish brown mottled grey CLAY. (ALLUVIUM)		2.50	(0.50)				2.20 - 2.25	D			
Very soft grey CLAY. Decayed plant roots throughout. (ALLUVIUM)		3.00	(0.50)				2.80 - 2.85	ES	2.80	PID=0.0ppmv	
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion.4. Installed with a 63 mm HDPE standpipe to 3.00 m bgl.5. GPS not possible due to the proximity of trees.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Borehole Surveys	**Dando Terrier**	**JR**	**PH**	**PH**	**1:30**

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Project: **Former Glanford House, Flixborough**			
Dynamic Sampler Log	Date: **01/09/2020**	Client: **North Lincolnshire Council**	

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type & Ref	Test Details Depth (m)	Test Details Results	Backfill
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse flint, brick and concrete. Rootlets throughout. (TOPSOIL)		0.20	(0.20)								
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse flint, brick, concrete and limestone.		0.90	(0.70)				0.30 - 0.35	ES	0.30	PID=0.0ppmv	
Firm orangish brown CLAY. (ALLUVIUM)		2.20	(1.30)				1.00 - 1.05	ES	1.00	PID=0.3ppmv	
									1.20	SPT(S) N=20 (3,5/4,5,5,6)	
							1.60 - 1.65	ES	1.60	PID=0.0ppmv	
									2.00	SPT(S) N=8 (1,1/2,2,2,2)	
Soft orangish brown mottled grey CLAY. (ALLUVIUM)		2.40	(0.20)								
Very soft orangish brown mottled grey CLAY. Occasional decayed plant roots. (ALLUVIUM)		3.00	(0.60)				2.60 - 2.80	B			
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion.4. Backfilled with arisings.5. GPS not possible due to the proximity of trees.

Water Strike Date	Water Strike Depth (m)	Water Strike Remarks	Water Level Duration (min)	Water Level Depth	Borehole Diameter Depth Base	Borehole Diameter Diameter

Coordinates:	Elevation (mAOD):	Drilled By: **Borehole Surveys**	Plant Used: **Dando Terrier**	Logged: **JR**	Checked: **PH**	Approved: **PH**	Scale: **1:30**

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Project: **Former Glanford House, Flixborough**			
Date: **01/09/2020**	Client: **North Lincolnshire Council**		

Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details: Depth (m)	Sample Details: Type & Ref	Test Details: Depth (m)	Test Details: Results	Backfill
MADE GROUND: Firm dark brown slightly sandy CLAY. Sand is fine to coarse. (TOPSOIL)		0.35	(0.35)	3.83							
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular fine to coarse concrete and brick.		0.80	(0.45)	3.38			0.50 - 0.55	ES	0.50	PID=0.0ppmv	
Firm orangish brown slightly sandy CLAY. Sand is fine to medium. (ALLUVIUM)		2.00	(1.20)	2.18			0.80 - 0.85 1.50 - 1.55	ES D	0.80 1.20	PID=0.0ppmv SPT(S) N=21 (4,4/4,6,5,6)	
Soft orange mottled grey CLAY. (ALLUVIUM)		2.50	(0.50)	1.68			2.40 - 2.45	D	2.00	SPT(S) N=6 (1,2/1,1,2,2)	
Very soft grey CLAY. (ALLUVIUM)		3.00	(0.50)	1.18							
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion.4. Backfilled with arisings.

Water Strike: Date	Water Strike: Depth (m)	Water Strike: Remarks	Water Level: Duration (min)	Water Level: Depth	Borehole Diameter: Depth Base	Borehole Diameter: Diameter

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E486243.35 N414337.94	**4.18**	**Borehole Surveys**	**Dando Terrier**	**JR**	**PH**	**PH**	**1:30**

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Date: **02/09/2020**	Client: **North Lincolnshire Council**		

Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Concrete with 10mm rebar reinforcement at 0.25 m bgl.	▨	0.30	(0.30)	3.79							▨
MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded clinker and flint.	▨	1.00	(0.70)	3.09			0.40 - 0.45	ES	0.40	PID=0.8ppmv	▨
Firm grey mottled orangish brown CLAY. (ALLUVIUM)	▤	2.10	(1.10)	1.99			1.10 - 1.15 1.50 - 1.55	ES D	1.10 1.20 2.00	PID=0.4ppmv SPT(S) N=9 (2,4/3,2,2,2) SPT(S) N=4 (1,1/1,1,1,1)	▨
Soft grey mottled orangish brown CLAY. (ALLUVIUM)	▤	3.00	(0.90)	1.09			2.50 - 2.55	ES	2.50 3.00	PID=0.0ppmv SPT(S) N=0 (0,0/0,0,0,0)	▨
Borehole complete at 3.00 m bgl.											

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion.4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates: **E486237.82 N414373.36**	Elevation (mAOD): **4.09**	Drilled By: **Borehole Surveys**	Plant Used: **Dando Terrier**	Logged: **JR**	Checked: **PH**	Approved: **PH**	Scale: **1:30**

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Project: **Former Glanford House, Flixborough**			
Date: **01/09/2020**	Client: **North Lincolnshire Council**		

Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type & Ref	Test Details Depth (m)	Test Details Results	Backfill
MADE GROUND: Macadam.	▨	0.20	(0.20)	3.54							▨
MADE GROUND: Grey sandy sub-angular to sub-rounded fine to medium limestone, concrete and macadam GRAVEL. Sand is fine to coarse.	▨	0.50	(0.30)	3.24			0.30 - 0.35	ES	0.30	PID=0.1ppmv	▨
Firm locally soft orangish brown mottled grey slightly sandy CLAY. Sand is fine. (ALLUVIUM)	▨	2.00	(1.50)	1.74			0.60 - 0.65 1.20 - 1.40	ES B	0.60 1.20	PID=2.2ppmv SPT(S) N=7 (0,1/1,2,2,2)	▨
Soft orangish brown mottled grey CLAY. (ALLUVIUM)	▨	3.00	(1.00)	0.74		2.10 ▼			2.00	SPT(S) N=0 (0,0/0,0,0,0)	▨
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater encountered at 2.1 m bgl. 4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter
01/09/2020	2.10					

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E486223.56 N414360.32	**3.74**	**Borehole Surveys**	**Dando Terrier**	**JR**	**PH**	**PH**	**1:30**

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Project: **Former Glanford House, Flixborough**

Dynamic Sampler Log

Date: **02/09/2020**
Client: **North Lincolnshire Council**

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Concrete with 10mm rebar reinforcement at 0.20 m bgl.	▨	0.25	(0.25)	3.82							
Borehole complete at 0.25 m bgl.											

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Service pit identified beneath concrete hardstanding. No damage noted to services. Borehole relocated. 4. Borehole could not be backfilled given the void beneath the concrete. Borehole covered.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates: **E486201.80 N414385.87**
Elevation (mAOD): **4.08**
Drilled By: **Borehole Surveys**
Plant Used: **Dando Terrier**
Logged: **JR**
Checked: **PH**
Approved: **PH**
Scale: **1:30**

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Client:	**North Lincolnshire Council**

Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Concrete paving slab.	▨	0.10	(0.10)	3.68							▨
MADE GROUND: Orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium clinker, flint and brick.	▨	0.70	(0.60)	3.08			0.50 - 0.55	ES	0.50	PID=0.6ppmv	
MADE GROUND: Concrete.		0.72		3.06							
Borehole complete at 0.72 m bgl.											

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Concrete obstruction identified at 0.72 m bgl, borehole backfilled with arisings and relocated.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E486203.87 N414391.71	**3.78**	**Borehole Surveys**	**Dando Terrier**	**JR**	**PH**	**PH**	**1:30**

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Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type & Ref	Test Details Depth (m)	Test Details Results	Backfill
MADE GROUND: Concrete paving slab.		0.10	(0.10)	3.68							
MADE GROUND: Orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium clinker, flint and metal. Rare clinker cobbles.		0.90	(0.80)	2.88			0.60 - 0.65	ES	0.60	PID=0.1ppmv	
Firm grey mottled orangish brown CLAY. (ALLUVIUM)		1.85	(0.95)	1.93			0.90 - 0.95 1.80 - 1.85	ES ES	0.90 1.20 1.80	PID=0.0ppmv SPT(S) N=6 (1,1/1,1,2,2) PID=0.0ppmv	
Soft grey mottled orangish brown CLAY. (ALLUVIUM)		3.00	(1.15)	0.78		2.60 ▼	2.60 - 2.65	D	2.00	SPT(S) N=0 (0,0/0,0,0,0)	
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Groundwater identified at 2.60 m bgl.4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter
02/09/2020	2.60					

Coordinates: **E486203.88 N414392.71**	Elevation (mAOD): **3.78**	Drilled By: **Borehole Surveys**	Plant Used: **Dando Terrier**	Logged: **JR**	Checked: **PH**	Approved: **PH**	Scale: **1:30**

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	Project: **Former Glanford House, Flixborough**		
Dynamic Sampler Log	Date: **02/09/2020**	Client: **North Lincolnshire Council**	

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Concrete with 15 mm rebar reinforcement at 0.05 m bgl and 10 mm at 0.12 m bgl.	▨	0.20	(0.20)	3.84							▨
MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded clinker and flint.	▨	0.80	(0.60)	3.24			0.70 - 0.75	ES	0.70	PID=4.7ppmv	▨
Firm orangish brown mottled grey CLAY. (ALLUVIUM)	▤	2.00	(1.20)	2.04			1.00 - 1.05	ES	1.00	PID=0.7ppmv	▨
									1.20	SPT(S) N=5 (3,2/1,1,1,2)	
Soft orangish brown mottled grey CLAY. (ALLUVIUM)	▤	3.00	(1.00)	1.04			2.00 - 2.05	D	2.00	SPT(S) N=4 (1,1/1,1,1,1)	▨
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion. 4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates: **E486219.17 N414389.00**	Elevation (mAOD): **4.04**	Drilled By: **Borehole Surveys**	Plant Used: **Dando Terrier**	Logged: **JR**	Checked: **PH**	Approved: **PH**	Scale: **1:30**

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Dynamic Sampler Log

Date: **02/09/2020**
Client: **North Lincolnshire Council**

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details Depth (m)	Sample Details Type & Ref	Test Details Depth (m)	Test Details Results	Backfill
MADE GROUND: Concrete with 10 mm rebar reinforcement at 0.25 m bgl.	▨	0.36	(0.36)	3.71							▨
MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded limestone, clinker and flint.	▨	0.95	(0.59)	3.12			0.60 - 0.65	ES	0.60	PID=3.8ppmv	▨
Firm orangish browm mottled grey CLAY. (ALLUVIUM)	— —	1.80	(0.85)	2.27			1.20 - 1.25 1.60 - 1.65	ES D	1.20 1.20	SPT(S) N=11 (2,4/2,2,3,4) PID=0.1ppmv	▨
Soft orangish brown mottled grey SILT/ CLAY. (ALLUVIUM)	× — ×	3.00	(1.20)	1.07			2.60 - 2.80	B	2.00	SPT(S) N=5 (1,2/1,1,2,1)	▨
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion. 4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E486244.68 N414395.99	**4.07**	**Borehole Surveys**	**Dando Terrier**	**JR**	**PH**	**PH**	**1:30**

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Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Grey sub-angular fine to medium limestone GRAVEL.		0.10	(0.10)	3.51							
MADE GROUND: Dark greyish brown clayey very gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse limestone, concrete, brick and clinker.		1.70	(1.60)	1.91			0.40 - 0.45 1.20 - 1.25	ES ES	0.40 1.20 1.20	PID=4.4ppmv SPT(S) N=0 (1,0/0,0,0,0) PID=3.2ppmv	
Soft orangish brown mottled grey CLAY. Occasional decayed rootlets. (ALLUVIUM)		3.00	(1.30)	0.61			1.80 - 1.85 2.50 - 2.70 2.80 - 2.85	ES B D	1.80 2.00	PID=0.0ppmv SPT(S) N=0 (0,0/0,0,0,0)	
Borehole complete at 3.00 m bgl.									3.00	SPT(S) N=0 (0,0/0,0,0,0)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion. 4. Installed with a 63 mm HDPE standpipe to 1.50 m bgl.

Water Strike			Water Level		Borehole Diameter	
Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E486194.68 N414397.92	3.61	Borehole Surveys	Dando Terrier	JR	PH	PH	1:30

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Dynamic Sampler Log

Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details: Depth (m)	Sample Details: Type & Ref	Test Details: Depth (m)	Test Details: Results	Backfill
MADE GROUND: Macadam.	▨	0.20	(0.20)	3.33							▨
MADE GROUND: Dark grey sandy sub-angular to sub-rounded fine to coarse limestone and clinker GRAVEL. Sand is fine to coarse.	▨	0.80	(0.60)	2.73			0.50 - 0.55	ES	0.50	PID=7.4ppmv	▨
Firm orangish brown mottled grey CLAY. (ALLUVIUM)	▤	1.50	(0.70)	2.03			0.90 - 0.95 1.10 - 1.15	ES D	0.90 1.20	PID=0.4ppmv SPT(S) N=4 (1,1/1,1,1,1)	▨
Soft orangish brown mottled grey CLAY. (ALLUVIUM)	▤	2.80	(1.30)	0.73			1.80 - 1.85	ES	1.80 2.00	PID=0.1ppmv SPT(S) N=0 (0,0/0,0,0,0)	▨
Soft grey organic CLAY. Decayed rootlets throughout. (ALLUVIUM)	▤	3.00	(0.20)	0.53			2.80 - 2.85	ES	2.80 3.00	PID=0.0ppmv SPT(S) N=0 (0,0/0,0,0,0)	▨
Borehole complete at 3.00 m bgl.											

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.2. Area CAT scanned prior to excavation.3. Borehole remained dry upon completion. 4. Backfilled with arisings.

Water Strike: Date	Water Strike: Depth (m)	Water Strike: Remarks	Water Level: Duration (min)	Water Level: Depth	Borehole Diameter: Depth Base	Borehole Diameter: Diameter

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E486219.06 N414406.11	**3.53**	**Borehole Surveys**	**Dando Terrier**	**JR**	**PH**	**PH**	**1:30**

Appendix D – Geotechnical Analysis Results

LABORATORY REPORT

4043

Contract Number: PSL20/4735

Report Date:	16 September 2020
Client's Reference:	DS56613
Client Name:	Delta Simons 3 Henley Office Park Doddington Road Lincoln LN6 3QR
For the attention of:	**Jessica Rowe**
Contract Title:	Former Glanford House, Flixborough
Date Received:	9/9/2020
Date Commenced:	9/9/2020
Date Completed:	16/9/2020
Notes:	**Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

[redacted]

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

S Eyre
(Senior Technician)

L Knight
(Senior Technician)

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fax: +44 (0)844 815 6642
[redacted]

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
DS101	1	B	1.80	2.00	Brown slightly gravelly very sandy CLAY.
DS101	1	D	2.20	2.25	Brown mottled grey slightly gravelly CLAY.
DS103	2	D	2.40	2.45	Brown mottled grey CLAY.
DS105	1	B	1.20	1.40	Brown CLAY.
DS108	1	D	1.60	1.65	Brown CLAY.
DS108	1	B	2.60	2.85	Brown CLAY.
DS116	1	D	1.10	1.15	Brown mottled grey CLAY.
CP103	4	D	3.00	3.45	Brown CLAY.
CP103	4	B	4.00		Dark brown peaty CLAY.
CP103	5	D	4.50	4.95	Dark brown peaty CLAY.
CP103	5	B	6.80		Grey very gravelly very sandy CLAY.
CP103	7	D	7.50	7.95	Grey very gravelly very sandy CLAY.
CP103	8	B	11.50		Brown slightly gravelly slightly sandy CLAY.
CP103	9	B	12.00		Brown slightly gravelly slightly silty SAND.
CP103	11	B	19.00		Grey slightly gravelly very sandy CLAY.
CP102	2	D	1.50		Brown slightly gravelly CLAY.
CP102	4	D	3.00	3.45	Brown mottled grey CLAY.
CP102	3	B	4.50		Brown mottled grey CLAY.
CP102	6	D	4.50	4.95	Brown mottled grey CLAY.

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
CP102	4	B	6.50		Dark brown peaty CLAY.
CP102	10	D	9.00	9.45	Dark brown peaty CLAY.
CP102	5	B	11.80		Dark brown slightly gravelly clayey silty SAND.
CP102	6	B	16.00		Brown slightly gravelly slightly silty SAND.
CP101	6	D	4.50	4.95	Brown mottled grey CLAY.
CP101	4	B	7.00		Brown mottled grey organic CLAY.
CP101	5	B	12.00		Brown slightly silty SAND.
CP101	6	B	14.80		Brown slightly silty SAND.
CP101	8	B	20.00		Brown slightly gravelly very sandy CLAY.

UKAS TESTING
4043

Professional Soils Laboratory

Former Glanford House, Flixborough

Contract No:
PSL20/4735
Client Ref:
DS56613

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
DS101	1	B	1.80	2.00	21							
DS101	1	D	2.20	2.25	42			77	31	46	94	Very high plasticity CV.
DS103	2	D	2.40	2.45	39			74	30	44	100	Very high plasticity CV.
DS105	1	B	1.20	1.40	30			62	26	36	100	High plasticity CH.
DS108	1	D	1.60	1.65	25			61	26	35	100	High plasticity CH.
DS108	1	B	2.60	2.85	35							
DS116	1	D	1.10	1.15	38			68	28	40	100	High plasticity CH.
CP103	4	D	3.00	3.45	34			63	26	37	100	High plasticity CH.
CP103	4	B	4.00		260							
CP103	5	D	4.50	4.95	197							
CP103	5	B	6.80		36							
CP103	7	D	7.50	7.95	28			39	19	20	60	Intermediate plasticity CI.
CP103	8	B	11.50		30							
CP103	9	B	12.00		22							
CP103	11	B	19.00		22							
CP102	2	D	1.50		42			66	28	38	93	High plasticity CH.
CP102	4	D	3.00	3.45	35			59	25	34	100	High plasticity CH.
CP102	3	B	4.50		42							
CP102	6	D	4.50	4.95	37			65	27	38	100	High plasticity CH.

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

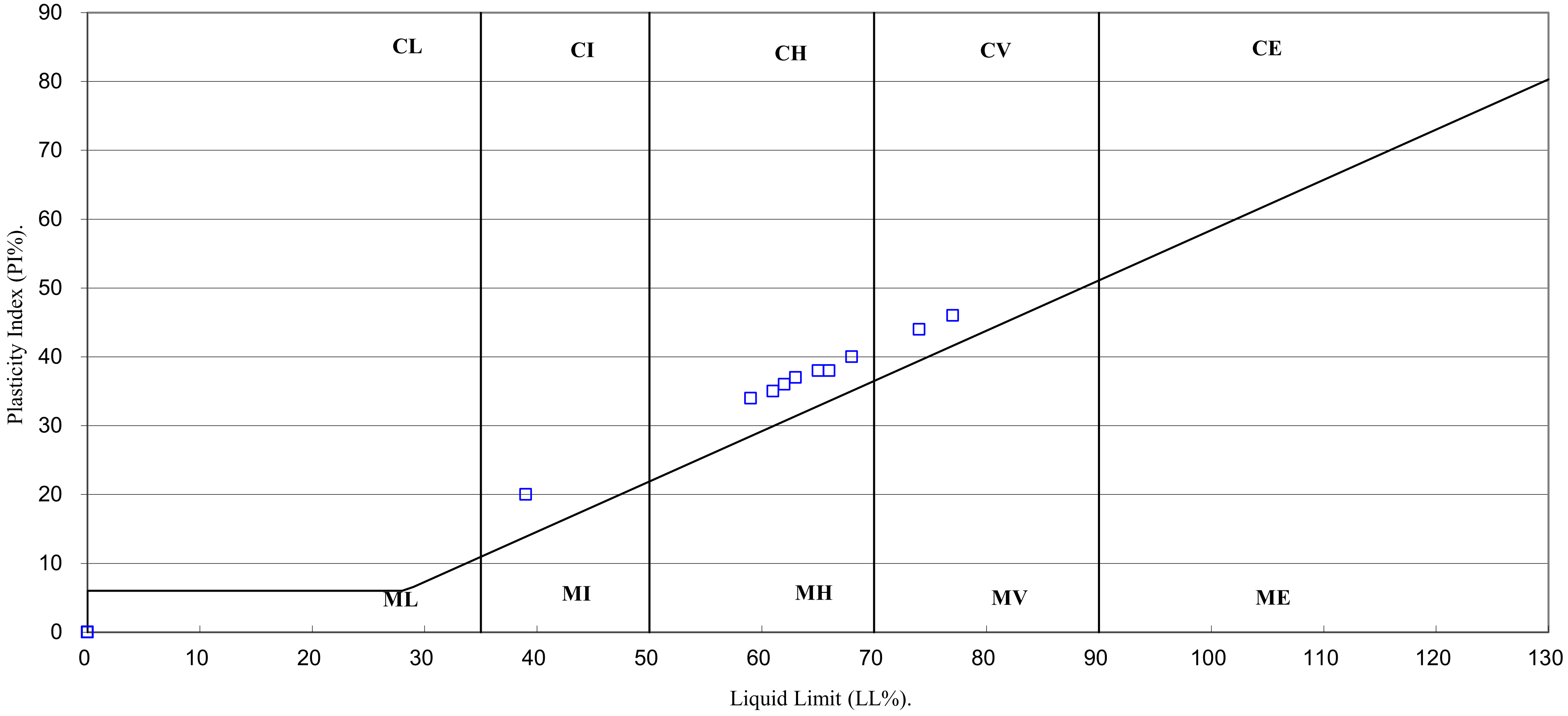
UKAS TESTING
4043

PSL
Professional Soils Laboratory

Former Glanford House, Flixborough

Contract No:	PSL20/4735
Client Ref:	DS56613

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	Professional Soils Laboratory	**Former Glanford House, Flixborough**	**Contract No:** **PSL20/4735** **Client Ref:** **DS56613**

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
CP102	4	B	6.50		184							
CP102	10	D	9.00	9.45	160							
CP102	5	B	11.80		35							
CP102	6	B	16.00		21							
CP101	6	D	4.50	4.95	45							
CP101	4	B	7.00		132							
CP101	5	B	12.00		22							
CP101	6	B	14.80		21							
CP101	8	B	20.00		41							

SYMBOLS : NP : Non Plastic * : Liquid Limit and Plastic Limit Wet Sieved.

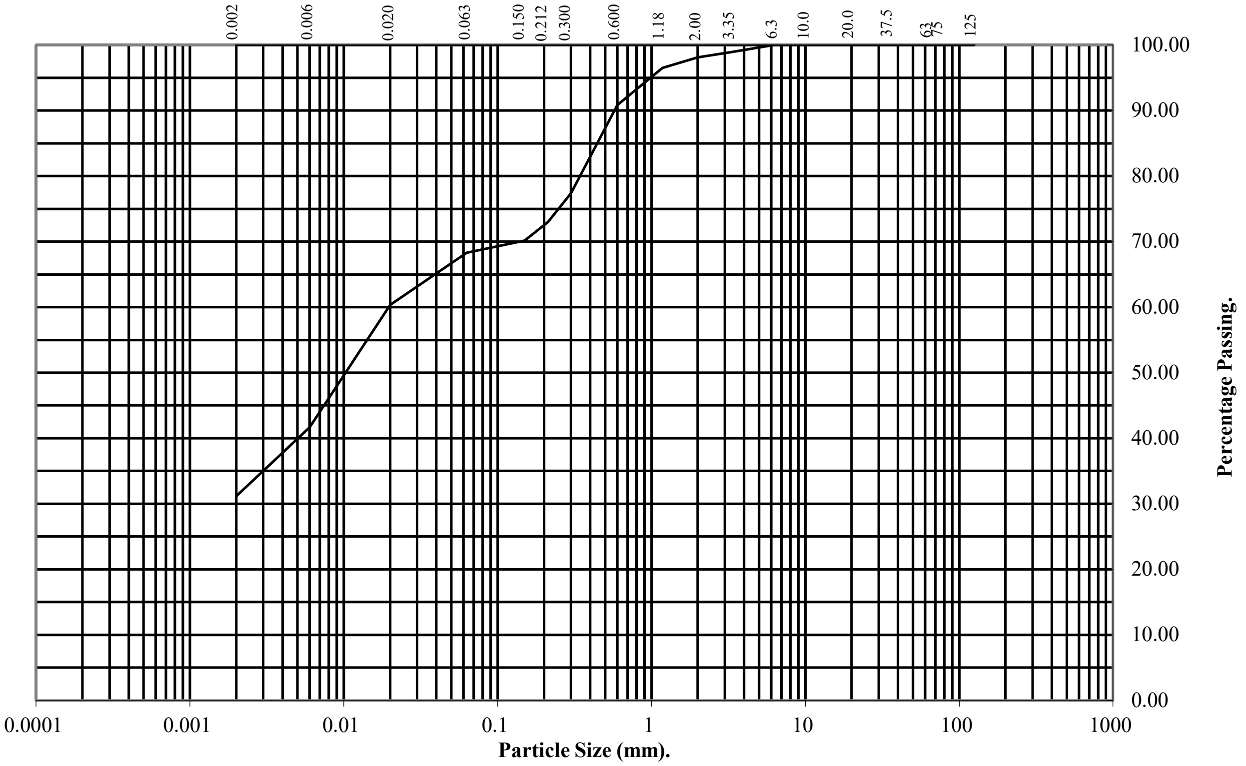
UKAS TESTING 4043	PSL Professional Soils Laboratory	Former Glanford House, Flixborough	Contract No:
			PSL20/4735
			Client Ref:
			DS56613

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**DS101**	**Top Depth (m):**	**1.80**
Sample Number:	**1**	**Base Depth(m):**	**2.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	98
1.18	96
0.6	91
0.3	77
0.212	73
0.15	70
0.063	68

Particle Diameter	Percentage Passing
0.02	60
0.006	42
0.002	31

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	30
Silt	37
Clay	31

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Former Glanford House, Flixborough

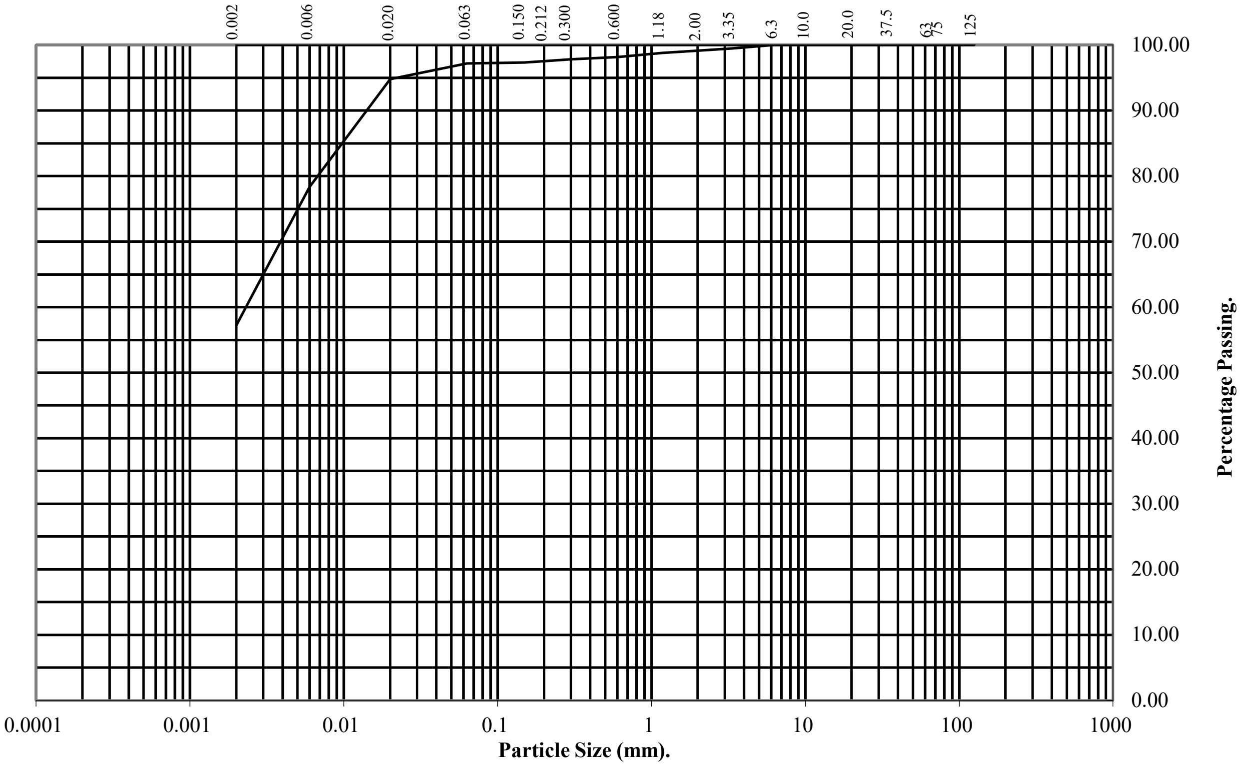
Contract No:	**PSL20/4735**
Client Ref:	**DS56613**

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**DS108**	**Top Depth (m):**	**2.60**
Sample Number:	**1**	**Base Depth(m):**	**2.80**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	99
0.6	98
0.3	98
0.212	98
0.15	97
0.063	97

Particle Diameter	Percentage Passing
0.02	95
0.006	78
0.002	57

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	2
Silt	40
Clay	57

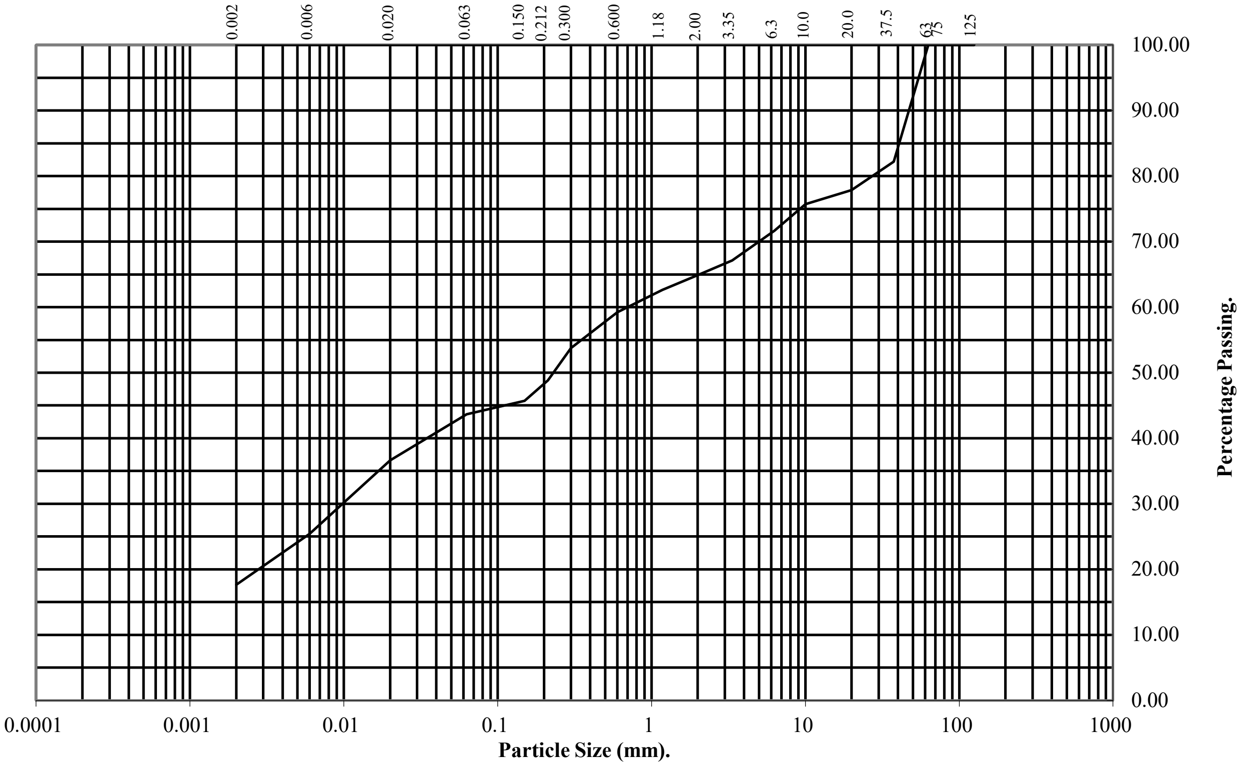
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**CP103**	**Top Depth (m):**	**6.80**
Sample Number:	**5**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	82
20	78
10	76
6.3	72
3.35	67
2	65
1.18	63
0.6	59
0.3	54
0.212	49
0.15	46
0.063	44

Particle Diameter	Percentage Passing
0.02	37
0.006	25
0.002	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	35
Sand	21
Silt	26
Clay	18

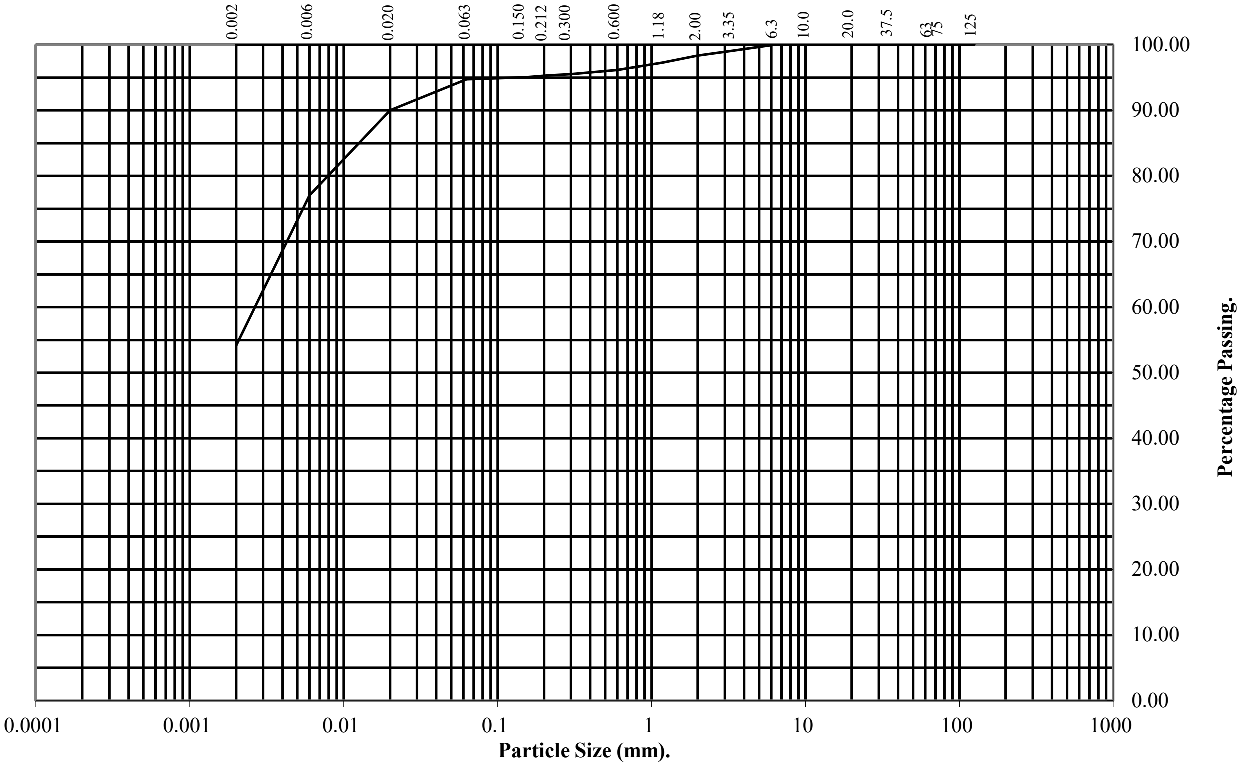
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**CP103**	**Top Depth (m):**	**11.50**
Sample Number:	**8**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	98
1.18	97
0.6	96
0.3	96
0.212	95
0.15	95
0.063	95

Particle Diameter	Percentage Passing
0.02	90
0.006	77
0.002	54

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	3
Silt	41
Clay	54

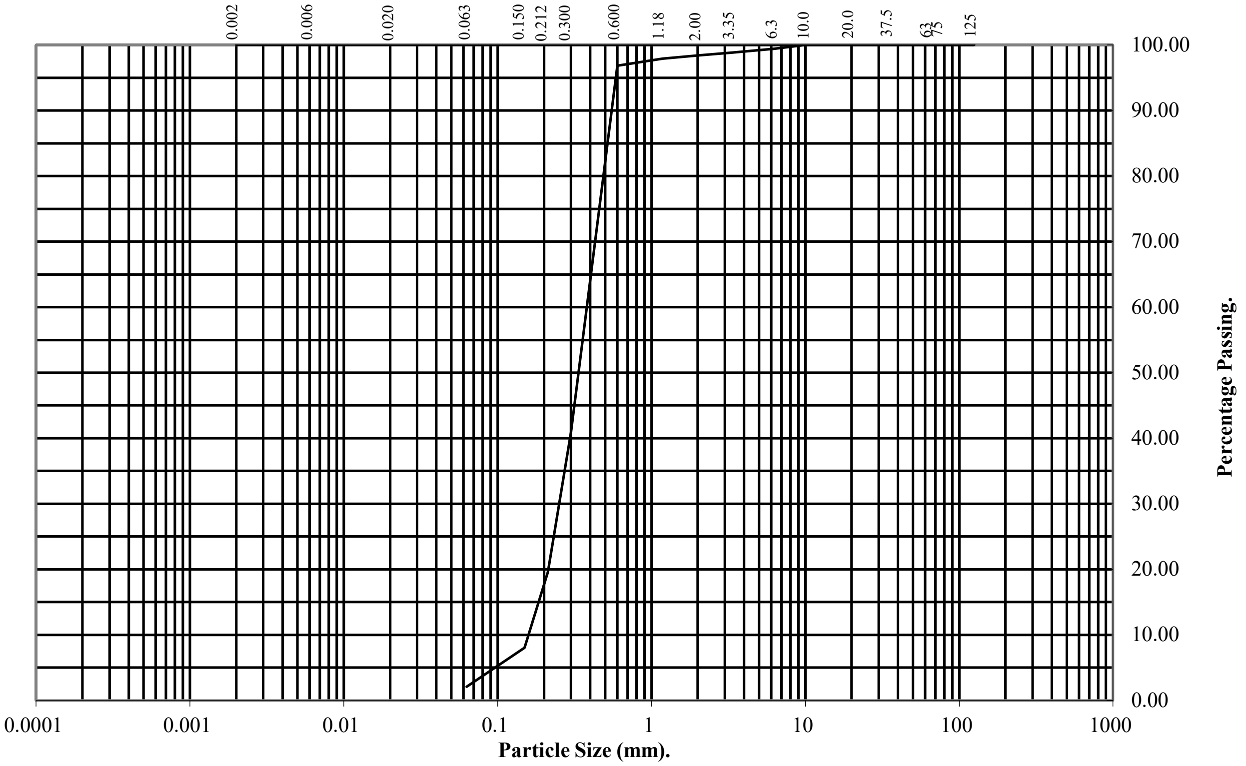
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**CP103**	**Top Depth (m):**	**12.00**
Sample Number:	**9**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	99
2	98
1.18	98
0.6	97
0.3	41
0.212	20
0.15	8
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	96
Silt/Clay	2

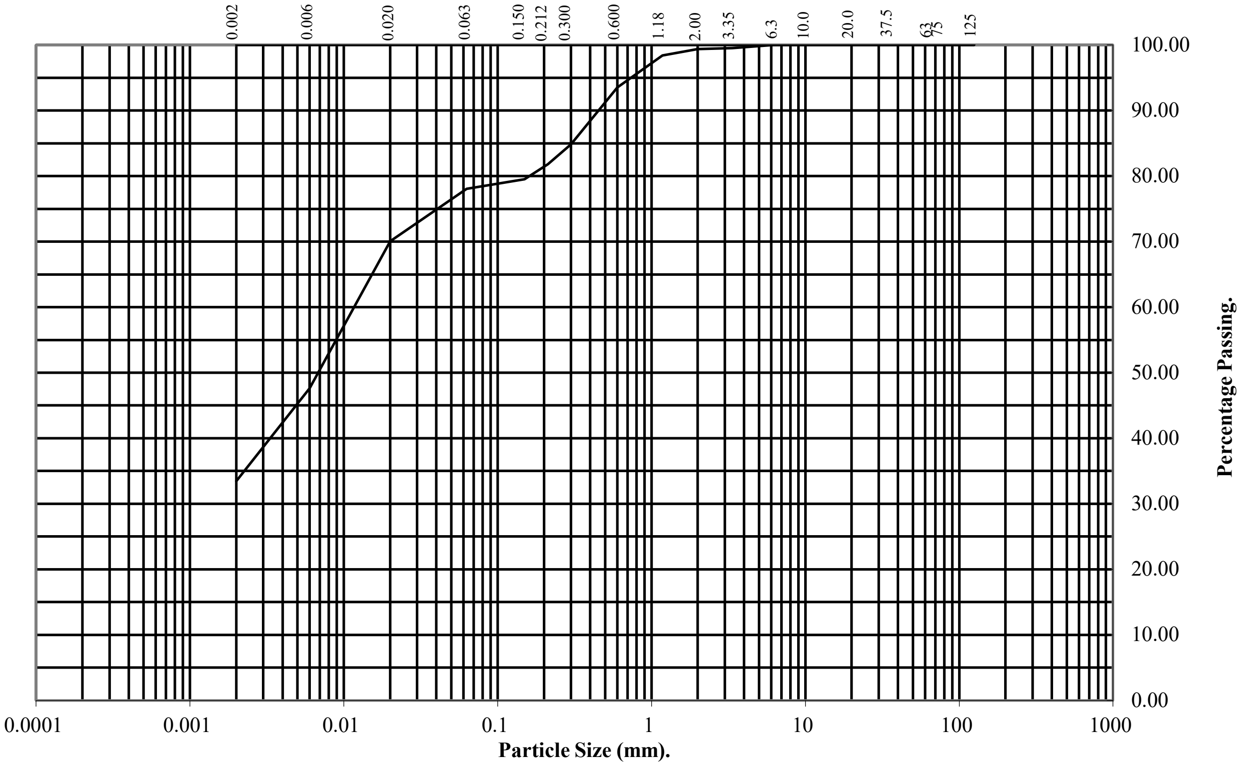
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**CP103**	**Top Depth (m):**	**19.00**
Sample Number:	**11**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	98
0.6	94
0.3	85
0.212	82
0.15	80
0.063	78

Particle Diameter	Percentage Passing
0.02	70
0.006	48
0.002	33

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	21
Silt	45
Clay	33

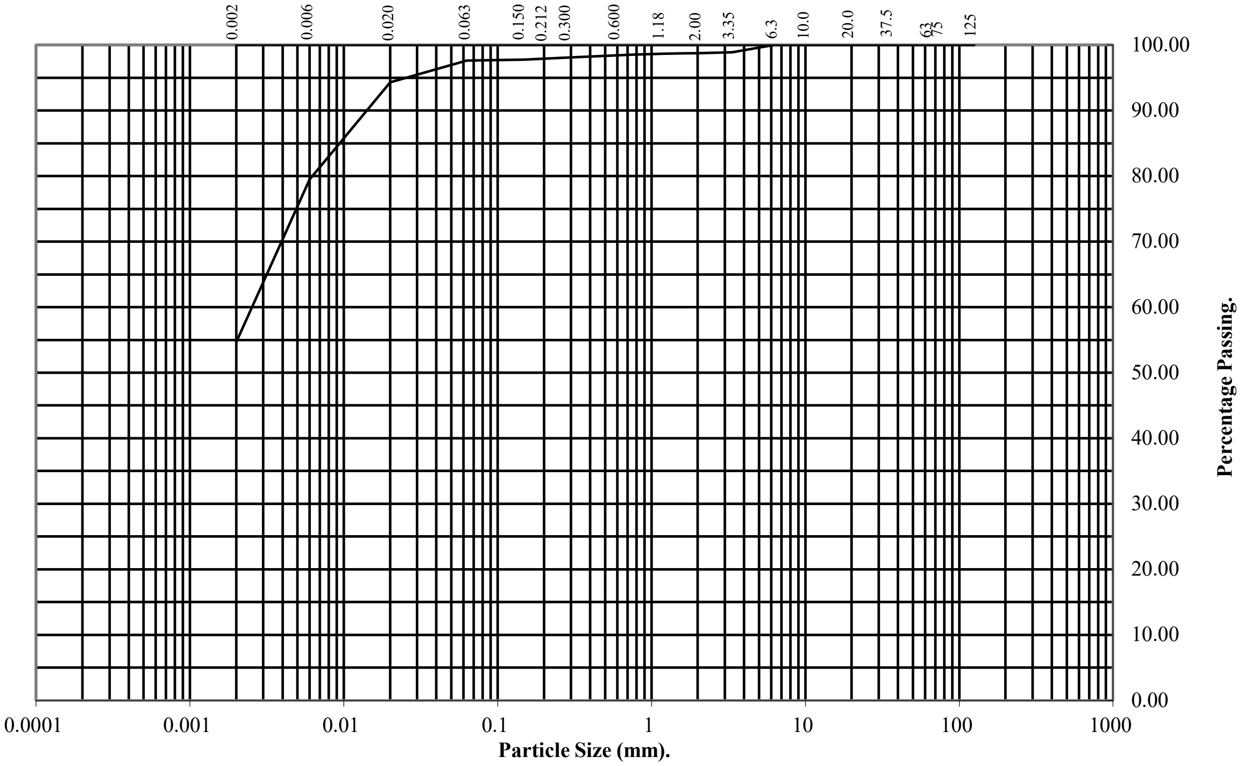
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	CP102	**Top Depth (m):**	4.50
Sample Number:	3	**Base Depth(m):**	
Sample Type:	B		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	99
0.6	98
0.3	98
0.212	98
0.15	98
0.063	98

Particle Diameter	Percentage Passing
0.02	94
0.006	79
0.002	55

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	1
Silt	43
Clay	55

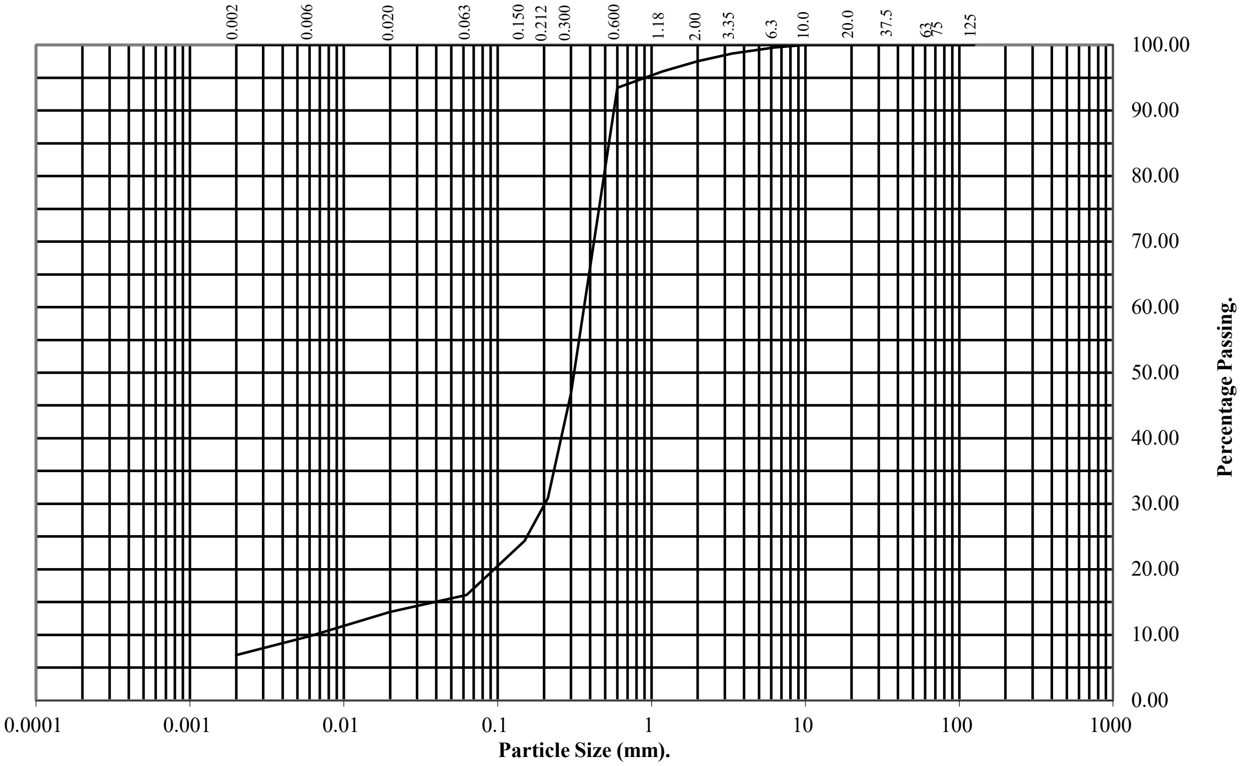
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**CP102**	**Top Depth (m):**	**11.80**
Sample Number:	**5**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	98
1.18	96
0.6	93
0.3	47
0.212	31
0.15	24
0.063	16

Particle Diameter	Percentage Passing
0.02	13
0.006	10
0.002	7

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	82
Silt	9
Clay	7

Remarks:
See Summary of Soil Descriptions

4043

Professional Soils Laboratory

Former Glanford House, Flixborough

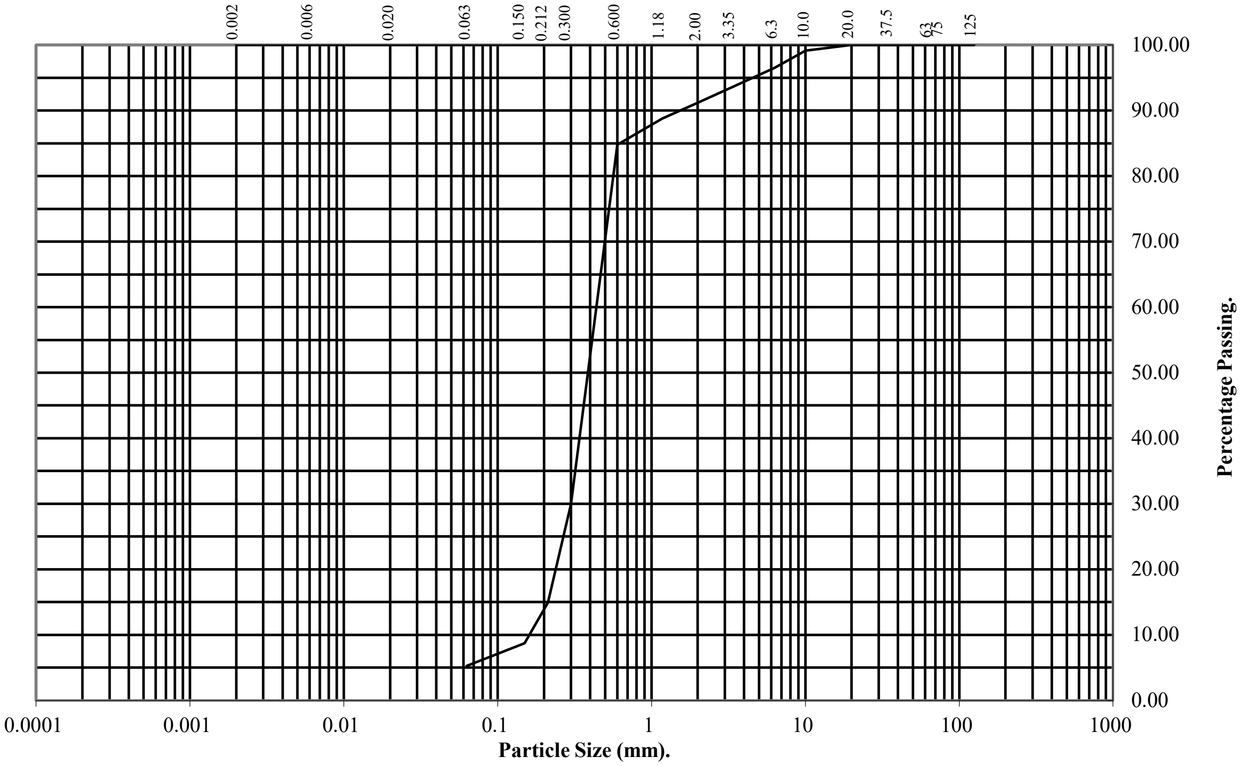
Contract No:
PSL20/4735
Client Ref:
DS56613

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**CP102**	**Top Depth (m):**	**16.00**
Sample Number:	**6**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	97
3.35	94
2	91
1.18	89
0.6	85
0.3	30
0.212	15
0.15	9
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	9
Sand	86
Silt/Clay	5

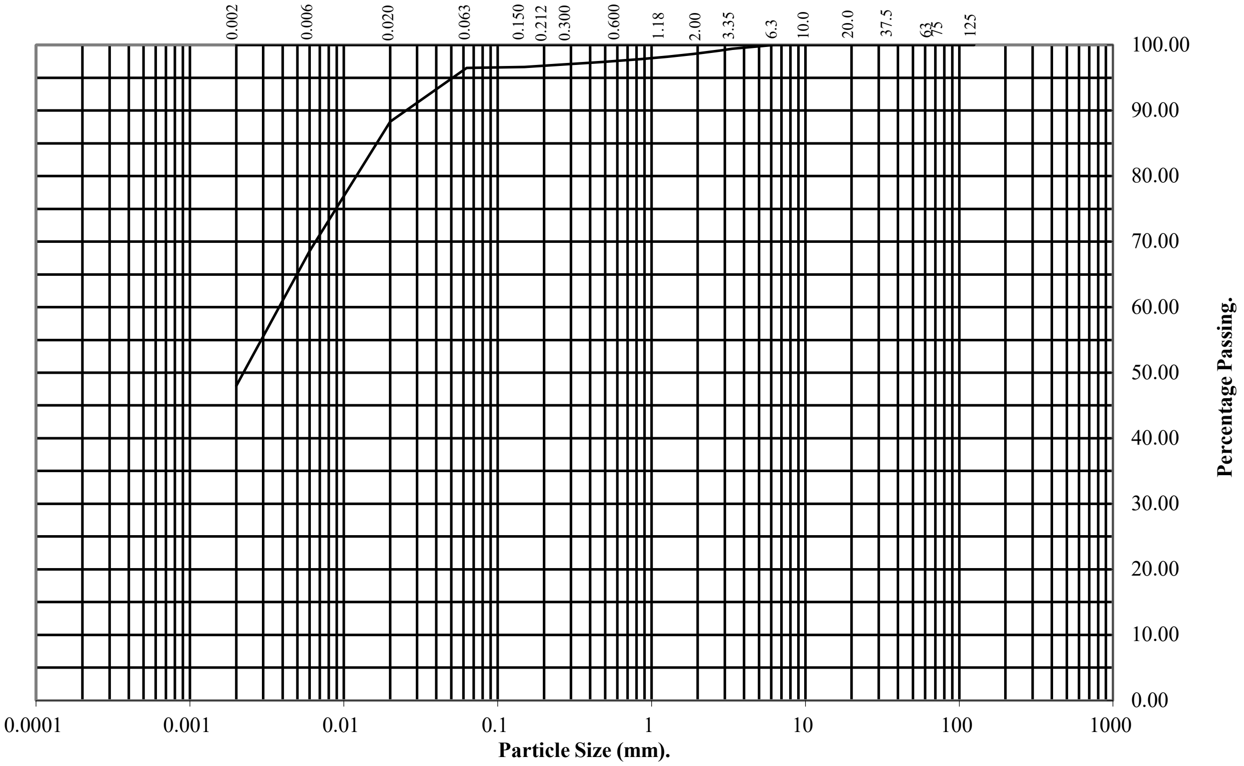
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**CP101**	**Top Depth (m):**	**7.00**
Sample Number:	**4**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	98
0.6	98
0.3	97
0.212	97
0.15	97
0.063	97

Particle Diameter	Percentage Passing
0.02	88
0.006	69
0.002	48

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	2
Silt	49
Clay	48

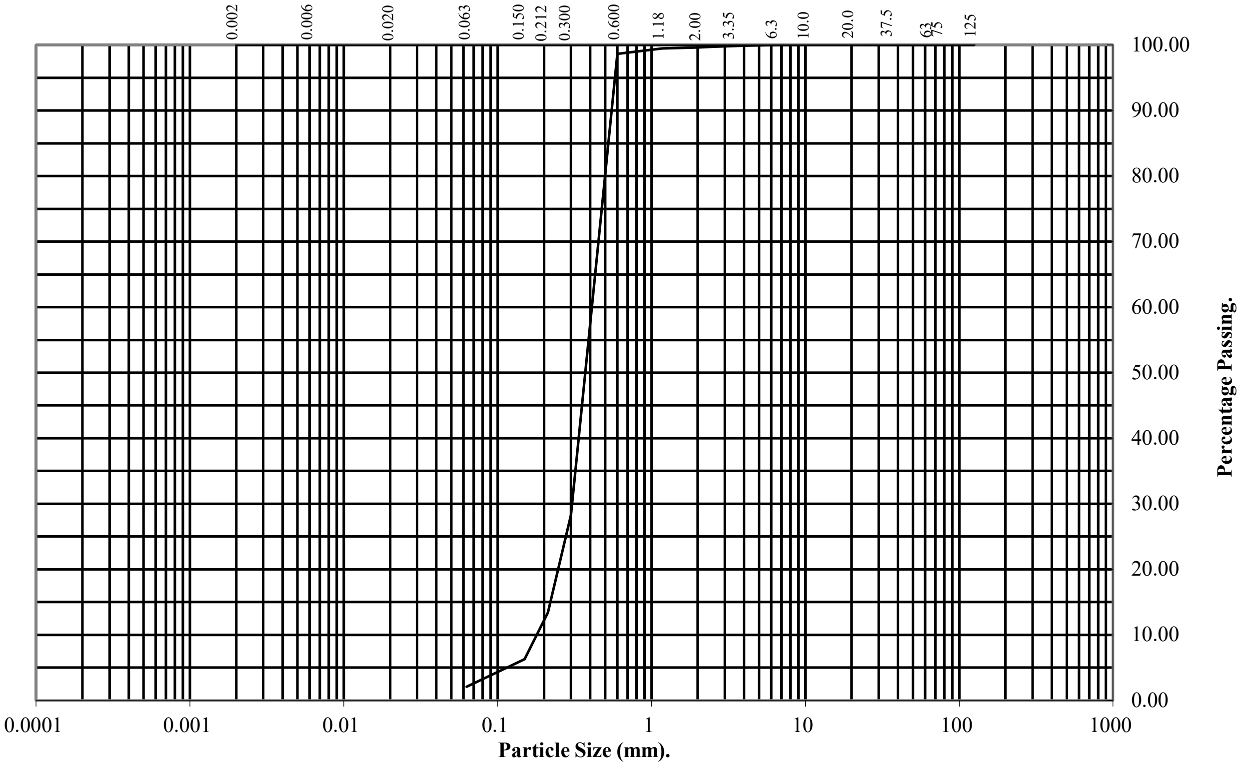
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**CP101**	**Top Depth (m):**	**12.00**
Sample Number:	**5**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	28
0.212	13
0.15	6
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	98
Silt/Clay	2

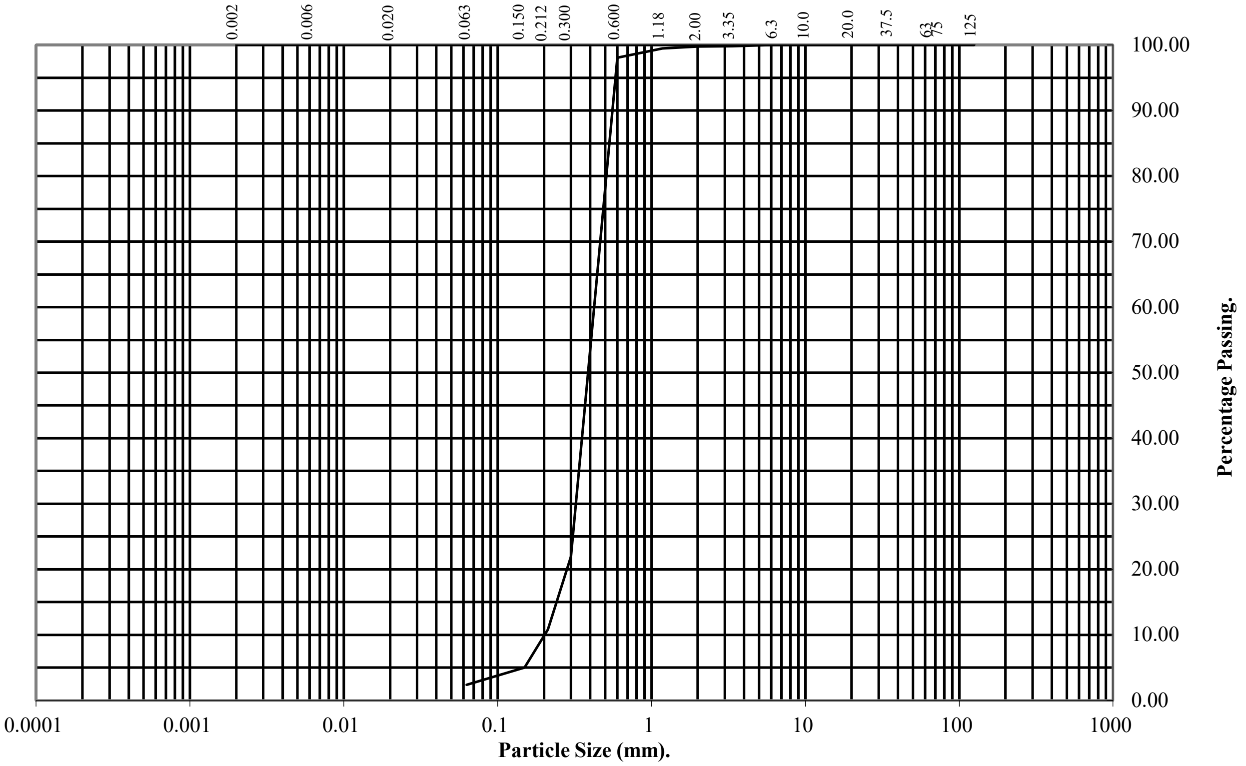
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**CP101**	**Top Depth (m):**	**14.80**
Sample Number:	**6**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	98
0.3	22
0.212	11
0.15	5
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	98
Silt/Clay	2

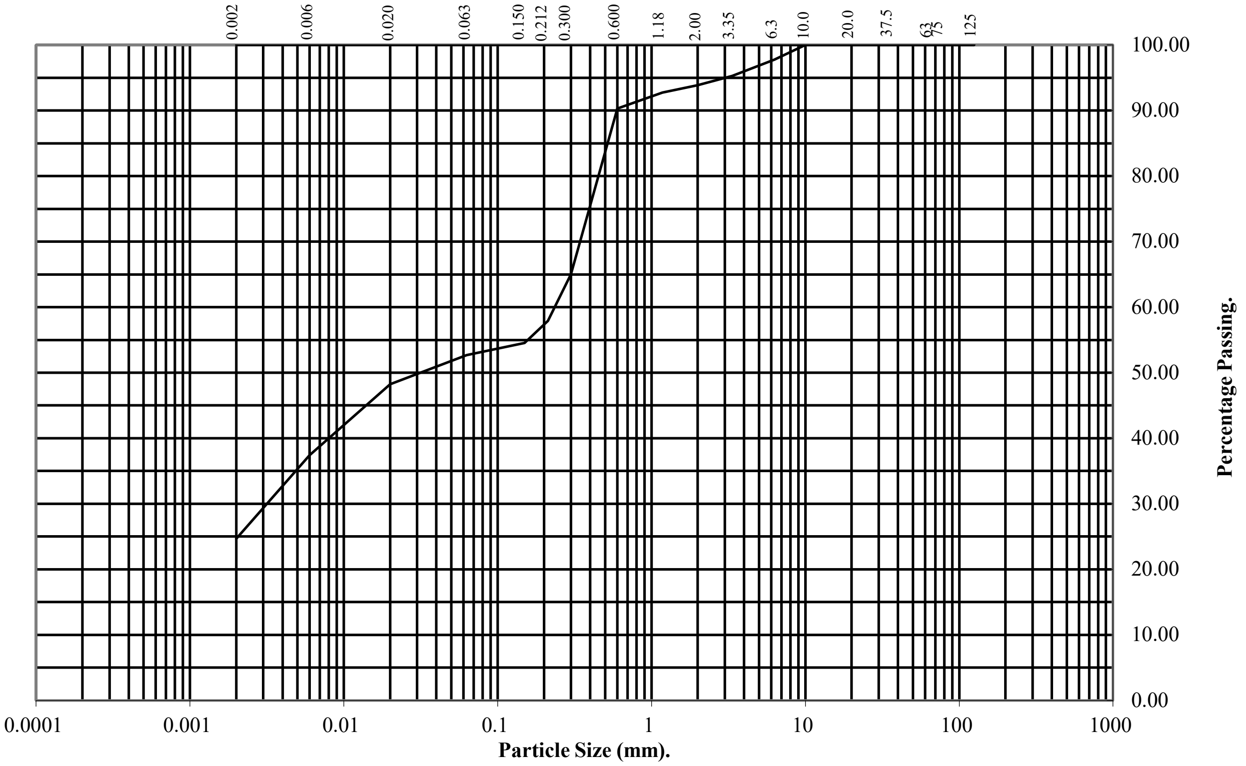
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**CP101**	**Top Depth (m):**	**20.00**
Sample Number:	**8**	**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	98
3.35	95
2	94
1.18	93
0.6	90
0.3	65
0.212	58
0.15	55
0.063	53

Particle Diameter	Percentage Passing
0.02	48
0.006	37
0.002	25

Soil Fraction	Total Percentage
Cobbles	0
Gravel	6
Sand	41
Silt	28
Clay	25

Remarks:
See Summary of Soil Descriptions

4043

Professional Soils Laboratory

Former Glanford House, Flixborough

Contract No: **PSL20/4735**
Client Ref: **DS56613**

2531

CHEMTECH environmental

ANALYTICAL TEST REPORT

Contract no: 89306

Contract name: Former Glanford House, Flixborough

Client reference: PSL20/4735

Clients name: Professional Soils Laboratory

Clients address:
5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 15 September 2020

Analysis started: 15 September 2020

Analysis completed: 22 September 2020

Report issued: 22 September 2020

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by: [redacted]

Dave Bowerbank
Customer Support Hero

SOILS

Lab number **Sample id** **Depth (m)** **Date sampled**			89306-1 CP101 3.00-3.45 -	89306-2 CP101 14.80 -	89306-3 CP101 18.00-18.45 -	89306-4 CP102 2.00 -	89306-5 CP102 4.50-4.95 -	89306-6 CP102 6.50 -
Test	**Method**	**Units**						
pH	CE004 ^{U}	units	7.3	7.9	8.2	8.0	7.6	-
Magnesium (2:1 water soluble)	CE061	mg/l Mg	17	7.5	4.7	<1	17	-
Chloride (2:1 water soluble)	CE049 ^{U}	mg/l Cl	59	67	17	37	220	-
Nitrate (2:1 water soluble)	CE049 ^{U}	mg/l NO_3	<1	<1	<1	42	1.0	-
Sulphate (2:1 water soluble)	CE061 ^{U}	mg/l SO_4	278	81	52	425	176	-
Sulphate (total)	CE062 ^{U}	mg/kg SO_4	925	272	934	1666	751	-
Sulphur (total)	CE119	mg/kg S	1199	1152	673	771	2729	-
Sulphur (total)	CE119	% w/w S	0.12	0.12	0.07	0.08	0.27	-
Organic matter content (OMC)	CE005	% w/w	6.1	0.6	1.8	3.8	5.4	42.5

Chemtech Environmental Limited

SOILS

Lab number **Sample id** **Depth (m)** **Date sampled**			89306-7 CP102 7.50-7.95 -	89306-8 CP102 13.50-13.95 -	89306-9 CP102 18.00-18.45 -	89306-10 CP103 4.00 -	89306-11 CP103 9.00-9.45 -	89306-12 CP103 16.00 -
Test	**Method**	**Units**						
pH	CE004 ^{U}	units	7.4	8.1	8.3	-	8.6	8.5
Magnesium (2:1 water soluble)	CE061	mg/l Mg	113	13	10	-	151	6.0
Chloride (2:1 water soluble)	CE049 ^{U}	mg/l Cl	183	29	25		2250	8.0
Nitrate (2:1 water soluble)	CE049 ^{U}	mg/l NO_3	<1	<1	<1	-	149	<1
Sulphate (2:1 water soluble)	CE061 ^{U}	mg/l SO_4	1144	181	135	-	151	58
Sulphate (total)	CE062 ^{U}	mg/kg SO_4	7110	543	494	-	845	455
Sulphur (total)	CE119	mg/kg S	25743	4756	698	-	1466	465
Sulphur (total)	CE119	% w/w S	2.57	0.48	0.07	-	0.15	0.05
Organic matter content (OMC)	CE005	% w/w	44.2	2.0	0.7	32.6	5.8	1.2

Chemtech Environmental Limited

SOILS

Lab number			89306-13	89306-14	89306-15	89306-16
Sample id			CP103	DS102	DS104	DS109
Depth (m)			19.50-19.97	2.60-2.80	1.50-1.55	2.80-2.85
Date sampled			-	-	-	-
Test	**Method**	**Units**				
pH	CE004 ^{U}	units	8.2	7.9	8.0	8.0
Magnesium (2:1 water soluble)	CE061	mg/l Mg	13	33	8.5	186
Chloride (2:1 water soluble)	CE049 ^{U}	mg/l Cl	8.7	58	14	64
Nitrate (2:1 water soluble)	CE049 ^{U}	mg/l NO_3	<1	1.2	<1	<1
Sulphate (2:1 water soluble)	CE061 ^{U}	mg/l SO_4	226	329	38	186
Sulphate (total)	CE062 ^{U}	mg/kg SO_4	1544	1095	418	673
Sulphur (total)	CE119	mg/kg S	609	3591	583	2735
Sulphur (total)	CE119	% w/w S	0.06	0.36	0.06	0.27
Organic matter content (OMC)	CE005	% w/w	3.6	4.2	3.3	3.7

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO_3
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	U	100	mg/kg SO_4
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		0.01	% w/w S
CE005	Organic matter content (OMC)	Based on BS 1377, Colorimetry	Dry		0.1	% w/w

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
89306-1	CP101	3.00-3.45	Y	All (NSD)
89306-2	CP101	14.80	Y	All (NSD)
89306-3	CP101	18.00-18.45	Y	All (NSD)
89306-4	CP102	2.00	Y	All (NSD)
89306-5	CP102	4.50-4.95	Y	All (NSD)
89306-6	CP102	6.50	Y	All (NSD)
89306-7	CP102	7.50-7.95	Y	All (NSD)
89306-8	CP102	13.50-13.95	Y	All (NSD)
89306-9	CP102	18.00-18.45	Y	All (NSD)
89306-10	CP103	4.00	Y	All (NSD)
89306-11	CP103	9.00-9.45	Y	All (NSD)
89306-12	CP103	16.00	Y	All (NSD)
89306-13	CP103	19.50-19.97	Y	All (NSD)
89306-14	DS102	2.60-2.80	Y	All (NSD)
89306-15	DS104	1.50-1.55	Y	All (NSD)
89306-16	DS109	2.80-2.85	Y	All (NSD)

Appendix E – Soil Chemical Analysis Results

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Analytical Report Number : 20-28298

Project / Site name:	Former Glanford House, Flixborough	**Samples received on:**	03/09/2020
Your job number:	20-1405.01	**Samples instructed on/ Analysis started on:**	03/09/2020
Your order number:	DS56608	**Analysis completed by:**	10/09/2020
Report Issue Number:	1	**Report issued on:**	10/09/2020
Samples Analysed:	4 leachate samples - 24 soil samples		

Signed: [redacted]

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough

Your Order No: DS56608

Lab Sample Number				1611671	1611672	1611673	1611674
Sample Reference				DS101	DS109	DS109	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	0.40-0.45	1.20-1.25	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1	< 1.1	< 1.1
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	1.1	1.2	< 1.0	8.1
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.1	1.2	0.4	8.1
Copper (dissolved)	µg/l	0.7	ISO 17025	4.8	4.2	1.9	6.2
Lead (dissolved)	µg/l	1	ISO 17025	3.5	3.6	1.6	4.4
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.4	1.8	0.6	< 0.3
Zinc (dissolved)	µg/l	0.4	ISO 17025	4.6	3.4	1.6	2.2

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10	< 10

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough

Your Order No: DS56608

Lab Sample Number				1611671	1611672	1611673	1611674
Sample Reference				DS101	DS109	DS109	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	0.40-0.45	1.20-1.25	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample   I/S = Insufficient Sample

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611647	1611648	1611649	1611650
Sample Reference				DS101	DS101	DS101	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.40-1.45	2.80-2.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.1	15	22	10
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	8.3	9
Total Sulphate as SO4	mg/kg	50	MCERTS	-	-	320	2400
Total Sulphate as SO4	%	0.005	MCERTS	-	-	0.032	0.24
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	180	660
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	0.088	0.33
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	88.4	332
Total Sulphur	%	0.005	MCERTS	-	-	0.04	0.183
Organic Matter	%	0.1	MCERTS	-	-	2.2	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.2
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.48
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.29
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.28
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.26
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.31
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	< 0.80	-	2.52

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	11	-	26
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	-	30	-	51
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	30	-	51
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	15	-	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	19	-	42
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	28	-	36
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	71	-	100

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611647	1611648	1611649	1611650
Sample Reference				DS101	DS101	DS101	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.40-1.45	2.80-2.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Toluene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
o-xylene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	-	< 10	-	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10	-	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	-	< 10	-	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	< 10

TPH (C35 - C40)	mg/kg	10	MCERTS	-	< 10	-	< 10

VOCs

Chloromethane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Chloroethane	mg/kg	0.001	NONE	< 0.0010	-	-	-
Bromomethane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Vinyl Chloride	mg/kg	0.001	NONE	< 0.0010	-	-	-
Trichlorofluoromethane	mg/kg	0.001	NONE	< 0.0010	-	-	-
1,1-Dichloroethene	mg/kg	0.001	NONE	< 0.0010	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Cis-1,2-dichloroethene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,1-Dichloroethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
2,2-Dichloropropane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Trichloromethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,1,1-Trichloroethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,2-Dichloroethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,1-Dichloropropene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Trans-1,2-dichloroethene	mg/kg	0.001	NONE	< 0.0010	-	-	-
Benzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Tetrachloromethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,2-Dichloropropane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Trichloroethene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Dibromomethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Bromodichloromethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611647	1611648	1611649	1611650
Sample Reference				DS101	DS101	DS101	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.40-1.45	2.80-2.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Cis-1,3-dichloropropene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Trans-1,3-dichloropropene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Toluene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,1,2-Trichloroethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,3-Dichloropropane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Dibromochloromethane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Tetrachloroethene	mg/kg	0.001	NONE	< 0.0010	-	-	-
1,2-Dibromoethane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
Chlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
p & m-Xylene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Styrene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Tribromomethane	mg/kg	0.001	NONE	< 0.0010	-	-	-
o-Xylene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Isopropylbenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Bromobenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
n-Propylbenzene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
2-Chlorotoluene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
4-Chlorotoluene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
tert-Butylbenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,2,4-Trimethylbenzene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
sec-Butylbenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,3-Dichlorobenzene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
p-Isopropyltoluene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
1,2-Dichlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,4-Dichlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Butylbenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
Hexachlorobutadiene	mg/kg	0.001	MCERTS	< 0.0010	-	-	-
1,2,3-Trichlorobenzene	mg/kg	0.001	ISO 17025	< 0.0010	-	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611647	1611648	1611649	1611650
Sample Reference				DS101	DS101	DS101	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.40-1.45	2.80-2.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	0.35	-	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	0.86	-	-	-
Pyrene	mg/kg	0.05	MCERTS	0.71	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.47	-	-	-
Chrysene	mg/kg	0.05	MCERTS	0.4	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.4	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.3	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.38	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611647	1611648	1611649	1611650
Sample Reference				DS101	DS101	DS101	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.40-1.45	2.80-2.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample I/S = Insufficient Sample

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Lab Sample Number				1611651	1611652	1611653	1611654
Sample Reference				DS103	DS102	DS102	CP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80-0.85	0.30-0.35	1.60-1.65	0.20-0.25
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	11	12	8.5
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.5	0.8
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	8.2	-
Total Sulphate as SO4	mg/kg	50	MCERTS	-	-	1400	-
Total Sulphate as SO4	%	0.005	MCERTS	-	-	0.145	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	790	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	0.4	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	397	-
Total Sulphur	%	0.005	MCERTS	-	-	0.074	-
Organic Matter	%	0.1	MCERTS	-	-	2.8	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	-	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	17	-	1.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	29	33	-	39
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	33	-	39
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	20	-	7.9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	35	31	-	2.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	29	-	4.3
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	90	84	-	15

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001

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Lab Sample Number				1611651	1611652	1611653	1611654
Sample Reference				DS103	DS102	DS102	CP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80-0.85	0.30-0.35	1.60-1.65	0.20-0.25
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	-	71
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	-	33
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	-	75

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	-	82
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	-	26
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	-	82

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	-	59

VOCs

Chloromethane	mg/kg	0.001	ISO 17025	-	-	-	-
Chloroethane	mg/kg	0.001	NONE	-	-	-	-
Bromomethane	mg/kg	0.001	ISO 17025	-	-	-	-
Vinyl Chloride	mg/kg	0.001	NONE	-	-	-	-
Trichlorofluoromethane	mg/kg	0.001	NONE	-	-	-	-
1,1-Dichloroethene	mg/kg	0.001	NONE	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	mg/kg	0.001	ISO 17025	-	-	-	-
Cis-1,2-dichloroethene	mg/kg	0.001	MCERTS	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	-	-
1,1-Dichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
2,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	-	-
Trichloromethane	mg/kg	0.001	MCERTS	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,1-Dichloropropene	mg/kg	0.001	MCERTS	-	-	-	-
Trans-1,2-dichloroethene	mg/kg	0.001	NONE	-	-	-	-
Benzene	mg/kg	0.001	MCERTS	-	-	-	-
Tetrachloromethane	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	-	-
Trichloroethene	mg/kg	0.001	MCERTS	-	-	-	-
Dibromomethane	mg/kg	0.001	MCERTS	-	-	-	-
Bromodichloromethane	mg/kg	0.001	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611651	1611652	1611653	1611654
Sample Reference				DS103	DS102	DS102	CP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80-0.85	0.30-0.35	1.60-1.65	0.20-0.25
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Cis-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	-	-
Trans-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	-	-
Toluene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,3-Dichloropropane	mg/kg	0.001	ISO 17025	-	-	-	-
Dibromochloromethane	mg/kg	0.001	ISO 17025	-	-	-	-
Tetrachloroethene	mg/kg	0.001	NONE	-	-	-	-
1,2-Dibromoethane	mg/kg	0.001	ISO 17025	-	-	-	-
Chlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
p & m-Xylene	mg/kg	0.001	MCERTS	-	-	-	-
Styrene	mg/kg	0.001	MCERTS	-	-	-	-
Tribromomethane	mg/kg	0.001	NONE	-	-	-	-
o-Xylene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	-	-
Isopropylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
Bromobenzene	mg/kg	0.001	MCERTS	-	-	-	-
n-Propylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
2-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	-	-
4-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
tert-Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,2,4-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
sec-Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.001	ISO 17025	-	-	-	-
p-Isopropyltoluene	mg/kg	0.001	ISO 17025	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.001	ISO 17025	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
Hexachlorobutadiene	mg/kg	0.001	MCERTS	-	-	-	-
1,2,3-Trichlorobenzene	mg/kg	0.001	ISO 17025	-	-	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611651	1611652	1611653	1611654
Sample Reference				DS103	DS102	DS102	CP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80-0.85	0.30-0.35	1.60-1.65	0.20-0.25
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	< 0.001

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-	< 0.007

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Lab Sample Number				1611651	1611652	1611653	1611654
Sample Reference				DS103	DS102	DS102	CP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80-0.85	0.30-0.35	1.60-1.65	0.20-0.25
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611655	1611656	1611657	1611658
Sample Reference				CP103	CP103	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.55	4.20-4.25	0.30-0.35	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	59	5.6	18
Total mass of sample received	kg	0.001	NONE	0.8	0.5	0.8	0.8
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	-
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	-	7.5	10.9	-
Total Sulphate as SO4	mg/kg	50	MCERTS	-	4500	13000	-
Total Sulphate as SO4	%	0.005	MCERTS	-	0.448	1.26	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	1600	2300	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.78	1.1	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	776	1140	-
Total Sulphur	%	0.005	MCERTS	-	3.11	1.19	-
Organic Matter	%	0.1	MCERTS	-	15	-	-
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	0.83	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.25	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.7	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.6	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.31	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	0.36	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.27	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.33	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.31	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	3.96	< 0.80
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	-	5.2	13
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	-	0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	38	-	43	32
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	38	-	43	32
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	-	9.4	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	36	-	19	31
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	-	4.9	29
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	-	50	96
Monoaromatics & Oxygenates							
Benzene	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611655	1611656	1611657	1611658
Sample Reference				CP103	CP103	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.55	4.20-4.25	0.30-0.35	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Toluene	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	320	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	-	160	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	330	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	11	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	510	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	-	280	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	520	< 10

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	-	440	< 10

VOCs

Chloromethane	mg/kg	0.001	ISO 17025	-	-	-	-
Chloroethane	mg/kg	0.001	NONE	-	-	-	-
Bromomethane	mg/kg	0.001	ISO 17025	-	-	-	-
Vinyl Chloride	mg/kg	0.001	NONE	-	-	-	-
Trichlorofluoromethane	mg/kg	0.001	NONE	-	-	-	-
1,1-Dichloroethene	mg/kg	0.001	NONE	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	mg/kg	0.001	ISO 17025	-	-	-	-
Cis-1,2-dichloroethene	mg/kg	0.001	MCERTS	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	-	-
1,1-Dichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
2,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	-	-
Trichloromethane	mg/kg	0.001	MCERTS	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,1-Dichloropropene	mg/kg	0.001	MCERTS	-	-	-	-
Trans-1,2-dichloroethene	mg/kg	0.001	NONE	-	-	-	-
Benzene	mg/kg	0.001	MCERTS	-	-	-	-
Tetrachloromethane	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	-	-
Trichloroethene	mg/kg	0.001	MCERTS	-	-	-	-
Dibromomethane	mg/kg	0.001	MCERTS	-	-	-	-
Bromodichloromethane	mg/kg	0.001	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611655	1611656	1611657	1611658
Sample Reference				CP103	CP103	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.55	4.20-4.25	0.30-0.35	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Cis-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	-	-
Trans-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	-	-
Toluene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,3-Dichloropropane	mg/kg	0.001	ISO 17025	-	-	-	-
Dibromochloromethane	mg/kg	0.001	ISO 17025	-	-	-	-
Tetrachloroethene	mg/kg	0.001	NONE	-	-	-	-
1,2-Dibromoethane	mg/kg	0.001	ISO 17025	-	-	-	-
Chlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
p & m-Xylene	mg/kg	0.001	MCERTS	-	-	-	-
Styrene	mg/kg	0.001	MCERTS	-	-	-	-
Tribromomethane	mg/kg	0.001	NONE	-	-	-	-
o-Xylene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	-	-
Isopropylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
Bromobenzene	mg/kg	0.001	MCERTS	-	-	-	-
n-Propylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
2-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	-	-
4-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
tert-Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,2,4-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
sec-Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.001	ISO 17025	-	-	-	-
p-Isopropyltoluene	mg/kg	0.001	ISO 17025	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.001	ISO 17025	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
Hexachlorobutadiene	mg/kg	0.001	MCERTS	-	-	-	-
1,2,3-Trichlorobenzene	mg/kg	0.001	ISO 17025	-	-	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611655	1611656	1611657	1611658
Sample Reference				CP103	CP103	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.55	4.20-4.25	0.30-0.35	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611655	1611656	1611657	1611658
Sample Reference				CP103	CP103	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.55	4.20-4.25	0.30-0.35	0.60-0.65
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample   I/S = Insufficient Sample

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611659	1611660	1611661	1611662
Sample Reference				DS109	DS109	DS109	DS110
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.20-1.25	1.80-1.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	12	8.7	32	6
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	10.6	-	10.3
Total Sulphate as SO4	mg/kg	50	MCERTS	-	5800	-	20000
Total Sulphate as SO4	%	0.005	MCERTS	-	0.582	-	2.01
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	1300	-	1600
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.65	-	0.82
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	648	-	823
Total Sulphur	%	0.005	MCERTS	-	0.826	-	1.23
Organic Matter	%	0.1	MCERTS	-	-	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	-	< 0.05	1.1
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.19
Fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	1.7
Pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	1.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	1
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.78
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.88
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.77
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.72
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.41
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.51

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	< 0.80	9.64

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	13	7.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	-	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	-	-	47	33
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	47	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	26	11
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	24	7.9
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	39	5.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	72	29

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001

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Lab Sample Number				1611659	1611660	1611661	1611662
Sample Reference				DS109	DS109	DS109	DS110
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.20-1.25	1.80-1.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Toluene	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	< 8.0	120
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	-	-	< 10	86
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	120

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	< 10	19
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	< 10	190
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	-	-	< 10	130
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	210

TPH (C35 - C40)	mg/kg	10	MCERTS	-	-	< 10	210

VOCs

Chloromethane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Chloroethane	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
Bromomethane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Vinyl Chloride	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
Trichlorofluoromethane	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
1,1-Dichloroethene	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Cis-1,2-dichloroethene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,1-Dichloroethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
2,2-Dichloropropane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Trichloromethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,1,1-Trichloroethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,2-Dichloroethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,1-Dichloropropene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Trans-1,2-dichloroethene	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
Benzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Tetrachloromethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,2-Dichloropropane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Trichloroethene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Dibromomethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Bromodichloromethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-

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Lab Sample Number				1611659	1611660	1611661	1611662
Sample Reference				DS109	DS109	DS109	DS110
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.20-1.25	1.80-1.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Cis-1,3-dichloropropene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Trans-1,3-dichloropropene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Toluene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,1,2-Trichloroethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,3-Dichloropropane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Dibromochloromethane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Tetrachloroethene	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
1,2-Dibromoethane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
Chlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
p & m-Xylene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Styrene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Tribromomethane	mg/kg	0.001	NONE	< 0.0010	< 0.0010	-	-
o-Xylene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Isopropylbenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Bromobenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
n-Propylbenzene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
2-Chlorotoluene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
4-Chlorotoluene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,3,5-Trimethylbenzene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
tert-Butylbenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,2,4-Trimethylbenzene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
sec-Butylbenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,3-Dichlorobenzene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
p-Isopropyltoluene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
1,2-Dichlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,4-Dichlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Butylbenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-
1,2,4-Trichlorobenzene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
Hexachlorobutadiene	mg/kg	0.001	MCERTS	< 0.0010	< 0.0010	-	-
1,2,3-Trichlorobenzene	mg/kg	0.001	ISO 17025	< 0.0010	< 0.0010	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-

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The results included within the report relate only to the sample(s) submitted for testing.

Lab Sample Number				1611659	1611660	1611661	1611662
Sample Reference				DS109	DS109	DS109	DS110
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.20-1.25	1.80-1.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	1.4	0.49	-	-
Anthracene	mg/kg	0.05	MCERTS	0.32	0.28	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	2.8	1.7	-	-
Pyrene	mg/kg	0.05	MCERTS	2.6	1.7	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.2	1.8	-	-
Chrysene	mg/kg	0.05	MCERTS	2.5	2.1	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.9	1.2	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.3	1	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	1.3	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.87	0.57	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.44	0.3	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	0.7	-	-

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611659	1611660	1611661	1611662
Sample Reference				DS109	DS109	DS109	DS110
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.45	1.20-1.25	1.80-1.85	0.50-0.55
Date Sampled				01/09/2020	01/09/2020	01/09/2020	01/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611663	1611664	1611665	1611666
Sample Reference				DS110	DS106B	DS106B	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80-2.85	0.60-0.65	0.90-0.95	0.40-0.45
Date Sampled				01/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	25	10	20	3.5
Total mass of sample received	kg	0.001	NONE	0.5	0.8	0.8	0.8

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	9.9	-	-
Total Sulphate as SO4	mg/kg	50	MCERTS	710	1200	-	-
Total Sulphate as SO4	%	0.005	MCERTS	0.071	0.118	-	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	440	310	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.22	0.16	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	218	156	-	-
Total Sulphur	%	0.005	MCERTS	0.036	0.132	-	-
Organic Matter	%	0.1	MCERTS	1.8	-	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.41
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	0.8	< 0.05	0.58
Pyrene	mg/kg	0.05	MCERTS	-	0.81	< 0.05	0.45
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.75	< 0.05	0.37
Chrysene	mg/kg	0.05	MCERTS	-	0.59	< 0.05	0.34
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.82	< 0.05	0.28
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.52	< 0.05	0.34
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.76	< 0.05	0.26
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.43	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.55	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	6.03	< 0.80	3.03

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	5.4	12	8.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	-	14	29	21
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	14	28	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	15	13	8
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	26	17	< 1.0
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	11	28	3.4
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	130	65	10

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001

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Lab Sample Number				1611663	1611664	1611665	1611666
Sample Reference				DS110	DS106B	DS106B	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80-2.85	0.60-0.65	0.90-0.95	0.40-0.45
Date Sampled				01/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Toluene	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	-	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0	2.1
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	23	< 10	22
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	-	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	30	< 10	31

TPH (C35 - C40)	mg/kg	10	MCERTS	-	< 10	< 10	< 10

VOCs

Chloromethane	mg/kg	0.001	ISO 17025	-	-	-	-
Chloroethane	mg/kg	0.001	NONE	-	-	-	-
Bromomethane	mg/kg	0.001	ISO 17025	-	-	-	-
Vinyl Chloride	mg/kg	0.001	NONE	-	-	-	-
Trichlorofluoromethane	mg/kg	0.001	NONE	-	-	-	-
1,1-Dichloroethene	mg/kg	0.001	NONE	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	mg/kg	0.001	ISO 17025	-	-	-	-
Cis-1,2-dichloroethene	mg/kg	0.001	MCERTS	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	-	-
1,1-Dichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
2,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	-	-
Trichloromethane	mg/kg	0.001	MCERTS	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,1-Dichloropropene	mg/kg	0.001	MCERTS	-	-	-	-
Trans-1,2-dichloroethene	mg/kg	0.001	NONE	-	-	-	-
Benzene	mg/kg	0.001	MCERTS	-	-	-	-
Tetrachloromethane	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	-	-
Trichloroethene	mg/kg	0.001	MCERTS	-	-	-	-
Dibromomethane	mg/kg	0.001	MCERTS	-	-	-	-
Bromodichloromethane	mg/kg	0.001	MCERTS	-	-	-	-

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Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611663	1611664	1611665	1611666
Sample Reference				DS110	DS106B	DS106B	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80-2.85	0.60-0.65	0.90-0.95	0.40-0.45
Date Sampled				01/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Cis-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	-	-
Trans-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	-	-
Toluene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.001	MCERTS	-	-	-	-
1,3-Dichloropropane	mg/kg	0.001	ISO 17025	-	-	-	-
Dibromochloromethane	mg/kg	0.001	ISO 17025	-	-	-	-
Tetrachloroethene	mg/kg	0.001	NONE	-	-	-	-
1,2-Dibromoethane	mg/kg	0.001	ISO 17025	-	-	-	-
Chlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
p & m-Xylene	mg/kg	0.001	MCERTS	-	-	-	-
Styrene	mg/kg	0.001	MCERTS	-	-	-	-
Tribromomethane	mg/kg	0.001	NONE	-	-	-	-
o-Xylene	mg/kg	0.001	MCERTS	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	-	-
Isopropylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
Bromobenzene	mg/kg	0.001	MCERTS	-	-	-	-
n-Propylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
2-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	-	-
4-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
tert-Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,2,4-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	-	-
sec-Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.001	ISO 17025	-	-	-	-
p-Isopropyltoluene	mg/kg	0.001	ISO 17025	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
Butylbenzene	mg/kg	0.001	MCERTS	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.001	ISO 17025	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.001	MCERTS	-	-	-	-
Hexachlorobutadiene	mg/kg	0.001	MCERTS	-	-	-	-
1,2,3-Trichlorobenzene	mg/kg	0.001	ISO 17025	-	-	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-

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Lab Sample Number				1611663	1611664	1611665	1611666
Sample Reference				DS110	DS106B	DS106B	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80-2.85	0.60-0.65	0.90-0.95	0.40-0.45
Date Sampled				01/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-

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Lab Sample Number				1611663	1611664	1611665	1611666
Sample Reference				DS110	DS106B	DS106B	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80-2.85	0.60-0.65	0.90-0.95	0.40-0.45
Date Sampled				01/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample I/S = Insufficient Sample

Lab Sample Number				1611667	1611668	1611669	1611670
Sample Reference				DS107	DS108	CP102	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.75	0.60-0.65	0.60-0.65	1.20-1.25
Date Sampled				02/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	4.3	4.8	5.5	27
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	12.2	-	8.1
Total Sulphate as SO4	mg/kg	50	MCERTS	-	11000	-	2600
Total Sulphate as SO4	%	0.005	MCERTS	-	1.11	-	0.261
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	380	-	1400
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.19	-	0.7
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	190	-	702
Total Sulphur	%	0.005	MCERTS	-	0.694	-	0.126
Organic Matter	%	0.1	MCERTS	-	-	-	4.8

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	3	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	2.2	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.5	13	-	0.23
Anthracene	mg/kg	0.05	MCERTS	0.17	2.1	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	2.3	11	-	0.41
Pyrene	mg/kg	0.05	MCERTS	1.8	7.9	-	0.35
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.4	5	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	1.1	4.4	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.3	5.2	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.95	2.2	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1	3.4	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.56	1.8	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.21	0.6	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.68	2.1	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	12.9	63.1	-	0.99

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	13	-	24
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	0.3
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	21	20	-	39
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	20	-	39
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.4	11	-	32
Lead (aqua regia extractable)	mg/kg	1	MCERTS	2.1	7.6	-	59
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.2	9	-	31
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	16	32	-	130

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001

Lab Sample Number				1611667	1611668	1611669	1611670
Sample Reference				DS107	DS108	CP102	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.75	0.60-0.65	0.60-0.65	1.20-1.25
Date Sampled				02/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	-	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	9.3	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	40	-	14
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	17	35	-	16
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	-	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	25	84	-	32

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	-	< 10

VOCs

Chloromethane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Chloroethane	mg/kg	0.001	NONE	-	-	< 0.0010	-
Bromomethane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Vinyl Chloride	mg/kg	0.001	NONE	-	-	< 0.0010	-
Trichlorofluoromethane	mg/kg	0.001	NONE	-	-	< 0.0010	-
1,1-Dichloroethene	mg/kg	0.001	NONE	-	-	< 0.0010	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Cis-1,2-dichloroethene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,1-Dichloroethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
2,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Trichloromethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,1,1-Trichloroethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,2-Dichloroethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,1-Dichloropropene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Trans-1,2-dichloroethene	mg/kg	0.001	NONE	-	-	< 0.0010	-
Benzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Tetrachloromethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,2-Dichloropropane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Trichloroethene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Dibromomethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Bromodichloromethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-

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Lab Sample Number				1611667	1611668	1611669	1611670
Sample Reference				DS107	DS108	CP102	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.75	0.60-0.65	0.60-0.65	1.20-1.25
Date Sampled				02/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Cis-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Trans-1,3-dichloropropene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Toluene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,1,2-Trichloroethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,3-Dichloropropane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Dibromochloromethane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Tetrachloroethene	mg/kg	0.001	NONE	-	-	< 0.0010	-
1,2-Dibromoethane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
Chlorobenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,1,1,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
p & m-Xylene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Styrene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Tribromomethane	mg/kg	0.001	NONE	-	-	< 0.0010	-
o-Xylene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,1,2,2-Tetrachloroethane	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Isopropylbenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Bromobenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
n-Propylbenzene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
2-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
4-Chlorotoluene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,3,5-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
tert-Butylbenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,2,4-Trimethylbenzene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
sec-Butylbenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,3-Dichlorobenzene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
p-Isopropyltoluene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
1,2-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,4-Dichlorobenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Butylbenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,2-Dibromo-3-chloropropane	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-
1,2,4-Trichlorobenzene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
Hexachlorobutadiene	mg/kg	0.001	MCERTS	-	-	< 0.0010	-
1,2,3-Trichlorobenzene	mg/kg	0.001	ISO 17025	-	-	< 0.0010	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	< 0.3	-

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Lab Sample Number				1611667	1611668	1611669	1611670
Sample Reference				DS107	DS108	CP102	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.75	0.60-0.65	0.60-0.65	1.20-1.25
Date Sampled				02/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	< 0.1	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	0.24	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	-	0.29	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	3.2	-
Anthracene	mg/kg	0.05	MCERTS	-	-	0.4	-
Carbazole	mg/kg	0.3	MCERTS	-	-	0.4	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	0.5	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	3.3	-
Pyrene	mg/kg	0.05	MCERTS	-	-	2.7	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	2.3	-
Chrysene	mg/kg	0.05	MCERTS	-	-	1.9	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	2	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	1.1	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	1.8	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	1	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	0.38	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	1.2	-

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-

Analytical Report Number: 20-28298
Project / Site name: Former Glanford House, Flixborough
Your Order No: DS56608

Lab Sample Number				1611667	1611668	1611669	1611670
Sample Reference				DS107	DS108	CP102	CP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-0.75	0.60-0.65	0.60-0.65	1.20-1.25
Date Sampled				02/09/2020	02/09/2020	02/09/2020	02/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-28298
Project / Site name: Former Glanford House, Flixborough

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1611647	DS101	None Supplied	0.40-0.45	Brown clay and sand with chalk and gravel
1611648	DS101	None Supplied	1.40-1.45	Brown clay and sand with vegetation.
1611649	DS101	None Supplied	2.80-2.85	Brown clay with vegetation and gravel
1611650	DS103	None Supplied	0.50-0.55	Brown clay and sand with vegetation and gravel
1611651	DS103	None Supplied	0.80-0.85	Brown clay and sand.
1611652	DS102	None Supplied	0.30-0.35	Brown loam and clay with vegetation and gravel
1611653	DS102	None Supplied	1.60-1.65	Brown clay and sand.
1611654	CP103	None Supplied	0.20-0.25	Light grey clay and sand with gravel.
1611655	CP103	None Supplied	0.50-0.55	Brown clay.
1611656	CP103	None Supplied	4.20-4.25	Brown clay and sand with vegetation.
1611657	DS105	None Supplied	0.30-0.35	Grey sand with rubble.
1611658	DS105	None Supplied	0.60-0.65	Brown clay and sand.
1611659	DS109	None Supplied	0.40-0.45	Brown sandy clay with gravel.
1611660	DS109	None Supplied	1.20-1.25	Brown sandy clay with rubble.
1611661	DS109	None Supplied	1.80-1.85	Brown clay.
1611662	DS110	None Supplied	0.50-0.55	Brown sand with gravel and tar.
1611663	DS110	None Supplied	2.80-2.85	Brown clay.
1611664	DS106B	None Supplied	0.60-0.65	Light brown sandy loam with vegetation and gravel.
1611665	DS106B	None Supplied	0.90-0.95	Brown clay.
1611666	DS104	None Supplied	0.40-0.45	Light grey gravel.**
1611667	DS107	None Supplied	0.70-0.75	Light grey sand with rubble.
1611668	DS108	None Supplied	0.60-0.65	Brown sand with rubble.
1611669	CP102	None Supplied	0.60-0.65	Brown sand with rubble.
1611670	CP102	None Supplied	1.20-1.25	Brown clay and sand with gravel.

**Non MCERTS Matrix

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	**Analytical Method Description**	**Analytical Method Reference**	**Method number**	**Wet / Dry Analysis**	**Accreditation Status**
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

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The results included within the report are representative of the samples submitted for analysis.

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPH Chromatogram in Leachate	TPH Chromatogram in Leachate.	In-house method	L070-PL	W	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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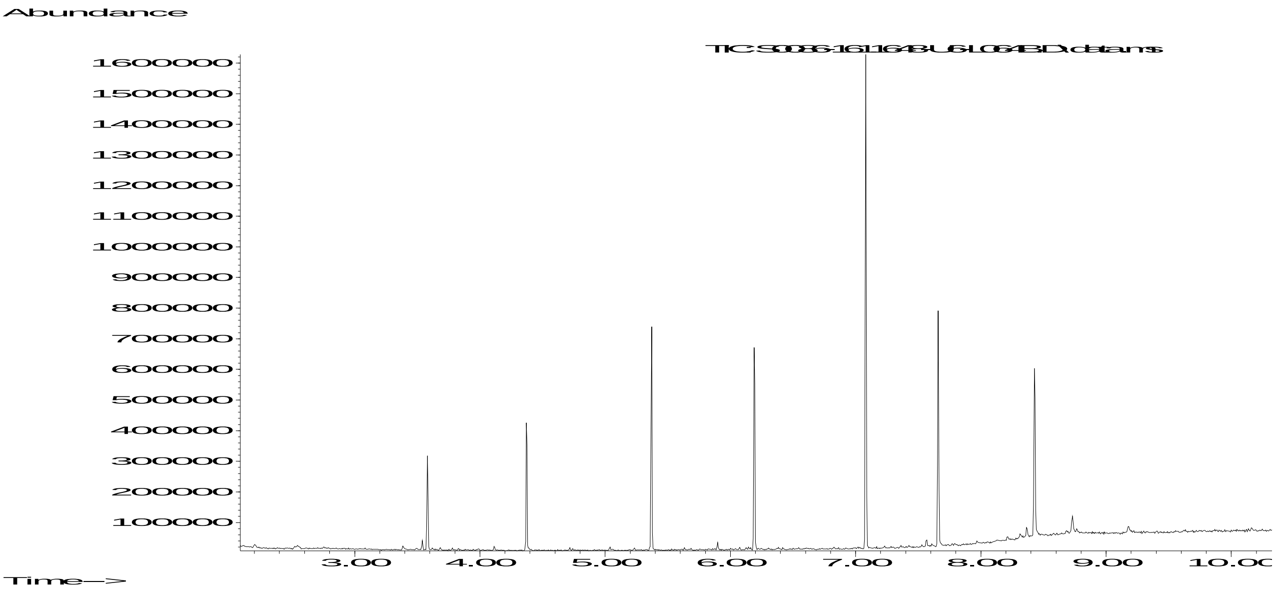
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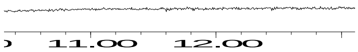
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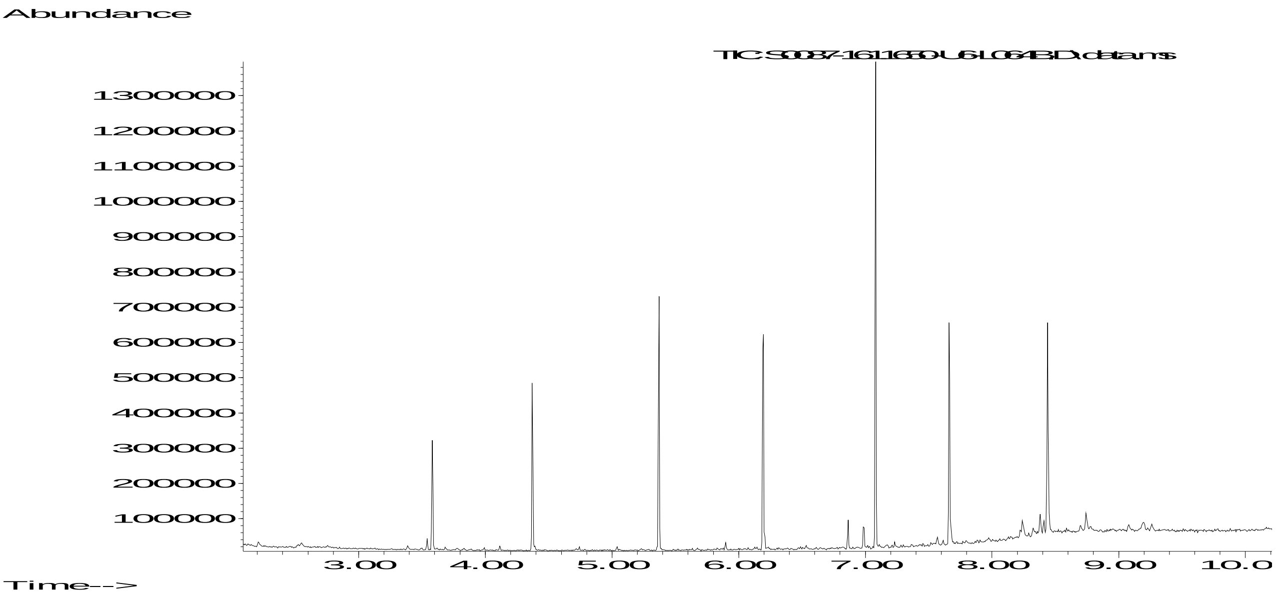
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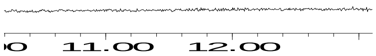
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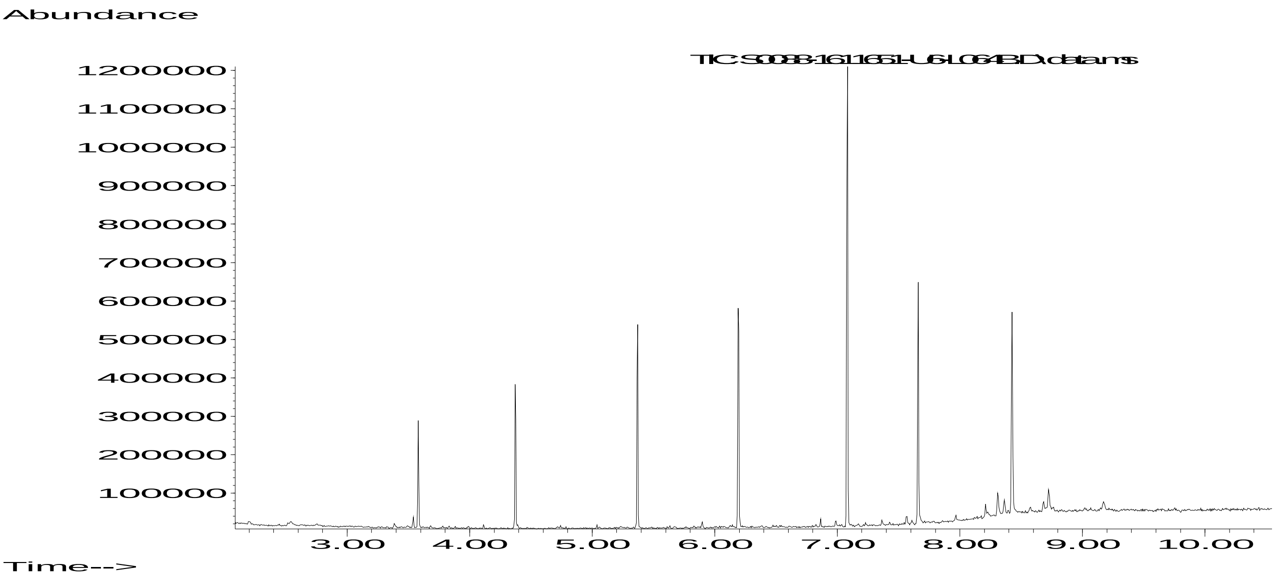
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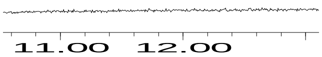
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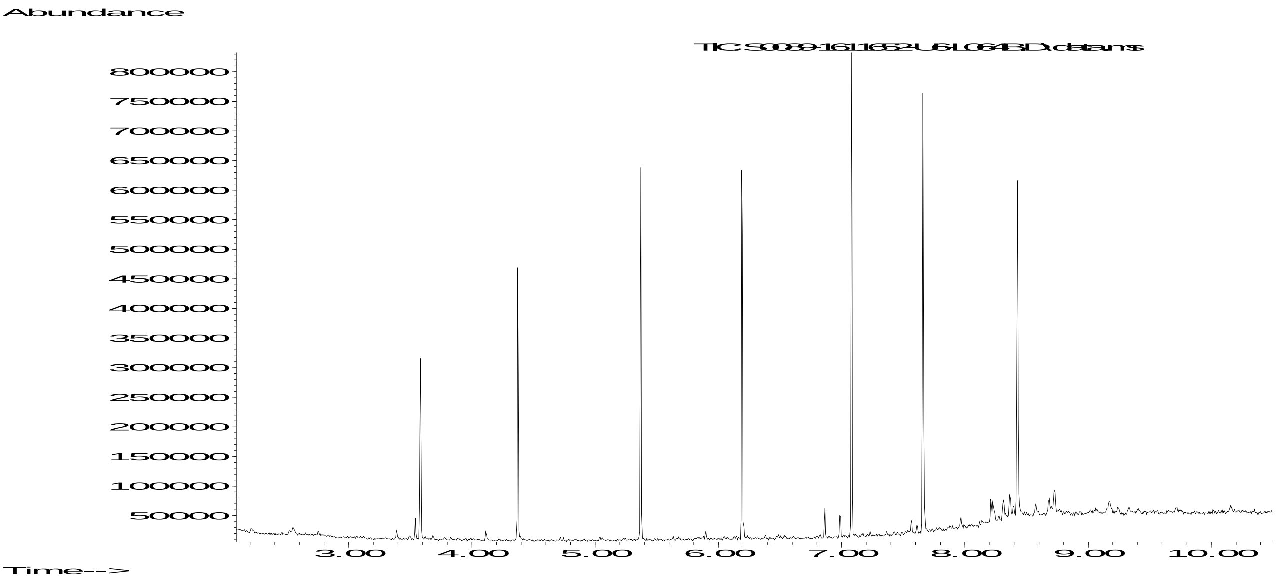
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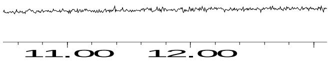
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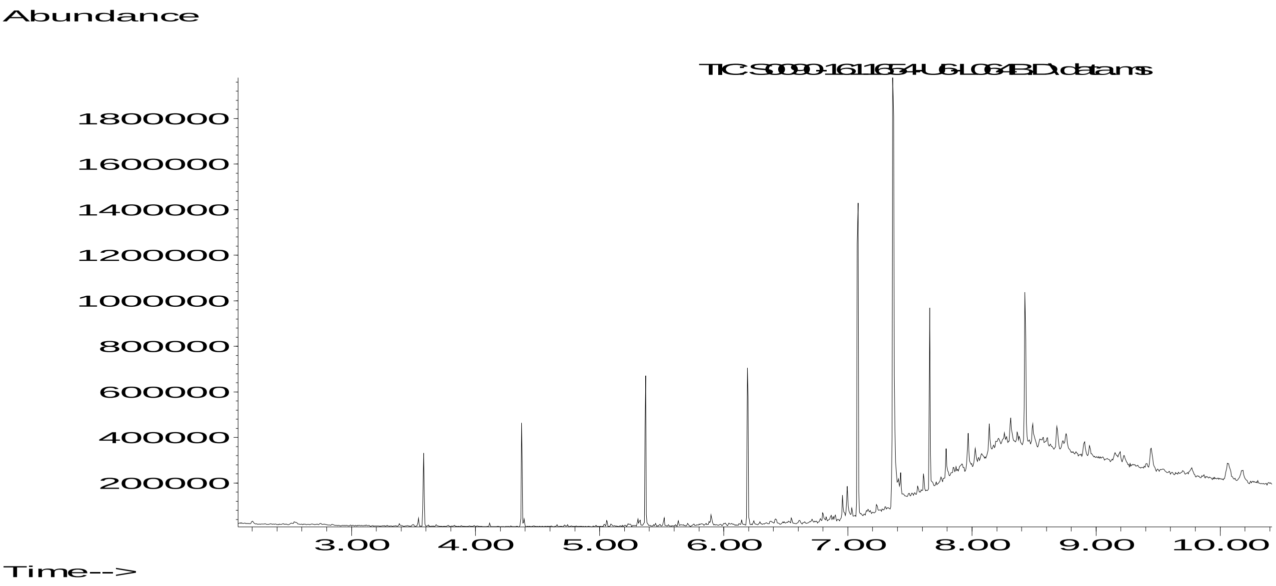
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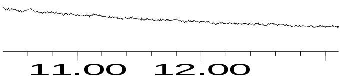
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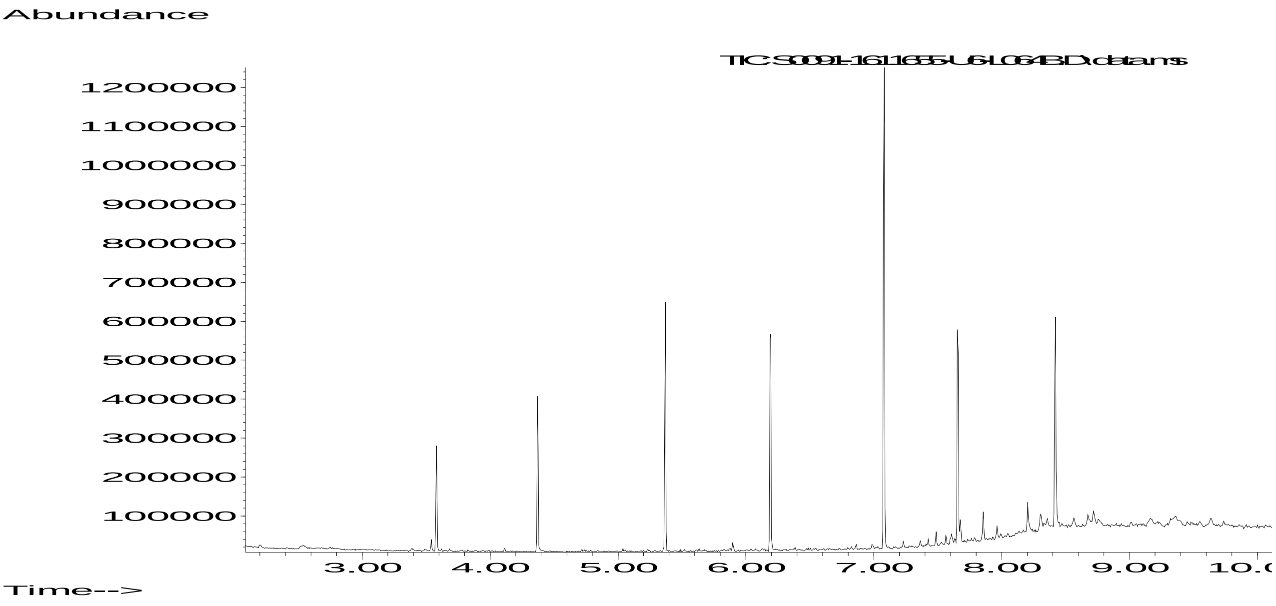
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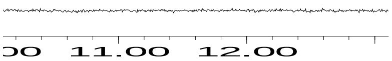
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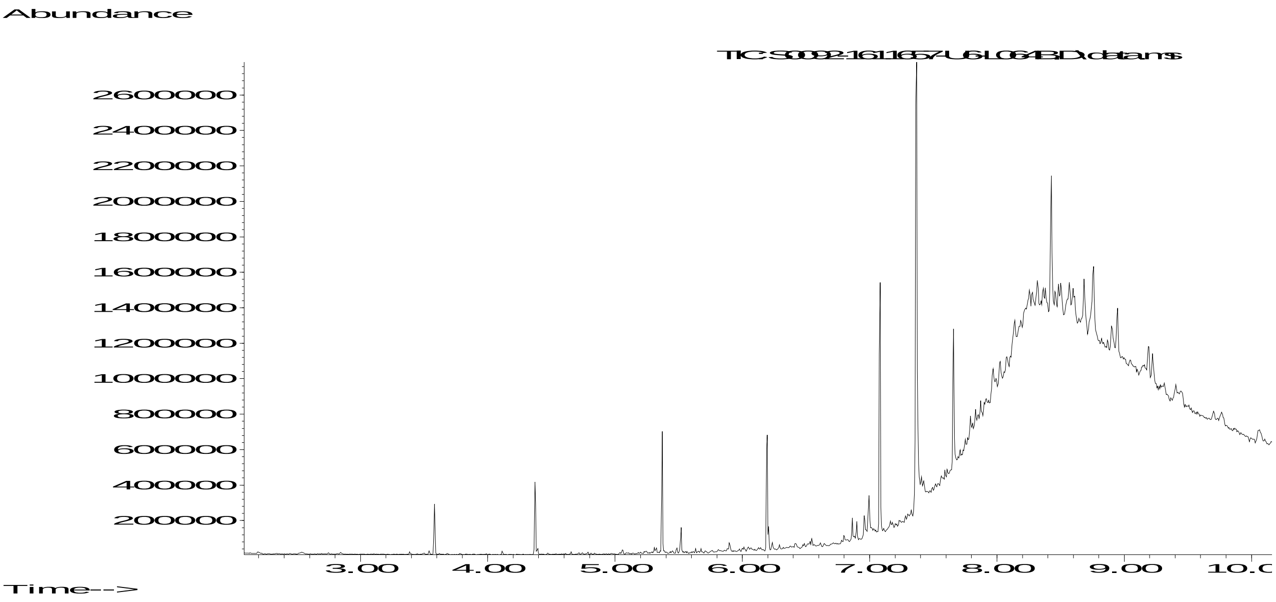
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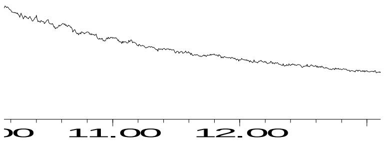
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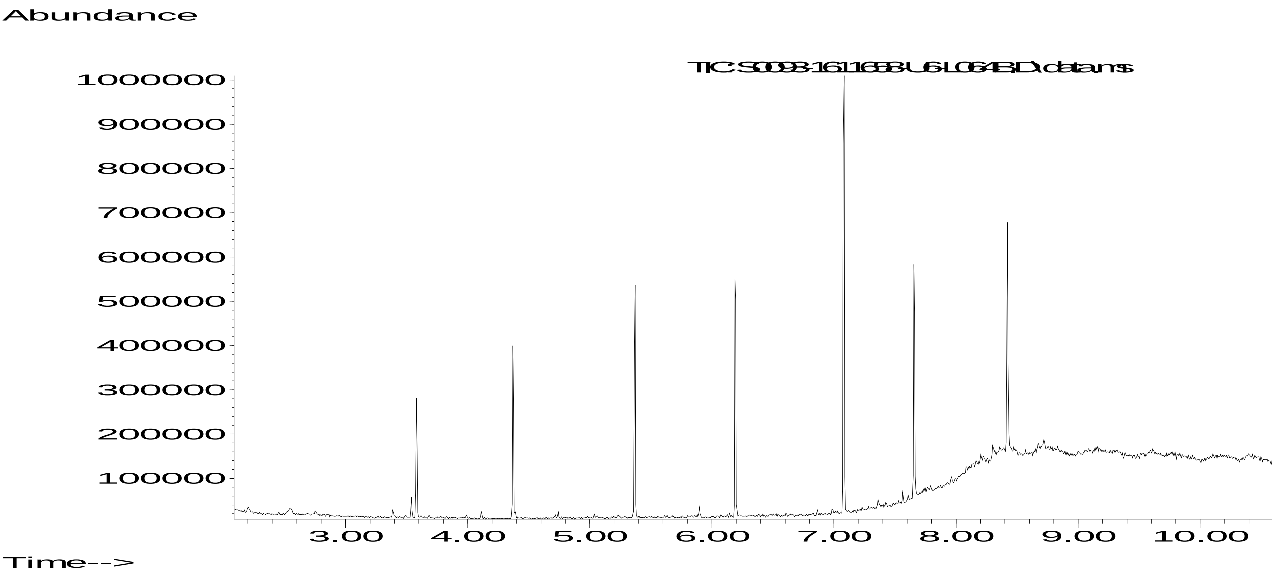
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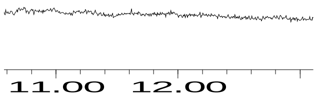
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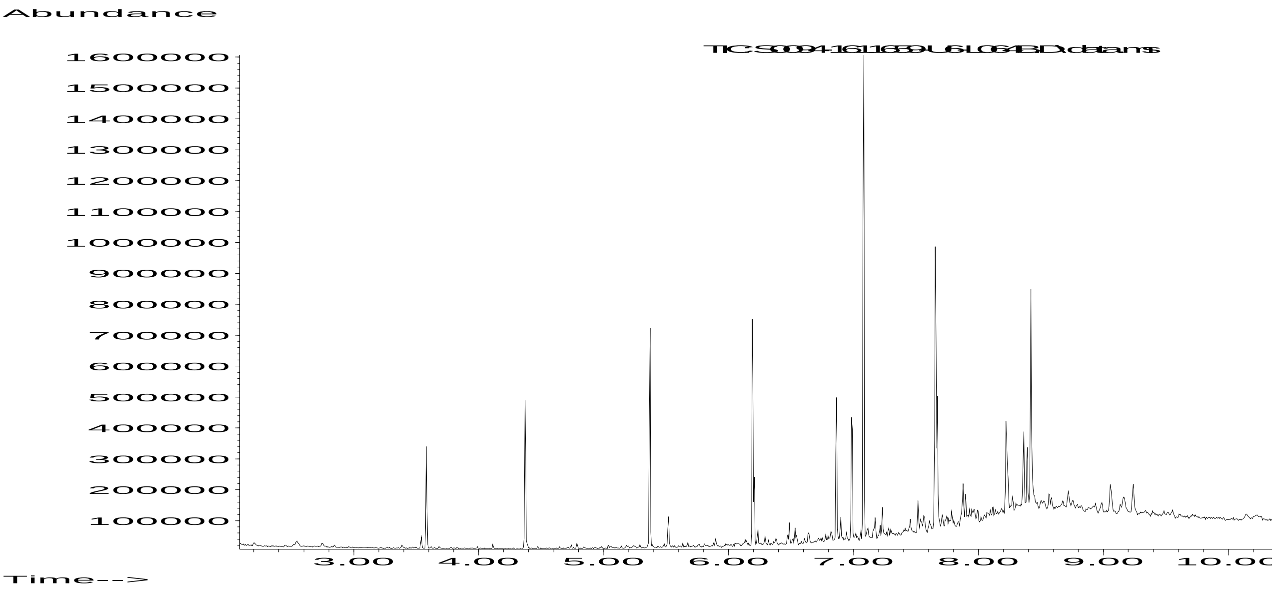
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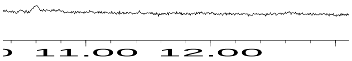
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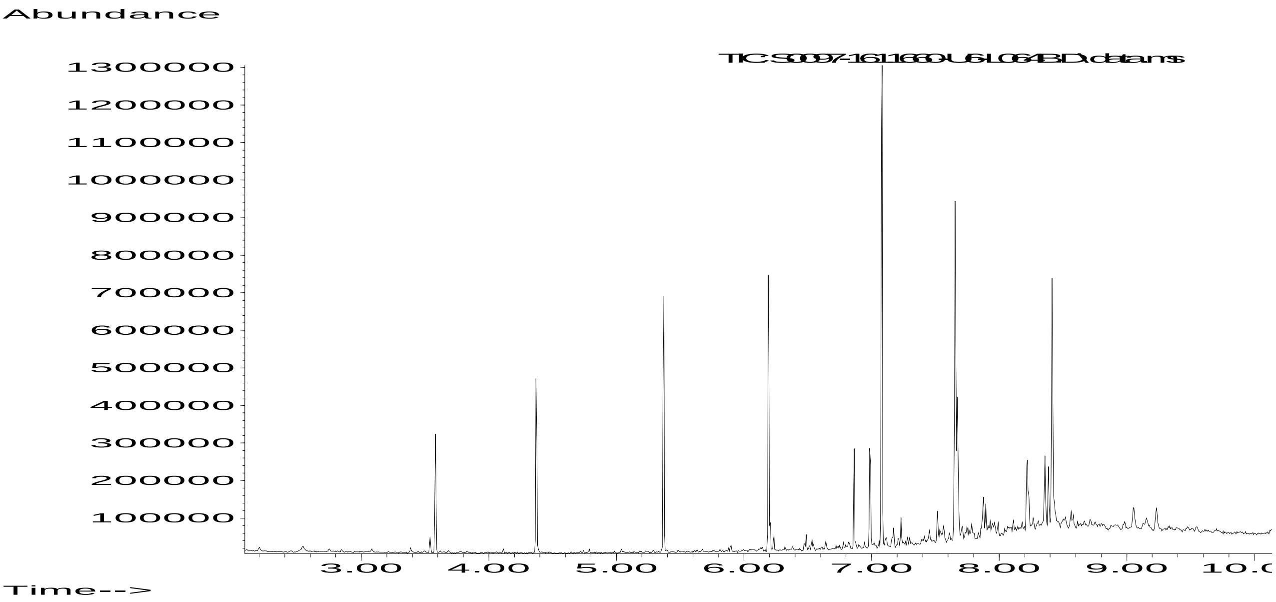
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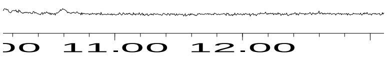

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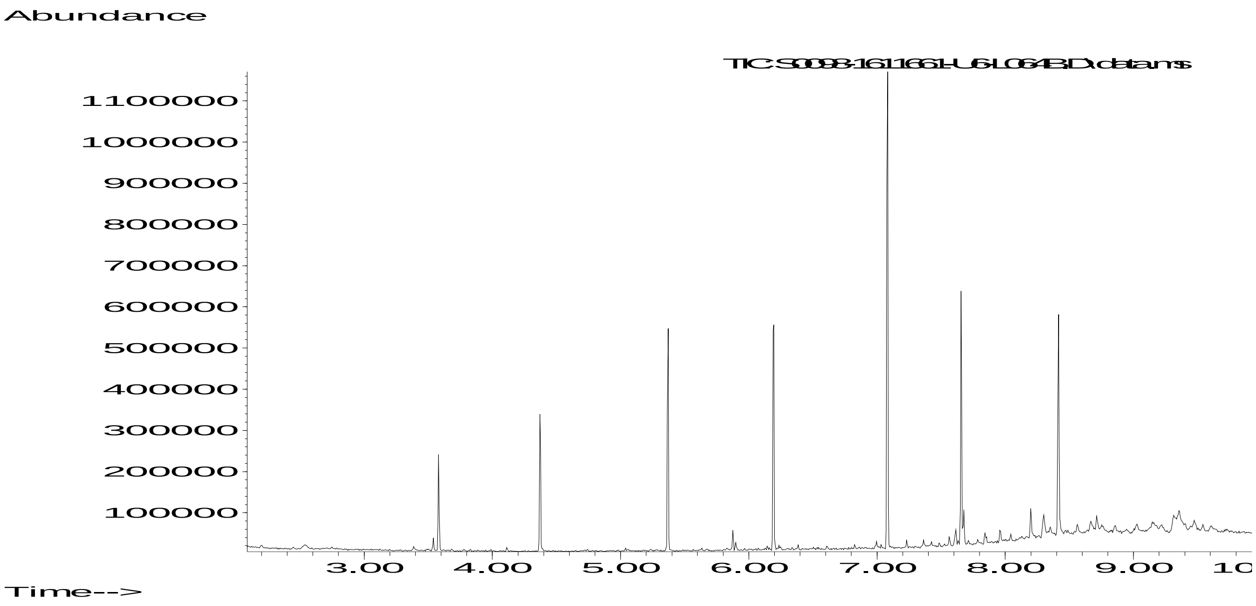
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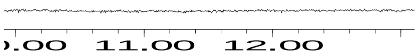
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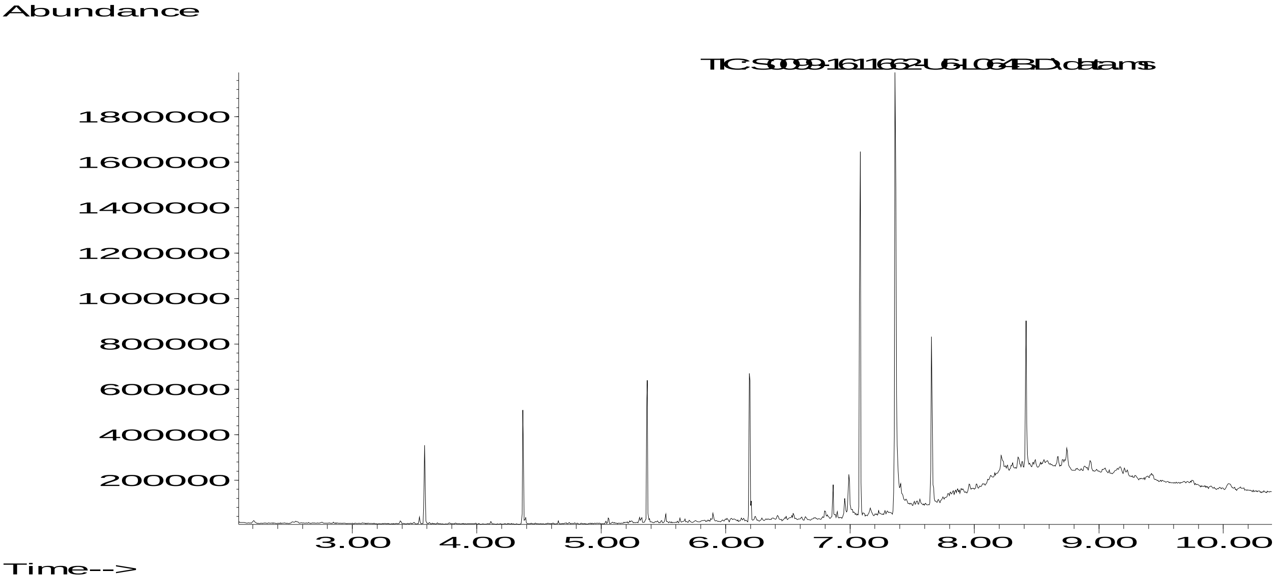
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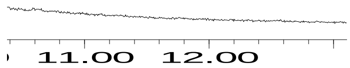
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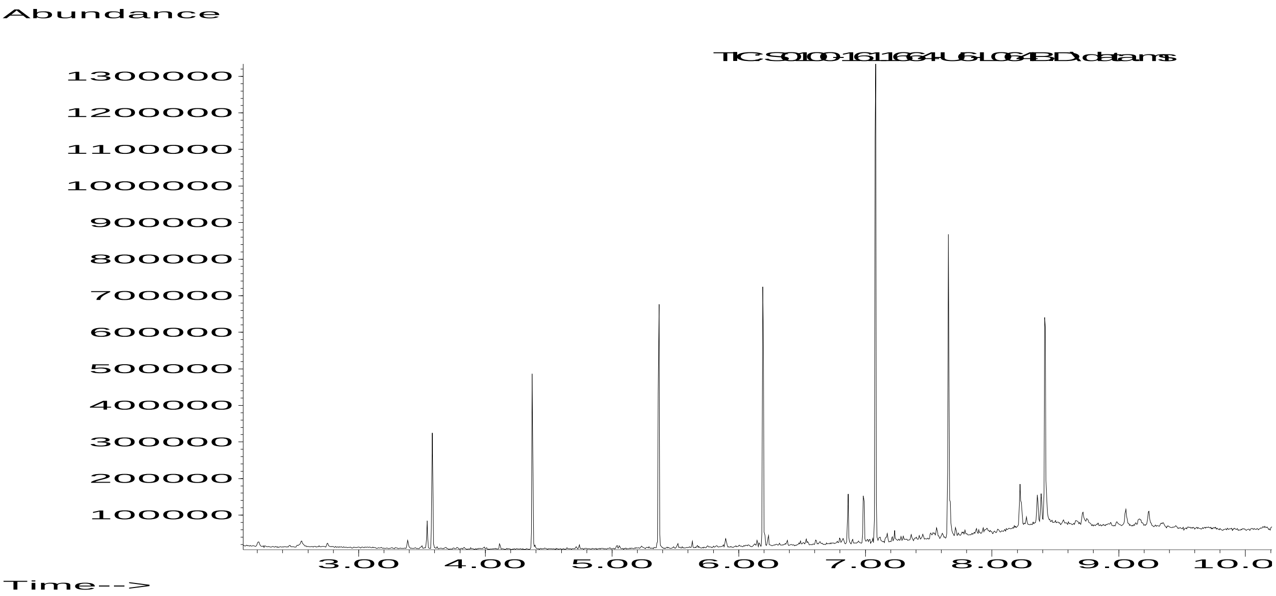
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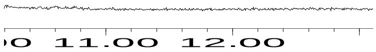
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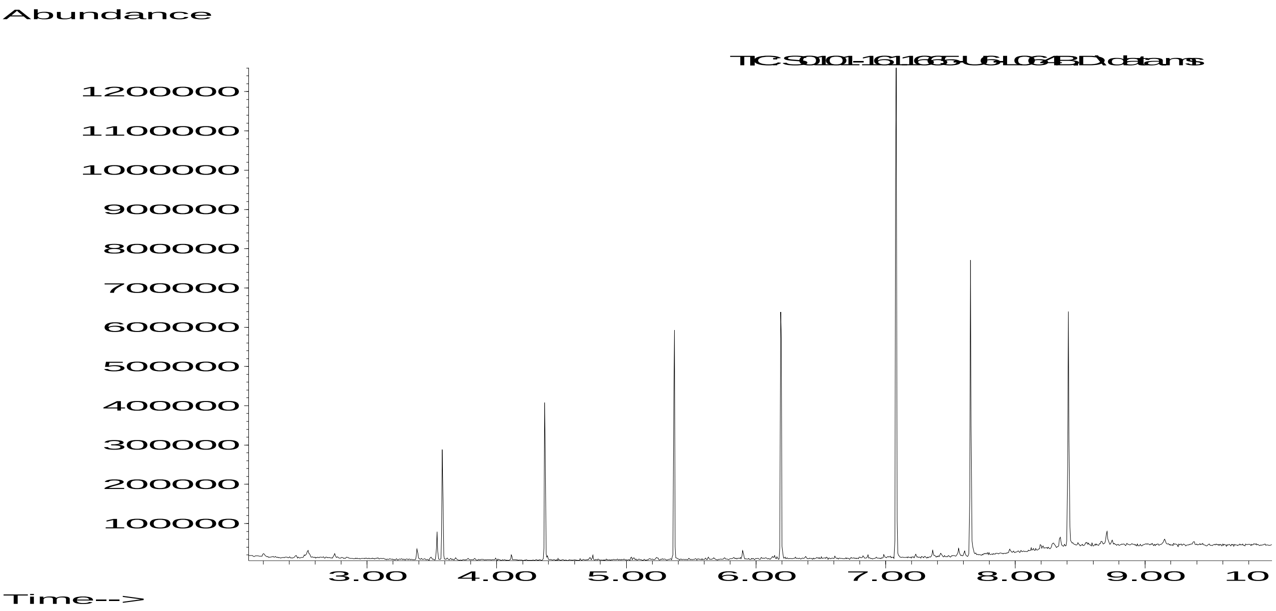
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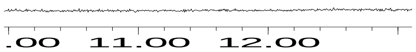
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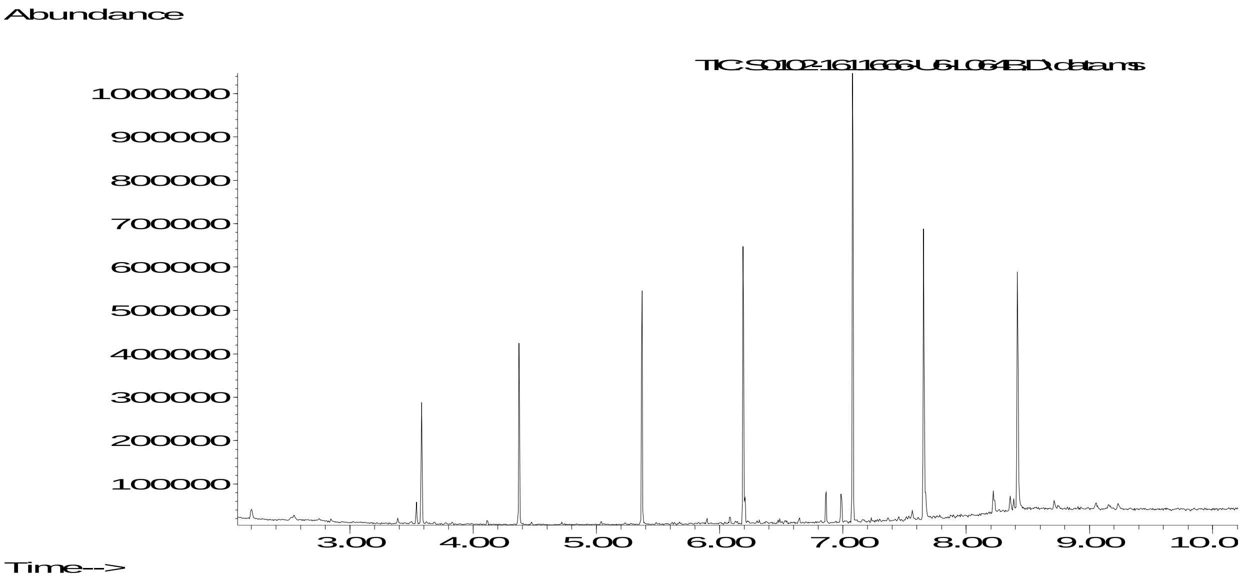
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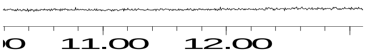
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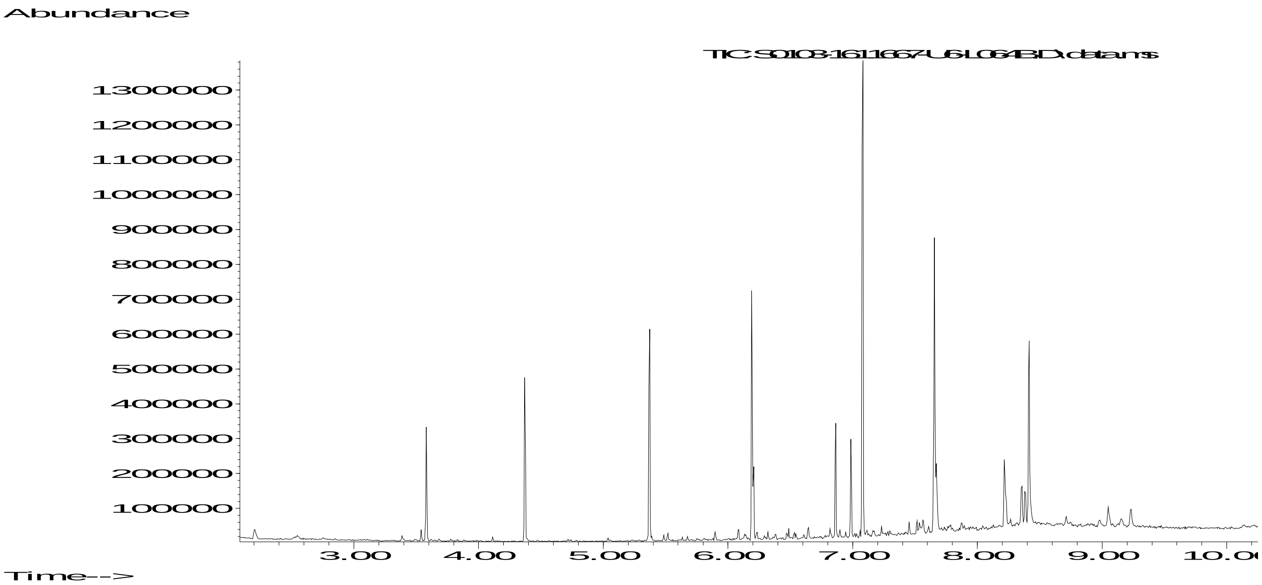

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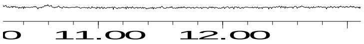
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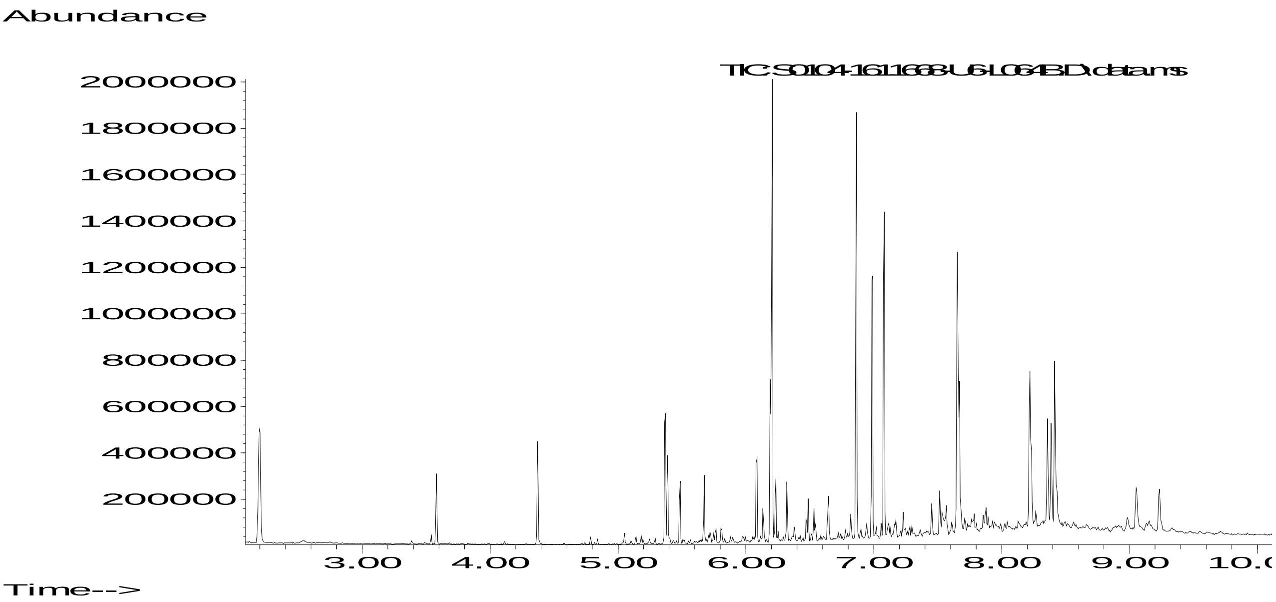
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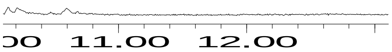
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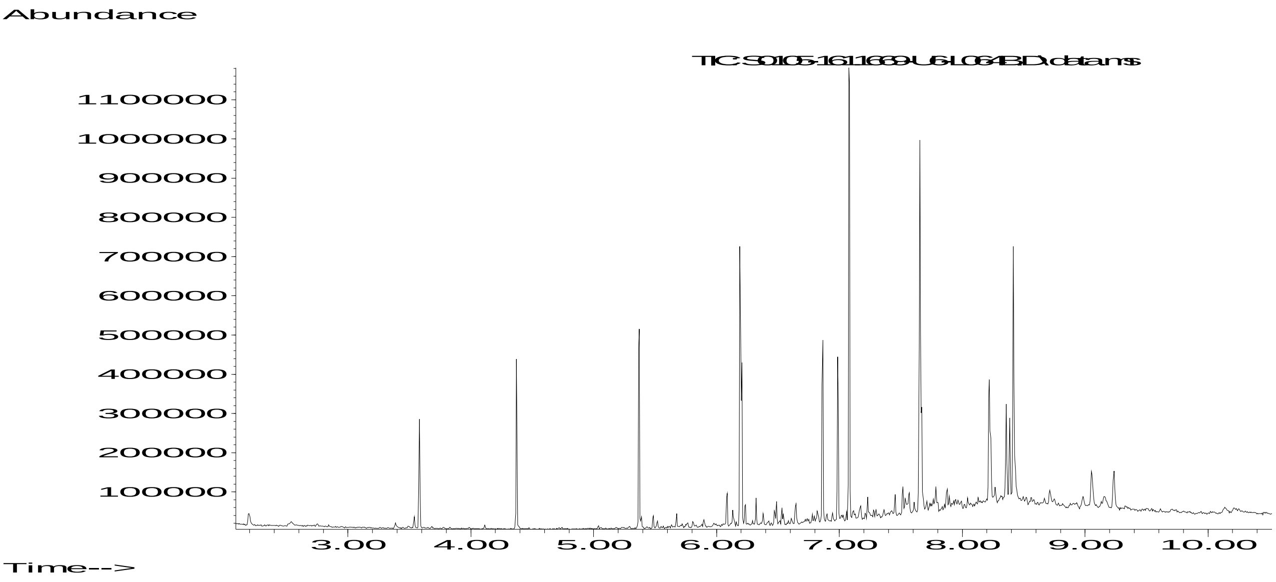
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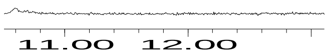
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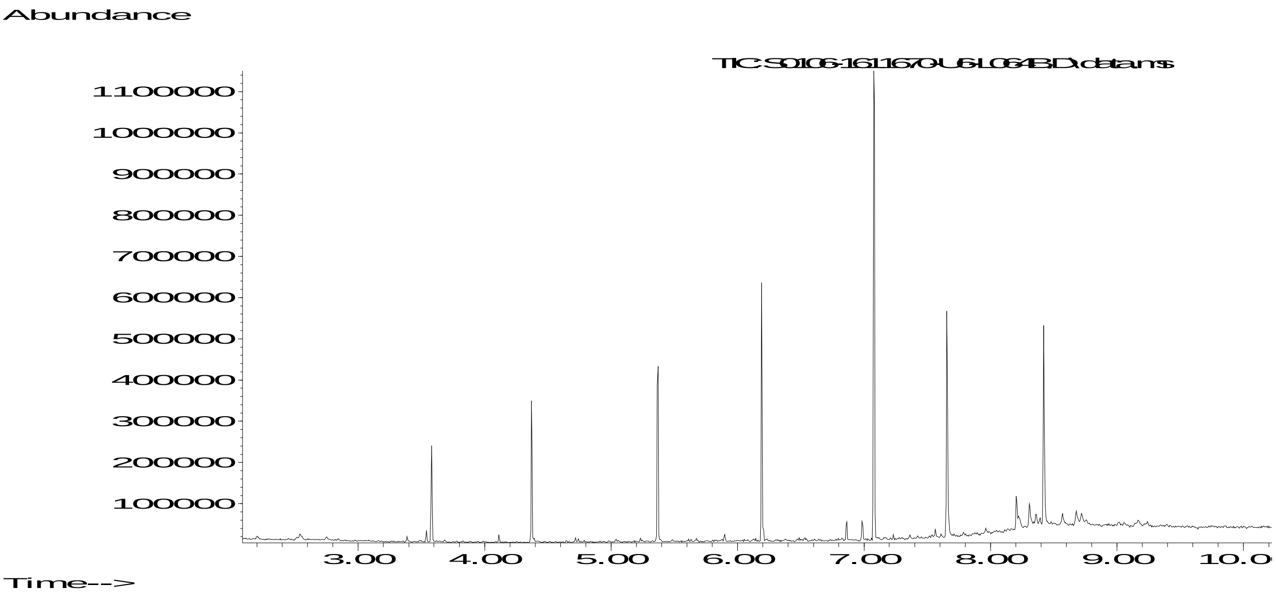
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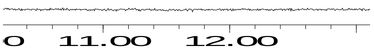
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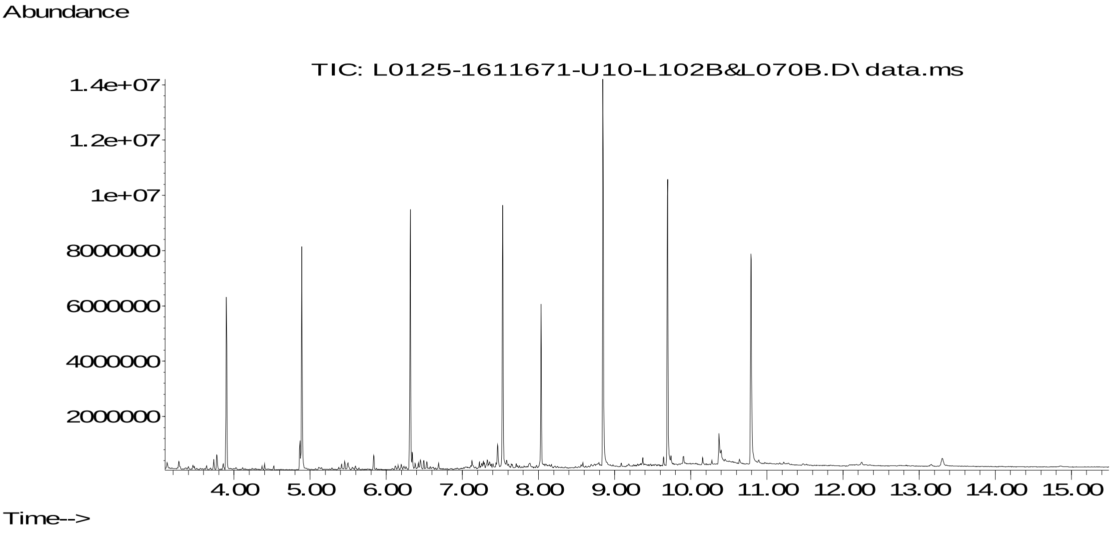
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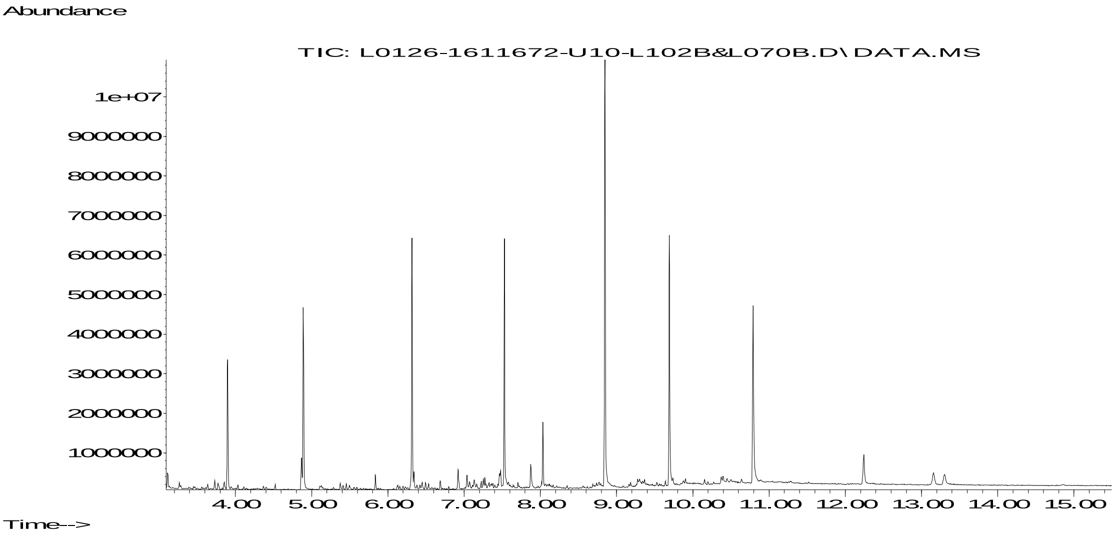
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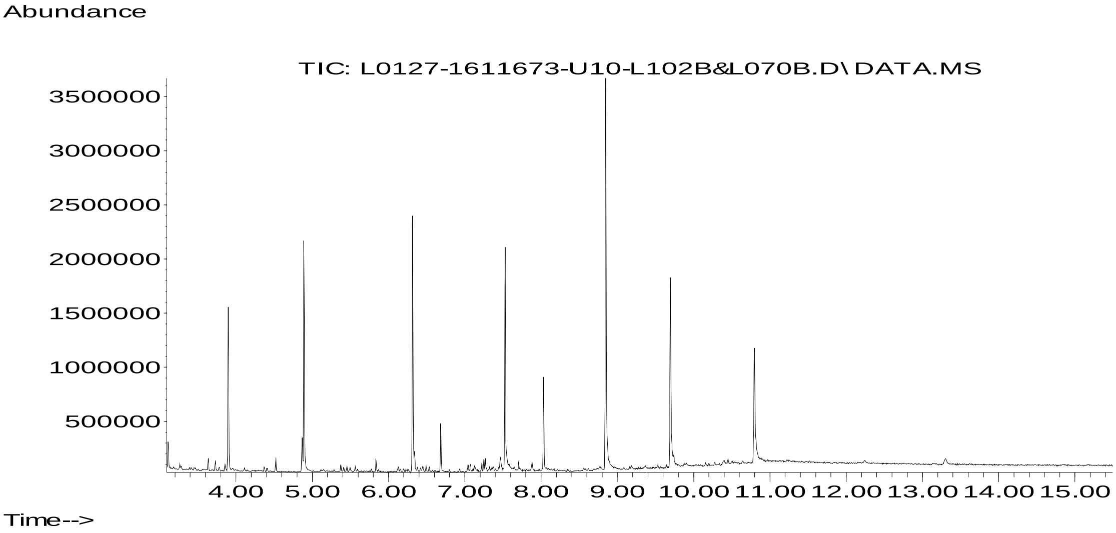
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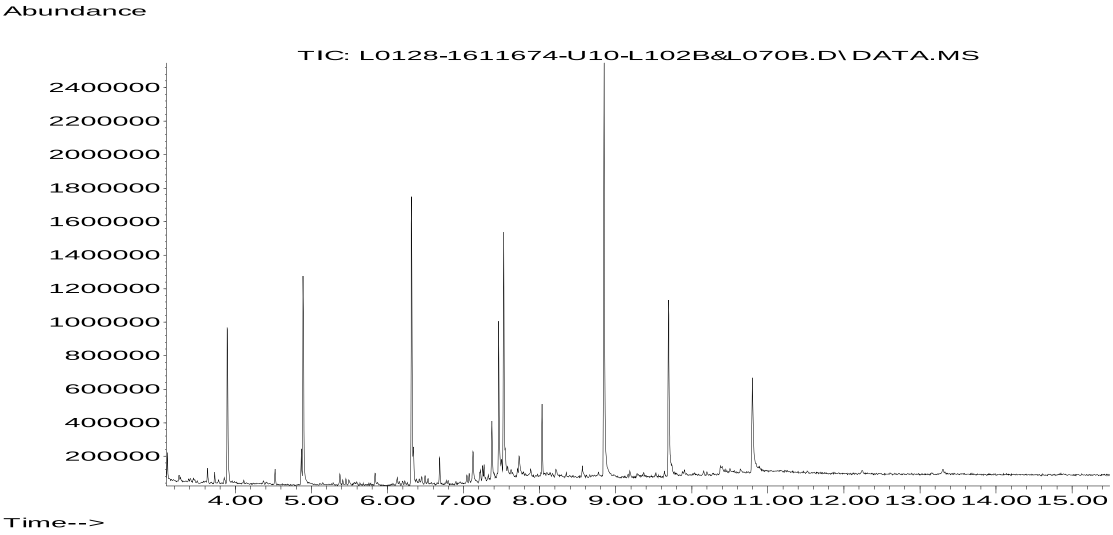
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Appendix F – Groundwater Chemical Analysis Results

4041

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Analytical Report Number : 20-29059

Project / Site name:	Former Glanford House, Flixborough	**Samples received on:**	09/09/2020
Your job number:	20-1405.01	**Samples instructed on/ Analysis started on:**	09/09/2020
Your order number:	DS56696	**Analysis completed by:**	16/09/2020
Report Issue Number:	1	**Report issued on:**	16/09/2020
Samples Analysed:	1 water sample		

[redacted]

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-29059
Project / Site name: Former Glanford House, Flixborough

Your Order No: DS56696

Lab Sample Number	1615628
Sample Reference	CP102(I31)
Sample Number	None Supplied
Depth (m)	None Supplied
Date Sampled	08/09/2020
Time Taken	None Supplied

Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.63
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.6
Selenium (dissolved)	µg/l	0.6	ISO 17025	6.8
Zinc (dissolved)	µg/l	0.5	ISO 17025	1.1
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
Aliphatic >C10 - C12	µg/l	10	ISO 17025	< 10
Aliphatic >C12 - C16	µg/l	10	ISO 17025	< 10
Aliphatic >C16 - C21	µg/l	10	ISO 17025	< 10
Aliphatic >C21 - C35	µg/l	10	ISO 17025	< 10
Aliphatic >C10 - C35	µg/l	10	ISO 17025	< 10
Aromatic >C10 - C12	µg/l	10	ISO 17025	< 10
Aromatic >C12 - C16	µg/l	10	ISO 17025	< 10
Aromatic >C16 - C21	µg/l	10	ISO 17025	< 10
Aromatic >C21 - C35	µg/l	10	ISO 17025	< 10
Aromatic >C10 - C35	µg/l	10	ISO 17025	< 10

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The results included within the report relate only to the sample(s) submitted for testing.

UKAS TESTING 4041

Analytical Environmental Science

Analytical Report Number: 20-29059
Project / Site name: Former Glanford House, Flixborough

Your Order No: DS56696

Lab Sample Number				1615628
Sample Reference				CP102(I31)
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/09/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
VOCs				
Chloromethane	µg/l	1	ISO 17025	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0

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The results included within the report relate only to the sample(s) submitted for testing.

Your Order No: DS56696

Lab Sample Number				1615628
Sample Reference				CP102(I31)
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/09/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Carbazole	µg/l	0.05	NONE	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01

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The results included within the report relate only to the sample(s) submitted for testing.

UKAS TESTING 4041

Analytical Environmental Science

Analytical Report Number: 20-29059
Project / Site name: Former Glanford House, Flixborough

Your Order No: DS56696

Lab Sample Number				1615628
Sample Reference				CP102(I31)
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/09/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01

U/S = Unsuitable Sample   I/S = Insufficient Sample

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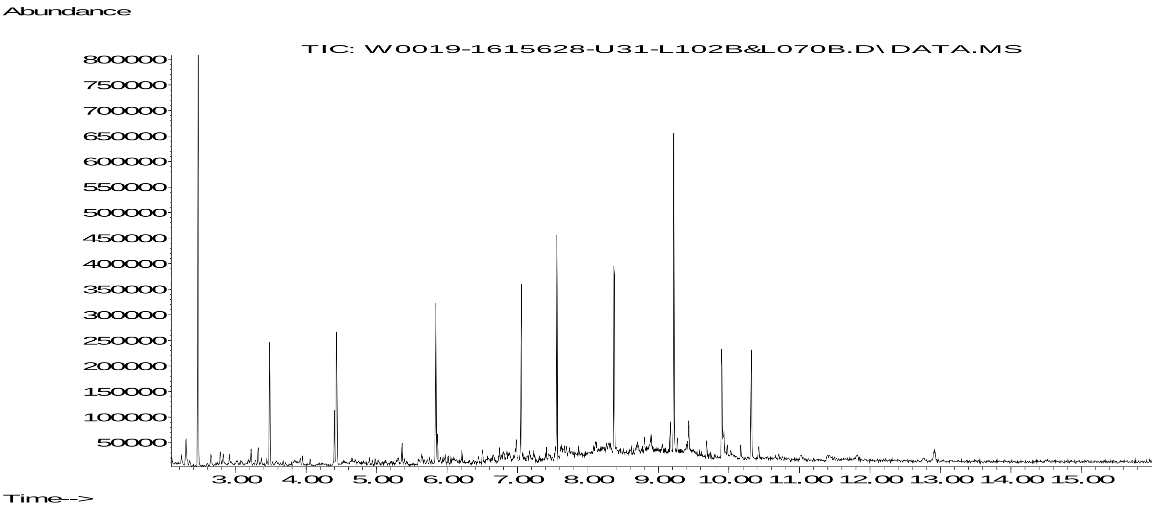
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 20-29059
Project / Site name: Former Glanford House, Flixborough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH C10-C35 by GCxGC-FID	Determination of total petroleum hydrocarbons in water by GC x GC FID with carbon banding aliphatic and aromatic C10-C35. Accredited Matrices SW,GW,PW.	In-house method	L101B-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.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[redacted]

Analytical Report Number : 20-30338

Replaces Analytical Report Number: 20-30338, issue no. 1

Client references/information amended.

Project / Site name:	Flixborough	**Samples received on:**	16/09/2020
Your job number:	20-1405.01	**Samples instructed on/ Analysis started on:**	16/09/2020
Your order number:	DS56820	**Analysis completed by:**	23/09/2020
Report Issue Number:	2	**Report issued on:**	25/09/2020
Samples Analysed:	1 water sample		

Signed: [redacted]

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-30338
Project / Site name: Flixborough

Your Order No: DS56820

Lab Sample Number	1621646
Sample Reference	CP102
Sample Number	None Supplied
Depth (m)	None Supplied
Date Sampled	15/09/2020
Time Taken	None Supplied

Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	6.9
Sulphate as SO4	µg/l	45	ISO 17025	342000
Sulphate as SO4	mg/l	0.045	ISO 17025	342
Heavy Metals / Metalloids				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (III)	µg/l	1	NONE	15
Arsenic (dissolved)	µg/l	0.15	ISO 17025	7.6
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	15
Copper (dissolved)	µg/l	0.5	ISO 17025	29
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	8.5
Zinc (dissolved)	µg/l	0.5	ISO 17025	6.9
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
Aliphatic >C10 - C12	µg/l	10	ISO 17025	< 10
Aliphatic >C12 - C16	µg/l	10	ISO 17025	< 10
Aliphatic >C16 - C21	µg/l	10	ISO 17025	< 10
Aliphatic >C21 - C35	µg/l	10	ISO 17025	< 10
Aliphatic >C10 - C35	µg/l	10	ISO 17025	< 10
Aromatic >C10 - C12	µg/l	10	ISO 17025	< 10
Aromatic >C12 - C16	µg/l	10	ISO 17025	< 10
Aromatic >C16 - C21	µg/l	10	ISO 17025	< 10
Aromatic >C21 - C35	µg/l	10	ISO 17025	< 10
Aromatic >C10 - C35	µg/l	10	ISO 17025	< 10
VOCs				
Chloromethane	µg/l	1	ISO 17025	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0

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Analytical Report Number: 20-30338
Project / Site name: Flixborough

Your Order No: DS56820

Lab Sample Number				1621646
Sample Reference				CP102
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				15/09/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Bromomethane	µg/l	1	ISO 17025	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0

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Analytical Report Number: 20-30338
Project / Site name: Flixborough

Your Order No: DS56820

Lab Sample Number				1621646
Sample Reference				CP102
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				15/09/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Carbazole	µg/l	0.05	NONE	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01

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Analytical Report Number: 20-30338
Project / Site name: Flixborough

Your Order No: DS56820

Lab Sample Number				1621646
Sample Reference				CP102
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				15/09/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01

U/S = Unsuitable Sample   I/S = Insufficient Sample

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UKAS TESTING 4041

Analytical Report Number : 20-30338
Project / Site name: Flixborough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH C10-C35 by GCxGC-FID	Determination of total petroleum hydrocarbons in water by GC x GC FID with carbon banding aliphatic and aromatic C10-C35. Accredited Matrices SW,GW,PW.	In-house method	L101B-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

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[redacted]

Analytical Report Number : 20-41560

Project / Site name:	Flixborough	**Samples received on:**	16/11/2020
Your job number:	20-1045.01	**Samples instructed on/ Analysis started on:**	16/11/2020
Your order number:	DS56820	**Analysis completed by:**	19/11/2020
Report Issue Number:	1	**Report issued on:**	19/11/2020
Samples Analysed:	1 water sample		

Signed: [redacted]

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

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soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Analytical Report Number: 20-41560
Project / Site name: Flixborough

Your Order No: DS56820

Lab Sample Number				1685027
Sample Reference				CP102
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				16/11/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	

PFAS Suite 3

PFBS C4 Sulphonate	µg/l	0.05	NONE	< 0.05
PHPS C5 Sulphonate	µg/l	0.05	NONE	< 0.05
PFHxS C6 Sulphonate	µg/l	0.05	NONE	< 0.05
PFHpS C7 Sulphonate	µg/l	0.05	NONE	< 0.05
PFOS C8 Sulphonate	µg/l	0.05	NONE	< 0.05
PFNS C9 Sulphonate	µg/l	0.05	NONE	< 0.05
PFDS C10 Sulphonate	µg/l	0.05	NONE	< 0.05
PFUdS C11 Sulphonate	µg/l	0.05	NONE	< 0.05
PFDoS C12 Sulphonate	µg/l	0.05	NONE	< 0.05
PFBA C4 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFPeA C5 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFHxA C6 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFHpA C7 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFOA C8 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFNA C9 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFDA C10 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFUdA C11 Carboxylic acid	µg/l	0.05	NONE	< 0.05
PFDoA C12 Carboxylic acid	µg/l	0.05	NONE	< 0.05

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 20-41560
Project / Site name: Flixborough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
EF - PFAS suite 3 in water by LC-MS/MS	PFAS suite 3 by LC-MS/MS	In-house method	UK	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Appendix G – Field Monitoring Data

Site Name	Former Glanford House, Flixborough	**Job number**	20-1405.01	**WEATHER**	**Start**	**End**
				Time	3:30	4:00
Client	North Lincolnshire County Council	**Recorded by**	JR	**Pressure (mb)**	1023	1023
				Wind speed (m/s)	5.30	5.30
Date (DD/MM/YYYY)	08/09/2020			**Wind Dir. (from)**	SW	SW
Gas Analyser	GFM436 (Gas Kit 4) - 11030	**Visit Number**	1	**Temperature (°C)**	25.00	25.00

Readings at start	**CH_4 (% v/v)**	<0.1	**CO_2** (% v/v)	<0.1	**O_2 (% v/v)**		20.7	**H_2S (ppm)**	0		**Dry/Rain/Snow/Ice**	Dry	Dry

General comments	High tide - 11:12, low tide- 19:11	**Rising/Falling Trend (for the three days before visit)**	Rising

Ref	**GROUND GAS**													**GROUNDWATER**			**Notes**
	Flow		**CH_4**		**CO_2**		**O_2**		**H_2S**	**CO**	**VOC**	**Differential (Relative) Pressure**	**Atmos. Pressure**	**Depth to free product**	**Depth to water**	**Depth to base**	**(e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.)**
	l/hr		**% v/v**		**% v/v**		**% v/v**		**ppm**								
	Max	**Steady**	**Max**	**Steady**	**Max**	**Steady**	**Min**	**Steady**	**Max**	**Max**	**Max**	**mb**	**mb**	**m**	**m**	**m**	
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS101	<0.1	<0.1	<0.1	<0.1	1.9	1.9	19.3	19.3	0	0	0.0	0.0	1023	NR	3.00	3.03	Damp at base, groundwater sample not possible
DS109	<0.1	<0.1	<0.1	<0.1	0.1	0.1	20.9	20.9	0	0	0.0	0.0	1023	NR	1.48	1.57	11 cm of water, groundwater sample not possible
CP102	<0.1	<0.1	3.0	3.0	1.0	1.0	15.0	15.0	0	53	0.0	0.0	1021	NR	2.92	13.75	Well bailed and groundwater sample collected.
																	No visual or olfactory evidence of contamination. Dark brown water,

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deltasimons

Site Name	Former Glanford House, Flixborough	**Job number**	20-1405.01	**WEATHER**	**Start**	**End**
				Time	10.45	11.30
Client	North Lincolnshire County Council	**Recorded by**	LD	**Pressure (mb)**	1021	1021
				Wind speed (m/s)	0.50	0.50
Date (DD/MM/YYYY)	15/09/2020			**Wind Dir. (from)**	N	N
Gas Analyser	GFM435 (Gas Kit 5) - 12233	**Visit Number**	2	**Temperature (°C)**	25.00	25.00

Readings at start	**CH_4 (% v/v)**	<0.1	**CO_2** (% v/v)	<0.1	**O_2 (% v/v)**		20.5	**H_2S (ppm)**	0		**Dry/Rain/Snow/Ice**	DRY	DRY

General comments	Low tide - 14:25, high tide - 18:43	**Rising/Falling Trend (for the three days before visit)**	STEADY

Ref	**GROUND GAS**													**GROUNDWATER**			**Notes**
	Flow		**CH_4**		**CO_2**		**O_2**		**H_2S**	**CO**	**VOC**	**Differential (Relative) Pressure**	**Atmos. Pressure**	**Depth to free product**	**Depth to water**	**Depth to base**	**(e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.)**
	l/hr		**% v/v**		**% v/v**		**% v/v**		**ppm**			**mb**	**mb**	**m**	**m**	**m**	
	Max	**Steady**	**Max**	**Steady**	**Max**	**Steady**	**Min**	**Steady**	**Max**	**Max**	**Max**						
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS101	<0.1	<0.1	<0.1	<0.1	1.3	1.3	19.4	19.4	0	0	0.0	0.0	1021	NR	2.93	3.02	9 cm of water, groundwater sample not possible.
DS109	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	20.2	20.2	0	0	0.0	0.0	1021	NR	1.40	1.52	12 cm of water, groundwater sample not possible.
CP102	0.1	<0.1	42.3	42.3	6.7	6.7	5.9	5.9	0	47	0.0	0.0	1021	NR	3.09	13.29	Well bailed and groundwater sample collected.

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Site Name	Former Glanford House, Flixborough	**Job number**	20-1405.01	**WEATHER**	**Start**	**End**
				Time	1100	1130
Client	North Lincolnshire County Council	**Recorded by**	LD	**Pressure (mb)**	1017	1017
				Wind speed (m/s)	4.00	4.00
Date (DD/MM/YYYY)	21/09/2020			**Wind Dir. (from)**	SSW	SSW
Gas Analyser	GFM435 (Gas Kit 5) - 12233	**Visit Number**	3	**Temperature (°C)**	16.00	16.00
Readings at start	**CH_4 (% v/v)** <0.1 **CO_2** (% v/v) 0.1 **O_2 (% v/v)** 19.8 **H_2S (ppm)** 0			**Dry/Rain/Snow/Ice**	DRY	DRY
General comments	Low Tide; 6:15 am, High Tide; 10:25 am			**Rising/Falling Trend (for the three days before visit)**	FALLING	

Ref	**GROUND GAS**													**GROUNDWATER**			**Notes** (e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.)
	Flow		**CH_4**		**CO_2**		**O_2**		**H_2S**	**CO**	**VOC**	**Differential (Relative) Pressure**	**Atmos. Pressure**	**Depth to free product**	**Depth to water**	**Depth to base**	
	l/hr		**% v/v**		**% v/v**		**% v/v**		**ppm**			**mb**	**mb**	**m**	**m**	**m**	
	Max	**Steady**	**Max**	**Steady**	**Max**	**Steady**	**Min**	**Steady**	**Max**	**Max**	**Max**						
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS101	<0.1	<0.1	<0.1	<0.1	1.9	1.9	17.4	17.4	0	0	0	0.0	1017	NR	2.97	3.06	
DS109	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	20.3	20.3	0	0	0	0.0	1017	NR	1.51	1.54	
CP102	<0.1	<0.1	14.7	14.7	6.0	6.0	11.2	11.2	0	0	0	0.0	1017	NR	2.76	13.12	

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Appendix H – Risk Definitions

Contaminated Land Risk Definitions

The following methodology is based on the methodology presented in CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001. It requires the classification of the:

- Magnitude of the potential consequence (severity) of the Risk occurring: and
- Magnitude of the Probability (likelihood) of the Risk occurring.

The classifications are then compared to indicate the risk presented by each pollutant linkage.

Consequence to Receptor Definition Matrix

	Human Health	Controlled Waters	Buildings/Services
Severe Consequence	Acute or chronic permanent impact on human health.	Sensitive controlled water pollution ongoing, or just about to occur.	Catastrophic collapse
Medium Consequence	Chronic permanent impact on human health	Gradual pollution of sensitive controlled water	Degradation of materials
Mild Consequence	Chronic temporary impact on human health	Gradual pollution of non-sensitive controlled water	Damage to building rendering it unsafe.to occupy (eg foundation damage resulting in instability).
Minor Consequence	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).	Slight discoloration of water	Easily repairable effects of damage to buildings, structures and services, i.e discoloration of concrete

Probability Definitions

Probability	**Definition in Context**
Higher	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution. Positive evidence of source, pathway and receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. Suspect source, pathway, and receptor
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term No evidence of hazard, pathway, and receptor

Standard Risk Matrix

		Consequence/Magnitude of impact			
		Severe	Medium	Mild	Minor
Probability	**High**	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Classified risks and likely action

Significance Level	**Definition/Comments**
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required. Demonstrable contaminated land situation, highest threat & liability level, urgent action recommended.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. Likely contaminated land situation, risk assessment and action recommended.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, if is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. Plausible contaminated land situation, risk assessment and possible action recommended.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Unlikely contaminated land situation, possible risk assessment and possible action.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe. Negligible risk, no action recommended except vigilance for changes in conditions.

Geotechnical Risk Classification

The geohazards listed in the report within Section 4 follow guidance presented in Clayton, C.R.I. (2001) *Managing Geotechnical Risk*, Thomas Telford and the Highways Agency document HD22/08 ‘*Managing Geotechnical Risk*’ (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

For each geohazard the probability of the hazard occurring (P) has been considered together with the impact it would have (I) if it were to happen to calculate the risk rating between 1 and 25.

Risks that fall within Moderate, Significant and Severe categories below are considered to be ***substantial*** and are therefore listed within the report.

Probability	**(P)**
Very Likely (VLk)	5
Likely (Lk)	4
Plausible (P)	3
Unlikely (U)	2
Very Unlikely (VU)	1

X

Impact	**(I)**
Very High (VH)	5
High (H)	4
Medium (M)	3
Low (L)	2
Very Low (VL)	1

=

(R)	**Risk**
20 – 25	Severe
15 – 19	Substantial
10 – 14	Moderate
5 – 9	Minor
1 – 4	Negligible

W29/219

1.00 Introduction.

1.1 Brichar Ltd., intend to develop on an area of open ground off Stathers Road, Flixborough, near to the entrance to Flixborough Wharf. The development will comprise a new manufacturing facility and in order to assist with the evaluation of the ground conditions prior to construction, TLP were commissioned to undertake a series of boreholes to supplement information from trial pits previously excavated by the consulting engineers for the project, Alan Wood & Ptns. of Hull.

2.00 Boreholes.

2.1 In all 5 No. percussive cable tool borings were excavated at the site at the approximate positions indicated on the enclosed site location plan. The borings were extended to between 17.75m. and 19.40m. depth and these were completed during late October and early November 1997.

3.00 Site and Geology

3.1 The site lies on the flood plain immediately behind the eastern embankment of the River Trent. There are signs that at least parts of the site were formerly occupied by old buildings and structures. These have now been cleared to form a essentially level area but with a surface made uneven by demolition and the deposition of surplus spoil from nearby developments. At the time of the investigation the area was covered by weeds and grasses with a hedgerow and low earth mound forming the western boundary. The eastern flank of the site lies adjacent to the Crystal Polymers development.

3.2 From information obtained during previous investigations undertaken in the area, together with data published by the British Geological Survey, it was anticipated that the superficial made up ground and disturbed soils were likely to overlie river alluvium, principally of silty clays and clayey silts

INV

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with layers of silty sand and occasional organic / peaty horizons. These alluvial sediments are known to pass down at greater depth into older geological strata represented by the Mercia Mudstones (Keuper Marl) of Triassic age.

3.3 Details of the various strata actually encountered in the borings are provided on the enclosed borehole logs, the data on the logs being related to existing ground level at the specific borehole locations.
A summary of the main characteristics of the various soil layers is given below.

4.00 Ground Conditions.

4.1 Beneath a superficial covering of silty topsoil the borings generally encountered only a small thickness of made ground which comprised a silty, sandy and stony clay that generally extended to no more than 0.50m. depth. In BH5, however, it was more extensive, extending to around 1.60m. depth but again comprising predominantly a silty and clayey soil with particles of brick and concrete and occasional lenses of rust brown silt.

4.2 The underlying natural deposits comprised a sequence of alluvial soils initially represented by a firm or soft to firm, mid brown and orange brown silty clay. The deposit quickly developed a slight lamination but at around 1.65m. to 2.40m. depth, graded down into a soft to firm and eventually soft, grey, silty clay.

4.3 In each of the borings significant deposits of peat and peaty clay were encountered at around 4.30m. to 5.80m. depth, which extended to between 10.85m. and 11.40m. b.g.l., before giving way to a granular sequence of wet, silty sand. These sandy deposits became progressively more gravelly with depth, eventually giving way to deposits of reddish brown and light grey silty clay at approximately 15.10m. to 15.80m. beneath the surface.

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4.4 The silty clay quickly graded down into a dense to very dense, reddish brown silty mudstone or clayey siltstone which contained occasional light grey veins of gypsum. This latter horizon is considered to represent the upper weathered surface of the Mercia Mudstones (Keuper Marl) of Triassic age and it was in this very dense horizon at around 17.50m. to 19.40m. that the borings were terminated.

5.00 Groundwater.

5.1 Details of the groundwater infiltrations encountered during boring have been recorded on the enclosed logs. Initial seeps were noted in the alluvium at around 4.00m. to 7.50m. depth and strong infiltrations were experienced whilst penetrating the underlying water bearing sands and gravels. This necessitated maintaining a 'head' of water in the borings to prevent 'piping" of the material in the base.
On withdrawing the borehole casing, equilibrium standing groundwater levels of between 5.00m. and 6.50m. b.g.l. were recorded in the completed borings.

6.00 Sampling

6.1 Within the cohesive deposits undisturbed core samples were taken as the borings were advanced to provide specimens for laboratory strength tests. Small disturbed samples were also obtained in order to provide a record of the strata encountered and samples for additional testing.
Groundwater samples were recovered from the borings for subsequent chemical analysis.

7.00 Laboratory and In situ Testing.

7.1 Since the alluvial deposits were generally soft in consistency, laboratory testing was primarily directed to obtaining the shear strength of these materials using a shear vane. The results of the tests have been tabulated

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on the enclosed summary data sheets along with the associated moisture content and bulk / dry density values.

Vane tests performed on undisturbed samples from the upper firmer layer of the alluvial silty clay, recorded strength values between 38kN/m² and 77kN/m². but fell quickly to around 18kN/m² to 26kN/m² in the the softer zones immediately beneath. Vane tests performed on samples of the underlying peat ranged between 15kN/m² and 58kN/m² demonstrating a variation in consistency from very soft, to firm.

7.2 The water soluble sulphate tests undertaken on the samples of groundwater obtained from the borings, recorded water soluble sulphate concentrations between 0.44g/l and 1.33g/l with pH varying between 6.4 and 7.0 .

7.3 Standard penetration tests were performed in the sand and gravel and weathered mudstone/siltstone layers and the results, which have been interpreted as 'N' values (blows per 300mm. penetration) appear on the borehole logs. Tests taken in the sand and gravel recorded 'N' values generally in the range 9 to 18, suggesting a medium dense state of compaction for these materials. Similar tests taken at greater depth in the weathered Mercia Mudstones/Siltstones, obtained values improving from around 34, to in excess of 105 blows, confirming a dense to very dense condition for this horizon.

8.00 Engineering Comments.

8.1 Beneath the superficial covering of topsoil and made ground, the borings have identified deposits of alluvial silty clay which quickly become soft in consistency before giving way to deposits of peat and peaty clay which may be between 5.50m. and 6.60m. in thickness.

8.2 Clearly on a site where such extensive deposits of weak and highly

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compressible silty clays and peat are present at shallow depth, the only sensible foundation solution would be that of piles. The piles should naturally penetrate the soft clays and peat, to terminate at a satisfactory level in the underlying more competent granular soils or preferably the dense to very dense Mercia Mudstones generally encountered in the borings below 16.00m. depth.

8.3 As a preliminary guide to design, it has been estimated from the in situ penetration test results, that for piles terminated in very dense mudstone/siltstone ('N' > 50, = soft rock) the allowable end pressure will be of the order 1000kN/m^2. Unit shaft friction in the overlying medium dense sand and gravel is estimated to be approximately 20kN/m^2.

8.4 Chemical tests undertaken on certain samples of groundwater obtained from the borings, recorded concentrations of water soluble sulphate which fall within Class 2 of the BRE Digest 363 Classification. On this basis appropriate precautions, in accordance with the Digest's recommendations, should be taken with any buried concrete, to guard against potential sulphate attack.

For T.L.P. Ground Investigations 19.11.1997

[redacted]

R.L.Trattles

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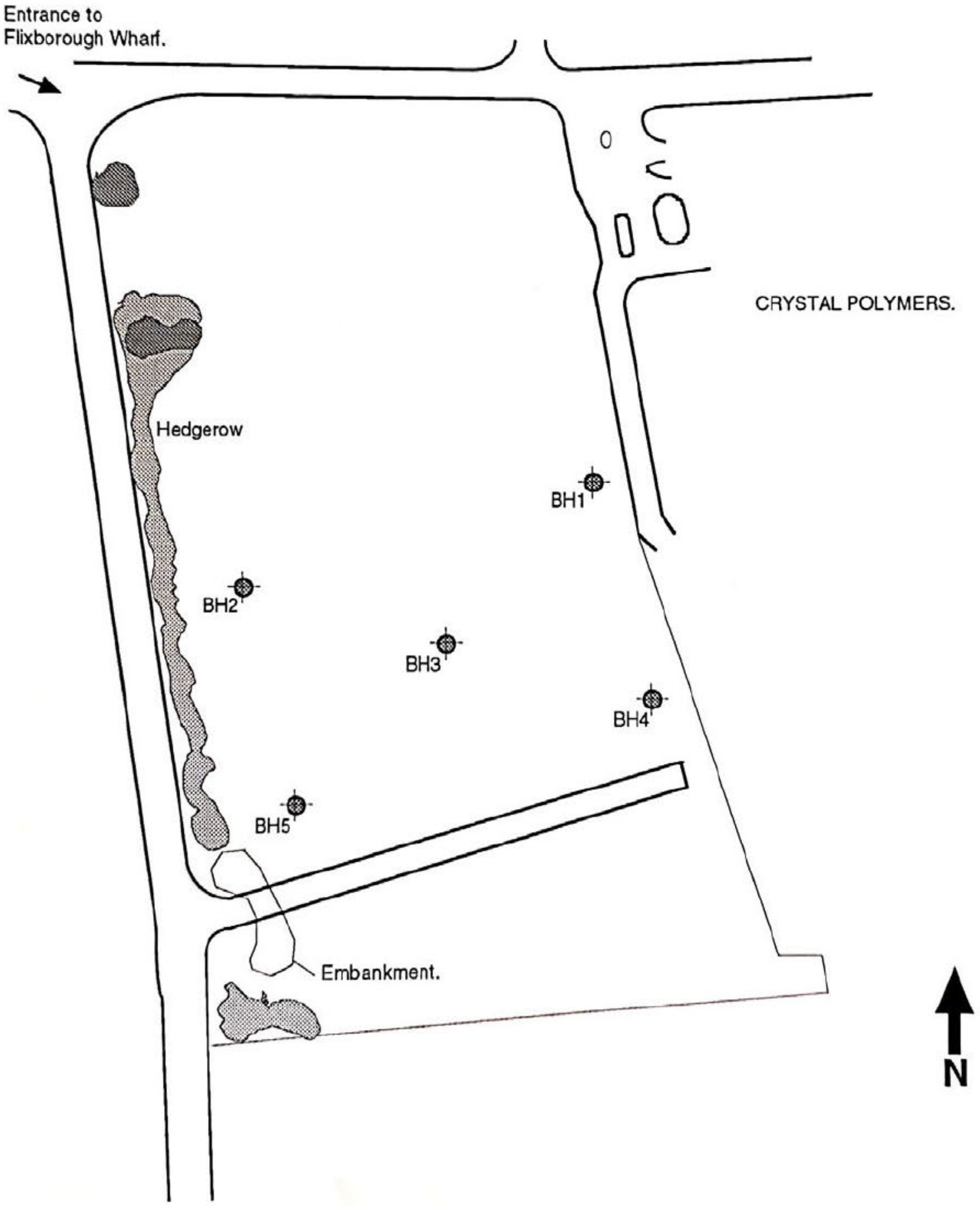
Borehole Location Plan,
Proposed Manufacturing Facility,
Stathers Road,
Flixborough.



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T.L.P. Ground Investigations.

Borehole Record
Cable Tool Boring 150mm. dia. to base

Location : Proposed development at Flixborough.

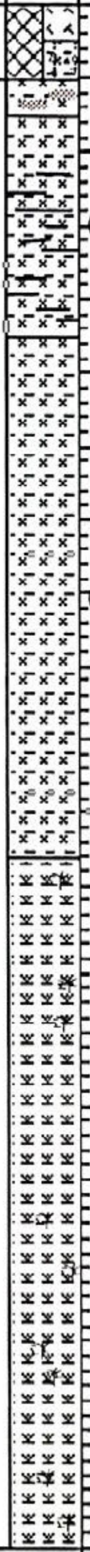
Borehole No. 1.

Carried out For: Brichar Ltd., C/o. Alan Wood & Partners.

Ground Level

Co-ordinates

Date : 4.11.97.

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	samples Type	samples No	Test	Field Records
Mixed brown silty **Topsoil.**			0.25					
Firm, brown, silty sandy and stony clay.			0.50	0.50	D	1.		
Firm brown and orange brown mottled silty **Clay** containing lenses of rust brown silt.			0.75	0.80	D	2.		
				1.00	U	1		
Firm, becoming soft to firm, brown, laminated silty **Clay.**			(1.50)	1.50	D	3.		
				2.00	U	2		
			2.25					
				2.50	D	4.		
Soft to firm, becoming soft, grey, silty **Clay.**								
				3.00	U	3		
				3.50	D	5.		
			(3.55)	4.00	U	4		
				5.00	D	6.		
				5.00	W	1		
				5.50	U	5		
			5.80					
Soft, dark brown, fibrous and woody **Peat.**								
				6.50	D	7.		
				7.00	U	6		
				8.00	D	8.		
				8.50	U	7		
			(5.50)					
				9.50	D	9.		
				10.00	U	8		

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.
- D Disturbed Sample
- B Bulk Sample
- W Water Sample
- U Undisturbed Core sample
- S Standard Penetration Test
- V Vane Test

Remarks
2.50hrs. chiselling and maintaining head of water in borehole

Logged by J.W.

Scale 1:50

Fig.

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T.L.P. Ground Investigations.	**Borehole Record** Cable Tool Boring 150mm. dia. to base	Location : Proposed development at Flixborough.	**Borehole No.** 1.
Carried out For	Brichar Ltd., C/o. Alan Wood & Partners.	Ground Level	Co-ordinates
			Date : 5.11.97.

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	samples Type	samples No.	Test	Field Records
As previous sheet, Soft, dark brown, fibrous, woody **Peat.** peat becoming more compact at base				11.00	D	10.		
			11.35	11.35	D	11.	S	
				11.50	D	12.	N12.	
Medium dense,water bearing, grey / brown slightly silty medium **Sand.**				12.50	D	13.		
			(2.65)	13.00	D	14.	S N14.	
			14.00	14.00	D	15.		
Medium dense, water bearing, grey / brown silty **Sand** and assorted **Gravel.**			(1.15)	14.50	D	16.	S N12.	
			15.15	15.15	D	17.		
Soft to firm reddish brown and grey silty marl **Clay.**			15.40					
Dense, becoming very dense, reddish brown silty **Mudstone / Siltstone** with occasional light grey veins of gypsum. **Weathered Mercia Mudstones (Triassic.)**				16.00	D	18.	S N48.	
			(3.76)	17.50	D	19.	S N53.	
			19.16	19.00	D	20.	S 50 blows for 100mm. penetration.	
	End of borehole.							

Observations.

Slight groundwater seepages at 5.80m. Stronger infiltrations between 11.35m. and 15.15m.
Standing level 5.00m. b.g.l. on completion with the casing withdrawn.
N. B. Head of water maintained whilst boring in sand and gravel.

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

- D Disturbed Sample
- B Bulk Sample
- W Water Sample
- U Undisturbed Core sample
- S Standard Penetration Test
- V Vane Test

Remarks

Logged by J.W.

Scale 1:50

Fig.

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T.L.P. Ground Investigations.

Borehole Record
Cable Tool Boring 150mm. dia. to base

Location : Proposed development at Flixborough.

Borehole No. 2.

Carried out For Brichar Ltd., C/o. Alan Wood & Partners.

Ground Level

Co-ordinates

Date : 29.10.97.

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	samples Type	samples No.	Test	Field Records
Mixed brown silty **Topsoil.**			0.25					
				0.50	D	1.		
			(1.50)	1.00	U	1		
Firm, becoming soft to firm, brown, laminated silty **Clay.**								
			1.75	1.75	D	2		
				2.00	U	2		
				2.65	D	3		
Soft to firm, becoming soft , grey, silty **Clay.**								
			(2.75)	3.00	U	3		
				3.50	D	4		
				4.00	U	4		
			4.50					
Soft and soft to firm, brown clayey **Peat.**				4.75	D	5		
				5.50	U	5		
				6.10	W	1		
				6.50	D	6		
Soft, brown, very clayey **Peat.**				7.00	U	6		
			(6.35)	8.00	D	7		
Soft brown slightly clayey fibrous **Peat.**				8.50	U	7		
				9.50	D	8		
				10.00	U	8		

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D Disturbed Sample
B Bulk Sample
W Water Sample
U Undisturbed Core sample
S Standard Penetration Test
V Vane Test

Remarks

2.00hrs. chiselling and maintaining head of water in borehole

Logged by J.W.

Scale 1:50

Fig.

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T.L.P. Ground Investigations.	**Borehole Record** Cable Tool Boring 150mm. dia. to base	Location : Proposed development at Flixborough.	**Borehole No.** 2
Carried out For Brichar Ltd., C/o. Alan Wood & Partners.		Ground Level / Co-ordinates	Date : 30.10.97.

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	samples Type	samples No.	Test	Field Records
As previous sheet, Soft, brown, slightly clayey, fibrous **Peat.**				10.60	D	9		
			10.85					
Medium dense, water bearing, light grey/brown,slightly slightly silty medium **Sand.**				11.50	D	10	S N13	
				12.50	D	11		
			(3.45)					
				13.00	D	12	S N15	
				14.00	D	13		
			14.30					
Medium dense, water bearing, grey/brown silty **Sand** and assorted **Gravel.**				14.50	D	14	S N17	
			(0.90)					
				15.15	D	15		
			15.20					
Soft to firm reddish brown and grey silty marl **Clay.**			15.45					
Dense, becoming very dense, reddish brown, silty **Mudstone/Siltstone** with occasional light grey veins of gypsum. **Weathered Mercia Mudstones (Triassic)**				16.00	D	16	S N47	
			(2.30)					
				17.25	D	17	S N76	
			17.75					

End of Borehole.

Observations.

Slight groundwater seepage at 6.90m. Stronger infiltrations between 13.00m.and 15.50m.
Standing level 6.10m.b.g.l. on completion with the borehole casing withdrawn
N.B. Head of water maintained whilst boring in sand and gravel.

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D	Disturbed Sample
B	Bulk Sample
W	Water Sample
U	Undisturbed Core sample
S	Standard Penetration Test
V	Vane Test

Remarks

Logged by J.W.

Scale 1:50

Fig.

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T.L.P. Ground Investigations.

Borehole Record
Cable Tool Boring 150mm. dia. to base

Location : Proposed development at Flixborough.

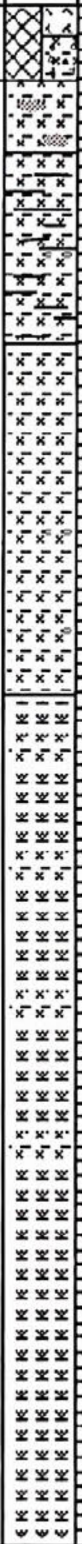
Borehole No. 3.

Carried out For Brichar Ltd., C/o. Alan Wood & Partners.

Ground Level

Co-ordinates

Date : 28.10.97.

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	Samples Type	Samples No	Test	Field Records
Mixed brown silty **Topsoil.**			0.20					
Firm brown silty and sandy clay containing occasional chalk, coal and other assorted gravel.			0.50	0.50	D	1.		
Soft to firm becoming firm mid brown and orange brown mottled silty **Clay** containing lenses of rust brown silt.			(0.50)					
			1.00	1.00	U	1		
				1.50	D	2.		
Firm, brown, laminated silty **Clay.**			(1.30)					
				2.00	U	2		
			2.30	2.50	D	3.		
Firm becoming soft, grey, silty **Clay.**				3.00	U	3		
Alluvium			(2.40)	3.70	D	4.		
				4.50	U	4		
			4.70					
Soft becoming firm, dark brown/black, clayey, fibrous **Peat.**								
				5.75	D	5.		
				6.00	U	5		
				6.50	W	1		
				7.00	D	6.		
				7.50	U	6		
			(6.60)	8.50	D	7.		
				9.00	U	7		
				10.00	D	8.		

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.
D Disturbed Sample
B Bulk Sample
W Water Sample
U Undisturbed Core sample
S Standard Penetration Test
V Vane Test

Remarks

3hrs. chiselling and maintaining head of water in borehole.

Logged by J.W.

Scale 1:50

Fig.

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T.L.P. Ground Investigations.	**Borehole Record** Cable Tool Boring 150mm. dia. to base	Location : Proposed development at Flixborough.	**Borehole No.** 3.
Carried out For	Brichar Ltd., C/o. Alan Wood & Partners.	Ground Level	Co-ordinates
			Date : 28.10.97.

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	samples Type	samples No	Test	Field Records
Soft becoming firm, dark brown/black, clayey, fibrous **Peat.**				10.50	U	8		
				11.00	D	9.		
			11.50					
Firm, grey ,silty **Clay.**				12.00	U	9		
			(1.50)					
			13.00	13.00	D	10.		
Medium dense, water bearing ,grey/brown silty **Sand** and assorted **Gravel.**				13.50			S N12.	
			(2.50)					
				15.00	D	11.		
			15.50	15.50	D	12.	S N35.	
Firm to stiff becoming hard, reddish brown and light grey, very silty **Clay,**			(0.50)	15.65	D	13.		
			16.00					
Dense becoming very dense, reddish brown silty **Mudstone/Siltstone** with occasional light grey veins of gypsum.			(2.00)	17.00	D	14	S 105 blows for 225mm. pen.	
Weathered Mercia Mudstones (Triassic)			18.05	18.00	D	15	S 50 blows for 50mm. pen	
	End of Borehole.							

Observations.

Slight ground water seeps at 4.00m. Strong infiltrations between 13.00m. and 15.50m. Standing level 6.50m. b.g.l. on completion with the borehole casing withdrawn.

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D	Disturbed Sample
B	Bulk Sample
W	Water Sample
U	Undisturbed Core sample
S	Standard Penetration Test
V	Vane Test

Remarks

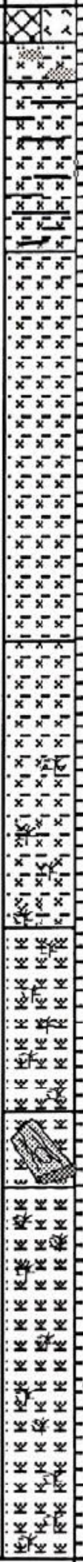
Logged by J.W.

Scale 1:50

Fig.

Scanned with CamScanner

T.L.P. Ground Investigations.	**Borehole Record** Cable Tool Boring 150mm. dia. to base	Location : Proposed development at Flixborough.	**Borehole No.** 4.
Carried out For Brichar Ltd., C/o. Alan Wood & Partners.	Ground Level	Co-ordinates	Date : 23/24.10.97.



Description	Reduced Level	Depth & Thickness	Samples/Tests Depth	samples Type	samples No	Test	Field Records
Mixed brown silty **Topsoil.**		0.25					
Firm brown and orange brown mottled, silty **Clay** containing lenses of rust brown silt.		0.50	0.50	D	1.		
Firm becoming soft, brown, laminated silty **Clay.**		(1.15)	1.00	U	1		
		1.65	1.65	D	2.		
			2.00	U	2		
			2.50	D	3.		
Soft becoming very soft, grey to dark grey, silty **Clay.**		(2.65)	3.00	U	3		
Alluvium			3.50	D	4.		
			4.00	U	4		
		4.30					
			4.75	D	5.		
Soft to firm, dark brown, clayey **Peat.**		(1.95)	5.50	U	5		
			6.00	W	1		
		6.25	6.25	D	6.		
			6.50	D	7.		
			7.00	U	6		
Firm, dark brown, fibrous and woody **Peat.**			7.50	D	8		
Timber obstruction.	{		8.00	D	9		
			8.50	U	7		
		(4.60)	9.50	D	10		
			10.00	U	8		

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D	Disturbed Sample
B	Bulk Sample
W	Water Sample
U	Undisturbed Core sample
S	Standard Penetration Test
V	Vane Test

Remarks

1.50hrs chiselling and maintaining head of water in borehole.

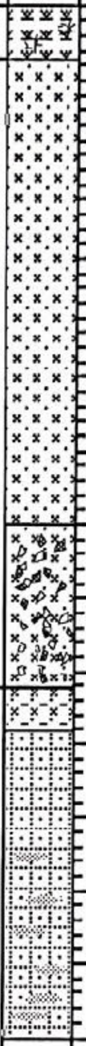
Logged by J.W.

Scale 1:50

Fig.

Scanned with CamScanner

T.L.P. Ground Investigations.	**Borehole Record** Cable Tool Boring 150mm. dia. to base	Location : Proposed development at Flixborough.	**Borehole No.** 4.
Carried out For	Brichar Ltd., C/o. Alan Wood & Partners.	Ground Level	Co-ordinates
			Date : 28.10.97.



Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	Samples Type	Samples No.	Test	Field Records
As previous sheet			10.85	10.85	D	11.		
Medium dense, water bearing, grey/brown silty **Sand.**				11.50	D	12	S N11.	
				12.00	D	13		
			(3.15)					
				13.00	D	14	S N11.	
			14.00	14.00	D	15		
Medium dense, water bearing, grey , silty **Sand** with fine to medium assorted **Gravel.**			(1.10)	14.50	D	16	S N10.	
				15.00	D	17		
Soft becoming hard, reddish brown and light grey very silty **Clay.**			15.10					
			15.40					
Dense becoming very dense, reddish brown, silty **Mudstone/Siltstone** with occasional light grey veins of gypsum.			(2.10)	16.50	D	18	S N45.	
Weathered Mercia Mudstones (Triassic).			17.50	17.50	D	19	S 80 blows for 150mm. pen.	
	End of Borehole.							

Observations.

Slight groundwater seepages at 7.50m. Strong infiltrations between 10.85m. and 15.10m. Standing level 6.00m. b.g.l. on completion with the borehole casing withdrawn.

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D	Disturbed Sample
B	Bulk Sample
W	Water Sample
U	Undisturbed Core sample
S	Standard Penetration Test
V	Vane Test

Remarks

Logged by J.W.

Scale 1:50

Fig.

Scanned with CamScanner

T.L.P. Ground Investigations.

Borehole Record
Cable Tool Boring 150mm. dia. to base

Location : Proposed development at Flixborough.

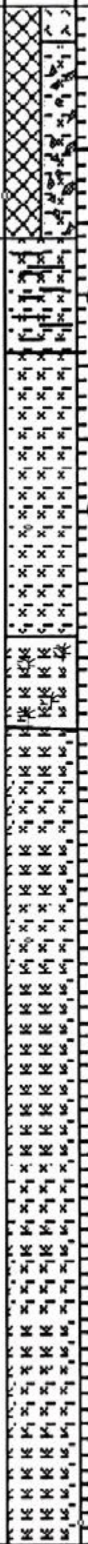
Borehole No. 5.

Carried out For Brichar Ltd., C/o. Alan Wood & Partners.

Ground Level

Co-ordinates

Date : 27/28.10.97.



Description	Reduced Level	Depth & Thickness	Samples/Tests Depth	Samples Type	Samples No.	Test	Field Records
Mixed brown silty **Topsoil.**		0.25					
Firm to stiff brown silty **Clay** containing particles of brick and concrete lenses of rust brown silt.		0.50	0.50	D	1.		
		(1.10)	1.00	U	1		
		1.60	1.60	D	3.		
Firm becoming soft, brown, laminated silty **Clay.**		(0.80)	2.00	U	2		
		2.40					
Very soft becoming soft, grey to dark grey, silty **Clay.**			2.50	D	4.		
			3.00	U	3		
		(1.95)	3.50	D	5.		
Alluvium			4.00	U	4		
		4.35					
Very soft, brown, fibrous **Peat.**			4.50	D	6		
		(0.65)	5.00	D	7.		
		5.00					
Soft becoming very soft, grey to dark grey, organic very peaty **Clay,** containing occasional pockets of woody peat.			5.50	U	5		
			6.00	D	8.		
			6.25	W	1		
			7.00	U	6		
			8.00	D	9.		
		(5.60)	8.50	U	7		
			9.50	D	10.		
			10.00	U	8		

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D	Disturbed Sample
B	Bulk Sample
W	Water Sample
U	Undisturbed Core sample
S	Standard Penetration Test
V	Vane Test

Remarks

1.50hrs. chiselling and maintaining head of weater in borehole.

Logged by J.W.

Scale 1:50

Fig.

T.L.P. Ground Investigations.	**Borehole Record** Cable Tool Boring 150mm. dia. to base	Location : Proposed development at Flixborough.	**Borehole No.** 5.
Carried out For	Brichar Ltd., C/o. Alan Wood & Partners.	Ground Level	Co-ordinates
			Date : 27 / 28.10.97

Description	Reduced Level	Legend	Depth & Thickness	Samples/Tests Depth	samples Type	samples No	Test	Field Records
Soft, brown fibrous **Peat.**			10.60 (0.80) 11.40	10.60	D	11.		
Loose to medium, water bearing, dense, grey silty **Sand.**			(4.10)	11.40 11.50 12.50 13.00 14.00 14.50	D D D D D D	12. 13 14 15 16 17	S N9. S N17. S N18.	
Medium dense, water bearing, grey silty **Sand** and assorted **Gravel.**			15.50 15.80	15.50	D	18		
Soft becoming hard, reddish brown and light grey very silty **Clay.**			16.00	16.00	D	19	S N34.	
Dense becoming very dense, reddish brown, **silty Mudstone/Siltstone** with occasional light grey veins of gypsum. **Weathered Mercia Mudstones (Triassic)**			(3.40) 19.40	16.65 17.50 19.00	D D D	20 21 22	 S N75. S 86 blows for 200mm. pen	

End of Borehole.

Observations.

Slight groundwater seepages encountered at 7.10m. b.g.l.

Standing level 6.25m. b.g.l. on completion with the casing withdrawn.

S.P.T. : Where full penetration has not been achieved the number of blows for the quoted penetration is given (Not 'N' value)

Depths: All depths and reduce levels in metres. Thickness given in brackets in depth column.

Samples/Test Key.

D	Disturbed Sample
B	Bulk Sample
W	Water Sample
U	Undisturbed Core sample
S	Standard Penetration Test
V	Vane Test

Remarks

Logged by J.W.

Scale 1:50

Fig.

Scanned with CamScanner

Summary of Laboratory Test Data

Client : Brichar Ltd.,
Location : Flixborough

Sample Details			Classification				Chemical		Density		Strength		
No. Type	Depth m.	Description	w %	LL %	PL %	PI %	SO_4 g/l	pH	Bulk Density Mg/m^3	Dry Density Mg/m^3	Type	c kN/m^2	ø Deg.
BH1													
U1	1.00	Silty Clay	40.0						1.74	1.24	V	52	-
U2	2.00	•	44.0						1.71	1.19	V	48	-
U3	3.00	•	51.0						1.68	1.11	V	40	-
U4	4.00	•	50.0						1.70	1.13	V	28	-
W1	5.00	Groundwater					0.74	6.6					
U5	5.50	Silty Clay	55.0						1.69	1.10	V	24	-
U6	7.00	Peat	312						1.19	0.28	V	36	-
U7	8.50	•	288						1.22	0.31	V	39	-
U8	10.0	•	304						1.30	0.32	V	54	-
BH2													
U1	1.00	Silty Clay	37.0						1.77	1.29	V	64	-
U2	2.00	'	48.0						1.67	1.13	V	22	-
U3	3.00	•	56.0						1.66	1.06	V	20	-
U4	4.00	•	54.0						1.60	1.04	V	26	-
U5	5.50	Peat	238						1.15	0.35	V	44	-
W1	6.10	Groundwater					0.88	6.8					
U6	7.00	Peat	187						1.28	0.45	V	42	-
U7	8.50	•	304						1.10	0.27	V	48	-
U8	10.0	•	211						1.22	0.39	V	40	-

Notes	U Undisturbed	NP Non Plastic
	B Bulk	
	D Disturbed	

Scanned with CamScanner

Summary of Laboratory Test Data

Client : Brichar Ltd.,
Location : Flixborough

Sample Details			Classification				Chemical		Density		Strength		
No. Type	Depth m	Description	w %	LL %	PL %	PI %	SO_4 g/l	pH	Bulk Density Mg/m^3	Dry Density Mg/m^3	Type	c kN/m^2	o Deg.
BH3													
U1	1.00	Silty Clay	46.0						1.72	1.18	V	39	-
U2	2.00	▪	43.0						1.69	1.18	V	54	-
U3	3.00	▪	41.0						1.65	1.17	V	47	-
U4	4.50	Peat	198						1.26	0.42	V	32	-
U5	6.00	▪	202						1.19	0.39	V	48	-
W1	6.50	Groundwater					1.33	7.0					
U6	7.50	Peat	232						1.22	0.37	V	45	-
U7	9.00	▪	320						1.27	0.30	V	45	-
U8	10.5	▪	306						1.20	0.29	V	40	-
U9	12.0	Silty Clay	45.0						1.77	1.22	V	58	-
BH4													
U1	1.00	Silty Clay	47.0						1.68	1.14	V	38	-
U2	2.00	▪	58.0						1.66	1.05	V	22	-
U3	3.00	▪	44.0						1.65	1.14	V	19	-
U4	4.00	Silty Clay/Peat	88						1.35	0.71	V	30	-
U5	5.50	Peat	277						1.22	0.32	V	48	-
W1	6.00	Groundwater					0.51	6.4					
U6	7.00	Peat	364						1.18	0.25	V	58	-
U7	8.5	▪	303						1.19	0.29	V	42	-
U8	10.0	▪	297						1.21	0.30	V	48	-

Notes
U Undisturbed
B Bulk
D Disturbed

NP Non Plastic

Scanned with CamScanner

Summary of Laboratory Test Data

Client : Brichar Ltd.,
Location : Flixborough

Sample Details			Classification				Chemical		Density		Strength		
No. Type	Depth m.	Description	w %	LL %	PL %	PI %	SO$_4$ g/l	pH	Bulk Density Mg/m^3	Dry Density Mg/m^3	Type	c kN/m^2	o Deg.
BH5													
U1	1.00	Silty stony Clay	25.0						1.84	1.47	V	77	-
U2	2.00	Silty Clay	39.0						1.70	1.22	V	58	-
U3	3.00	"	58.0						1.67	1.05	V	18	-
U4	4.00	"	54.0						1.66	1.08	V	21	-
U5	5.50	Peat	342						1.13	0.25	V	24	-
W1	6.25	Groundwater					0.44	6.7					
U6	7.00	Peat	354						1.11	0.24	V	19	-
U7	8.50	"	372						1.09	0.23	V	15	-
U8	10.0	"	388						1.14	0.23	V	17	-

Notes
U Undisturbed
B Bulk
D Disturbed

NP Non Plastic

Scanned with CamScanner

HUMBERSIDE MATERIALS LABORATORY
Atherton Way, Brigg
North Lincolnshire, DN20 8AR
Tel & Fax 01652 652753

CHEMICAL ANALYSIS
1 of 6

Summary Sheet

Sample References **S/50291 – S/50297** **Client** Jembuild
Grimsby

Site	Rainham Steel, Stather Road, Flixborough
Location	see below
Material	Clayey SAND with Gravels

Date sampled 03/10/2018 Sampled by client

Analytical Report

Report / Contract No.	-	74505-1	74505-2	74505-3	74505-4	74505-5	74505-6	74505-7
Sample I.D.	**-**	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1	TP6-1	TP7-1
Depth	-	0.10-0.30	0.10-0.20	0.05-0.10	0.10-0.30	0.10-0.40	0.10-0.25	0.05-0.10

Testing **-** Total Petroleum Hydrocarbons (TPH)
Poly aromatic hydrocarbons (PAH)
Asbestos identification

Accompanying Pages - 2-6 of 6

Comments

File ref	0839/4666/G
Date tested	15/10/2018
Date reported	19/10/2018

Signed: - M.J. Green C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request
Samples will normally be kept for 14 days from the date reported
Tested by UKAS laboratory 2531

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
74505-1	S/50291 TP1-1	-	Clayey Sand with Gravel	-	-	8.4
74505-2	S/50292 TP2-1	-	Clayey Sand with Gravel	-	-	7.0
74505-3	S/50293 TP3-1	-	Clayey Sand with Gravel	-	-	8.6
74505-4	S/50294 TP4-1	-	Clayey Sand with Gravel	-	-	16.2
74505-5	S/50295 TP5-1	-	Clayey Sand with Gravel	-	-	7.8
74505-6	S/50296 TP6-1	-	Clayey Sand with Gravel	-	-	5.3
74505-7	S/50297 TP7-1	-	Clayey Sand with Gravel	-	-	4.3

Chemtech Environmental Limited

SOILS

Lab number			74505-1	74505-2	74505-3	74505-4	74505-5	74505-6
Sample id			S/50291 TP1-1	S/50292 TP2-1	S/50293 TP3-1	S/50294 TP4-1	S/50295 TP5-1	S/50296 TP6-1
Depth (m)			-	-	-	-	-	-
Date sampled			03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Test	**Method**	**Units**						
PAH								
Naphthalene	CE087 ^{M}	mg/kg	0.05	0.08	0.35	0.08	0.05	0.26
Acenaphthylene	CE087 ^{M}	mg/kg	<0.01	<0.01	0.03	<0.01	<0.01	0.05
Acenaphthene	CE087 ^{M}	mg/kg	<0.01	<0.01	0.05	<0.01	<0.01	0.04
Fluorene	CE087 ^{U}	mg/kg	<0.01	<0.01	0.02	<0.01	<0.01	0.05
Phenanthrene	CE087 ^{M}	mg/kg	0.07	0.04	0.60	0.06	<0.02	0.64
Anthracene	CE087 ^{U}	mg/kg	<0.02	<0.02	0.14	<0.02	<0.02	0.16
Fluoranthene	CE087 ^{M}	mg/kg	0.11	0.06	0.94	0.11	<0.02	0.87
Pyrene	CE087 ^{M}	mg/kg	0.10	0.05	0.85	0.10	<0.02	0.82
Benzo(a)anthracene	CE087 ^{U}	mg/kg	0.04	<0.02	0.49	0.02	<0.02	0.44
Chrysene	CE087 ^{M}	mg/kg	0.06	<0.01	0.56	0.04	0.01	0.46
Benzo(b)fluoranthene	CE087 ^{M}	mg/kg	0.07	<0.02	0.72	0.06	<0.02	0.60
Benzo(k)fluoranthene	CE087 ^{M}	mg/kg	<0.02	<0.02	0.32	<0.02	<0.02	0.23
Benzo(a)pyrene	CE087 ^{U}	mg/kg	0.04	<0.02	0.52	<0.02	<0.02	0.41
Indeno(123cd)pyrene	CE087 ^{M}	mg/kg	<0.02	<0.02	0.28	<0.02	<0.02	0.21
Dibenz(ah)anthracene	CE087 ^{M}	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 ^{M}	mg/kg	<0.02	<0.02	0.30	<0.02	<0.02	0.23
PAH (total of USEPA 16)	CE087	mg/kg	0.53	<0.27	6.16	0.46	<0.27	5.48
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	<1	3	<1	<1	3
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	1	2	3	1	2	3
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	1	<1	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	<4	<4	<4	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	23	30	48	20	28	37
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	23	13	<10	20	18
Subcontracted analysis								
Asbestos (qualitative)	$	-	-	-	-	-	-	-

SOILS

Lab number			74505-7	74505-8	74505-9
Sample id			S/50297 TP7-1	S/50298 Heap	S/50298 Heap 2
Depth (m)			-	-	-
Date sampled			03/10/2018	03/10/2018	03/10/2018
Test	**Method**	**Units**			
PAH					
Naphthalene	CE087 ^{M}	mg/kg	0.01	-	-
Acenaphthylene	CE087 ^{M}	mg/kg	<0.01	-	-
Acenaphthene	CE087 ^{M}	mg/kg	<0.01	-	-
Fluorene	CE087 ^{U}	mg/kg	<0.01	-	-
Phenanthrene	CE087 ^{M}	mg/kg	<0.02	-	-
Anthracene	CE087 ^{U}	mg/kg	<0.02	-	-
Fluoranthene	CE087 ^{M}	mg/kg	<0.02	-	-
Pyrene	CE087 ^{M}	mg/kg	<0.02	-	-
Benzo(a)anthracene	CE087 ^{U}	mg/kg	<0.02	-	-
Chrysene	CE087 ^{M}	mg/kg	<0.01	-	-
Benzo(b)fluoranthene	CE087 ^{M}	mg/kg	<0.02	-	-
Benzo(k)fluoranthene	CE087 ^{M}	mg/kg	<0.02	-	-
Benzo(a)pyrene	CE087 ^{U}	mg/kg	<0.02	-	-
Indeno(123cd)pyrene	CE087 ^{M}	mg/kg	<0.02	-	-
Dibenz(ah)anthracene	CE087 ^{M}	mg/kg	<0.02	-	-
Benzo(ghi)perylene	CE087 ^{M}	mg/kg	<0.02	-	-
PAH (total of USEPA 16)	CE087	mg/kg	<0.27	-	-
TPH					
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	-	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	-	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	-	-
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	-	-
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	<1	-	-
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	-	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	-	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	-	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	<10	-	-
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	-	-
Subcontracted analysis					
Asbestos (qualitative)	$	-	-	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
74505-1	S/50291 TP1-1	-	N	
74505-2	S/50292 TP2-1	-	N	
74505-3	S/50293 TP3-1	-	N	
74505-4	S/50294 TP4-1	-	N	
74505-5	S/50295 TP5-1	-	N	
74505-6	S/50296 TP6-1	-	N	
74505-7	S/50297 TP7-1	-	N	

APPENDIX D PHASE ONE ENVIRONMENTAL SITE ASSESSMENT, ERM (2021)

Date: May 2022

North Lincolnshire Green Energy Park

Appendix D - Phase I Environmental Site Assessment Report

March 2022

Project No.: EN010116

The business of sustainability

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North Lincolnshire Green Energy Park

Appendix D - Phase I Environmental Site Assessment

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[Double click to insert signature] Name Job title	[Double click to insert signature] Name Job title

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CONTENTS

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Acronyms and Abbreviations

AOD	Above Ordnance Datum
BGL	Below Ground Level
BGS	British Geological Survey
CHP	Combined Heat and Power
CIEH	Chartered Institute of Environmental Health
COMAH	Control of Major Accident Hazards
CSM	Conceptual Site Model
DCO	Development Consent Order
DEFRA	Department for Environment, Farming and Rural Affairs
EFW	Energy From Waste
EA	Environment Agency
EIA	Environmental Impact Assessment
EPH	Extractable Petroleum Hydrocarbons
ERF	Energy Recovery Facility
ERM	Environmental Resources Management
ESA	Environmental Site Assessment
GAC	Generic Assessment Criteria
HSC	Hazardous Substances Consents
IPC	Integrated Pollution Control

IPPC	Integrated Pollution Prevention and Control
LQM	Land Quality Management
m bgl	m below ground level
PAHs	Poly Aromatic Hydrocarbons
PFAS	Per- and Polyfluoroalkyl Substances
S4ULs	Suitable 4 Use Levels
SAC	Special Area of Conservation
SGVs	Soil Guidance Values
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
UK	United Kingdom
WFD	Water Framework Directive
YALPAG	Yorkshire and Lincolnshire Pollution Advisory Group

1. INTRODUCTION

1.1 Preamble

1.1.1.1 Environmental Resources Management (ERM) was commissioned by the Applicant to undertake a Phase I Environmental Site Assessment (ESA) of the Project site required for the North Lincolnshire Green Energy Park located to the west of Flixborough, United Kingdom (UK). This Phase I ESA forms part of a wider Development Consent Order (DCO) application, which the client intends to submit to the UK Planning Inspectorate.

1.2 Background

1.2.1.1 ERM understands that the client intends to construct a new Energy Recovery Facility (ERF) and associated development (the Project) which constitutes a thermal combustion combined heat and power (CHP) plant with a potential power output capacity of up to 100 MWe from a total thermal capacity of 316 MWth and the client requires a Phase I ESA to be completed to inform the baseline for the Environmental Impact Assessment (EIA) in support of the DCO application.

1.2.1.2 The main part of the site is located on brownfield and agricultural land to the south and east of Flixborough Wharf and south of the Flixborough Industrial Estate in North Lincolnshire. The site includes land within and adjacent to Flixborough Port (RMS Trent Ports) on the River Trent in North Lincolnshire.

1.3 Report Aim and Scope of Works

1.3.1.1 In general terms, the purpose of this assessment is to provide the client (and ultimately the Planning Inspectorate) with a good understanding of the site’s history, its environmental setting and its potential to be affected by land contamination.

1.3.1.2 In line with the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG) guidance concerning the development of land affected by contamination (Technical Guidance for Developers, Land Owners and Consultants, YALPAG, v11.2 2020), this is accomplished by the following:

- an appraisal of the site’s history using historical mapping and other records where available;
- an assessment of the environmental setting of the site (in terms of its vulnerability and sensitivity to contamination) by reference to geological / hydrogeological mapping and other publicly available data (e.g. UK Environment Agency (EA) records);
- an assessment of the current / proposed land use and surrounding land uses by reference to publicly available permit / licence databases.
- a review of previous reports relating to land contamination at the site and any associated remedial works;
- formulation of a Conceptual Site Model (CSM); and
- completion of preliminary risk assessment based on the source-pathway-receptor model, with reference to the above CSM.

1.4 Limitations

1.4.1.1 This report is based upon the application of scientific principles and professional judgment to certain facts with resultant subjective interpretations. Professional judgments expressed herein are based on the information currently available within the limits of the existing data, scope of work, budget and schedule. To the extent that more definitive conclusions are required than are warranted by the currently available information, it is specifically ERM's intent that the conclusions and recommendations stated herein will be intended as guidance and not necessarily a firm course of action, except where explicitly stated as such. ERM makes no warranties, express or implied, including, without limitation, warranties as to merchantability or fitness for a particular purpose. In addition, the information provided to the client in this report is not to be construed as legal advice.

1.4.1.2 Nothing contained in this report shall be construed as a warranty or affirmation by ERM that the site described in the report is free of any potential environmental liability.

1.5 Report Structure

1.5.1.1 The remainder of the report is structured as follows:

- Section 2 – Site Location and Environmental Setting;
- Section 3 – Site History and Previous Works;
- Section 4 – Public Database Review;
- Section 5 – Conceptual Site Model;
- Section 6 – Refinement of Conceptual Site Model; and
- Section 7 – Recommendations.

1.5.1.2 The following supporting information is provided within other report appendices:

- Appendix A – Figures (Document Reference 6.2.8, Appendix A); and
- Appendix B – Landmark Envirocheck Report (including Historical Maps) (**Document Reference 6.2.8, Appendix B**).

2. SITE LOCATION AND ENVIRONMENTAL SETTING

2.1 Site Location and Layout

2.1.1.1 The site, as identified for the purpose of this assessment, is based on the Application Land boundary which occupies a total area of approximately 263 hectares and is located on the east bank of the tidal River Trent immediately west and south of the village of Flixborough and approximately 2 km to the northwest of Scunthorpe in the north east of the United Kingdom (UK). The site location is presented in Figure 1, Appendix A (**Document Reference 6.2.8, Appendix A**).

2.1.1.2 The Project comprises Energy Recovery Facility (ERF) and Associated Development. The ERF will be capable of converting up to 760,000 tonnes of non-recyclable waste into 95 MW of electricity and a carbon capture, utilisation and storage (CCUS) facility which will treat a proportion of the excess gasses released from the ERF to remove and store carbon dioxide (CO2) prior to emission into the atmosphere.

2.1.1.3 The Project will include the following Associated Development to support the operation of the NSIP:

- a bottom ash and flue gas residue handling and treatment facility;
- a concrete block manufacturing facility;
- a plastic recycling facility;
- a hydrogen production and storage facility;
- an electric vehicle and hydrogen refuelling station;
- battery storage;
- a hydrogen and natural gas above ground installations;
- a new access road and parking;
- a gatehouse and visitor centre with elevated walkway;
- railway reinstatement works including, sidings at Dragonby, reinstatement and safety improvements to the 6km private railway spur, and the construction of a new railhead with sidings south of Flixborough Wharf;
- a northern and southern district heating and private wire network;
- habitat creation, landscaping and ecological mitigation, including green infrastructure and 65 acre wetland area;
- new public rights of way and cycle ways including footbridges;
- sustainable drainage systems and flood defence; and
- utility constructions and diversions.

2.1.1.4 The proposed site layout is presented in Figure 2, Appendix A (**Document Reference 6.2.8, Appendix A**). The

2.2 Surrounding Area

2.2.1.1 The site area is located to the east of the River Trent, adjacent to Flixborough Industrial Estate, and extends to the east beyond Foxhills Industrial Estate, and to the South, encompassing the M181. Scunthorpe lies to the southeast. Land use in the area surrounding each element of the Project is further summarised in Table 1.

Table 1: Land Use Surrounding the Project Elements

Project Element	Direction	Land Use
ERF and Core Scheme	North	Flixborough Industrial Estate beyond which is agricultural land
	South	Agricultural land
	East	Agricultural land
	West	River Trent and wharf at Flixborough Port, beyond which are residential properties (Amcotts village approximately 400m west) and agricultural land
Associated Development and Mitigation	North	Agricultural land
	South	Agricultural land with Scunthorpe, including residential properties, to the southeast.
	East	Flixborough Industrial Estate lies immediately to the east in the central area for development and mitigation. The remaining land is mainly agricultural with some industrial properties at the southern end. Flixborough village is located approximately 500m to the east.
	West	River Trent and wharf at Flixborough Port, beyond which are residential properties (Amcotts village approximately 400m west) and agricultural land
Wharf Extension	North	Agricultural land
	South	Agricultural land
	East	Flixborough Industrial Estate
	West	River Trent adjacent, beyond which are residential properties (Amcotts village approximately 300m west) and agricultural land
Rail Line Upgrade	North	Agricultural land with Flixborough village located to the north of the central area of the rail line upgrade
	South	Mixed agricultural land, Flixborough Industrial Estate to the south of the western end and Normanby Enterprise Park to the south of the eastern end of the rail line upgrade.
	East	Agricultural land
	West	River Trent adjacent, beyond which are residential properties (Amcotts village approximately 300m west) and agricultural land
CHP Offtake to Council Offices	North	Foxhills Industrial Estate,
	South	Mixed residential properties, industrial properties and agricultural land.
	East	Mixed industrial, brownfields and agricultural land
	West	Agricultural land

Project Element	Direction	Land Use
CHP Offtake to proposed housing and industrial development	North	Agricultural land with the M181 running north-south through this element.
	South	Agricultural land with the M181 running north-south through this element.
	East	Agricultural land, beyond which are residential properties (Scunthorpe), the closest of which are 200m west at the northern end
	West	Agricultural land

2.3 Topography

2.3.1.1 The site is situated at an elevation of approximately 2m to 8m above Ordnance Datum (AOD) and is generally lower in the north and south and slightly elevated adjacent to Flixborough Industrial Estate. Land in the vicinity of the site is generally flat to the north and south in line with the River Trent (adjacent to the west), with an increase in elevation towards the east.

2.4 Geology

2.4.1.1 British Geological Survey (BGS) digital mapping[1] indicates that (Made Ground notwithstanding) the central and northern parts of the site are directly underlain by superficial deposits of alluvium (sand, silt and clay) described as unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta. Towards the east the site is underlain by blown sand described as sand that has been transported by wind, or sand consisting predominantly of wind borne particles. At the far east of the red line boundary, including the eastern laydown area, no superficial deposits are indicated. At the southern end of the site superficial deposits are shown as predominantly Warp (clay and silt), described as alluvium deposited by artificial flooding. The alluvial deposits, including the Warp, are identified as being in the region of three to 17m thickness (BGS borehole SE81SE21) and the blown sands are identified as being approximately 1.5m in thickness (BGS borehole SE81SE87). The 1982 BGS drift map, Sheet 89, Brigg 1:50,000, indicates that the alluvium, warp and blown sands are all underlain by sand and gravel of the Vale of York Glacial Lake Deposits.

2.4.1.2 The underlying bedrock across the majority of the site, with the exception of the proposed rail line upgrade and CHP offtake to council offices, is mapped as Mercia Mudstone Formation, described as "Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite widespread; sandstones are also present". Immediately to the east of the Mercia Mudstone Formation is the Penarth Group (mudstone) The underlying bedrock at the eastern side of the site (proposed rail line upgrade and CHP offtake to council offices) is mapped as Scunthorpe Mudstone Formation, described as "Grey, variably calcareous and silty, blocky or fissile mudstone with thin beds of argillaceous limestone (bioclastic or micritic) and calcareous siltstone, particularly near base and in upper part, which is ferruginous in the type area." The Frodingham Ironstone Member (Ironstone) is recorded beneath the very

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[1] [redacted]

eastern extent of the site, including the eastern laydown area. These (bedrock) deposits are listed as extending deeper than 30m across the site.

2.5 Hydrogeology

2.5.1.1 EA digital mapping[2] indicates that the superficial deposits (Alluvium, Warp and Blown Sands) are designated as Secondary A Aquifer units and are defined as “permeable layers that can support local water supplies, and may form an important source of base flow to rivers”. The underlying bedrock (Mercia Mudstone Group, Penarth Group and Scunthorpe Mudstone Formation) are designated as Secondary B aquifer units, which are defined as “lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers”.

2.5.1.2 Five groundwater abstractions are known to be present within 1km of the site, the nearest being an abstraction from the Blown Sands adjacent to the CHP Offtake to the south area for Spray irrigation (at Brumby Common West, Scunthorpe). The site does not lie within a groundwater Source Protection Zone (SPZ) of any type. The groundwater resources at the site have previously been classified[3] by the EA as having ‘Good’ quantitative status and ‘Good’ chemical quality in 2019 under the Water Framework Directive (WFD).

2.5.1.3 Due to the topography of the surrounding area and the proximity of the River Trent adjacent to the west, groundwater flow is inferred to be towards the west, however due to the tidal nature of the River Trent, groundwater elevations near to the river may also be tidally influenced.

2.6 Hydrology

2.6.1.1 The nearest surface water feature is the River Trent which is located adjacent to the western boundary. The River Trent, in the vicinity of the site, is within the Humber Estuary Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and Ramsar site.

2.6.1.2 Several other minor watercourses/field drains are present within the site’s red line boundary and surrounding the site (<250m), as summarised in Table 2.

Table 2: Summary of Site Hydrology

Feature	Location	Flow Direction	Comments
River Trent (Humber Upper)	Adjacent to the western boundary	S to N	Water quality information for the Humber Upper has an overall water body classification as Moderate in 2019 under the WFD. Within the Humber Estuary SSSI, SAC and Ramsar site.
Burton and Flixborough Drain (and associated field drains)	Within the northern portion of the site	Unknown, likely S to N	Water quality not rated by EA. Discharges to the River Trent c.1.4km N of the site.
Lysaght’s Drain (and associated field drains)	Within the southern portion of the site	Unknown, likely E to W	Water quality not rated by the EA.

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[2] https://magic.defra.gov.uk/MagicMap.aspx

[3] https://environment.data.gov.uk/catchment-planning/

Feature	Location	Flow Direction	Comments
Winterton Beck	c.20m north of railway spur	Unknown, likely S to N	Water quality not rated by the EA.

2.6.1.3 Thirty-five surface water abstractions are listed within 1km of the site, with 13 present within the site's red line boundary. The on-site surface water abstractions are listed below:

- W S Chapman & Sons, Brumby – Tributary of Warping Drain (1), for spray irrigation;
- three abstractions: W S Chapman & Sons, Warping Drain – Reach 1, for spray irrigation;
- three abstractions: W S Chapman & Sons, Warping Drain – Reach 2, for spray irrigation;
- three abstractions: Norman Jackson (Flixborough) Limited, Lysaghts Drain, for spray irrigation; and
- three abstractions: Norman Jackson (Flixborough) Limited, Burton & Flixborough Drain, for spray irrigation.

2.6.1.4 Fifty-nine discharge consents are listed within 1km of the site, seven are listed within 250m of the site boundary and 13 are listed within the site's red line boundary, of which five have been revoked. The eight active (no revocation date supplied) on-site discharge consents are listed below:

- W H Martin Limited, discharging process water into the River Trent;
- British Steel, discharging process water into the River Trent;
- Flixborough Wharf Limited, discharging final treated effluent into the River Trent;
- Sewage Disposal Works (Unknown), discharging final treated effluent into the River Trent;
- Norman Jackson (Farmers) Ltd, discharging sewage effluent into an unknown receptor;
- Crystal Polymers – Flixborough, unknown discharge into an unknown receptor;
- Lysaght's Scunthorpe Works, discharging sewage effluent into an unknown receptor; and
- North Lincolnshire Council, discharging final treated effluent onto land.

2.6.1.5 UK digital flood mapping[4] indicates that the majority of the site (adjacent to Flixborough Industrial Estate) is located within an area that has a high probability of flooding (Flood Zone 3 – area that benefits from flood defences). A flood risk assessment is currently being prepared for this site.

2.6.1.6 Based on the above, ERM considers surface water at the site to be of high vulnerability and of high sensitivity.

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[4] https://flood-map-for-planning.service.gov.uk/

3. SITE HISTORY AND PREVIOUS WORKS

3.1 Site History

3.1.1.1 The history of the site has primarily been determined by reference to historical mapping dating from c.1854 to 2020. These maps were obtained by ERM as part of a Landmark Envirocheck report (ref. 269869084_1_1 01/12/2020), which was procured for the specific purposes of this assessment. Where available, other sources (such as the EA public registers and other publicly available records) have also been reviewed.

3.1.1.2 In summary, the above sources indicate that the majority of the site has comprised undeveloped / agricultural land to present day, with some development associated with Flixborough Wharf and Flixborough Industrial Estate as well as construction of the railways and other road infrastructure. A former landfill/waste management facility is located within the eastern extent of the site (proposed eastern laydown area), at least some of which appears to have been capped and reverted to agricultural land, however the Envirocheck indicates that there may be an operational registered landfill in the area of the proposed eastern laydown area (see Section 4.3.1).

3.1.1.3 Table 3 provides further detail of the history of the site and that of the surrounding area (up to 1 km), as determined by reference to the historical maps and other sources where available.

Table 3: Site History

Date	On Site	Off Site (up to 1km)	Source(s)
1854 - 1907	■ The site is depicted as undeveloped / agricultural land with field drains. ■ Flixborough Stather residential properties in the centre of the site (the northern end of the proposed ERF and core scheme). ■ A 'Mineral Railway' and 'Barnsley to Barnetby Railway' are shown running east to west across the proposed laydown area at southern most extent of the site. ■ Road infrastructure associated with Scunthorpe is shown within the southeast tail of the red line boundary.	■ Predominantly undeveloped / agricultural land. ■ Road infrastructure surrounding the site in line with the present A18 and minor B roads. ■ Low density residential area present adjacent to the south of the site, labelled Scunthorpe. ■ Flixborough village adjacent to the east of the site. ■ Trent, Frodingham and Lindsey Ironworks and their associated railways are present c.100m to 1km south east of the site (south east of the CHP offtake to Council Offices).	Lincolnshire 1854, 1886, 1907; Yorkshire 1854, 1854-1855, 1855, 1892, 1893.
1908	■ No significant changes.	■ Area remains predominantly undeveloped / agricultural. ■ 'North Lindsey Light Railway' adjacent to the eastern laydown area. ■ Further expansion of the Ironworks to the south east.	Lincolnshire 1908
1938-1946	■ Construction of Flixborough Wharf on the western side of the site along the River Trent.	■ Significant medium density residential development associated with the expansion of Scunthorpe is now present adjacent to the south.	Lincolnshire 1938-1946,

Date	On Site	Off Site (up to 1km)	Source(s)
1946	■ A tank farm is present in the centre of the site (the northern end of the ERF and core scheme) adjacent to Flixborough Industrial Estate	■ Industrial development of Flixborough Industrial Estate, immediately to the north of the proposed ERF and Core Scheme, including construction of several buildings.	Lincolnshire 1946
1950-1969	■ A drain is shown adjacent to the tank farm from c.1966. ■ Construction of the railway line (mineral railway) in the eastern tail of the red line boundary associated with the adjacent Steel Works. ■ Railway sidings in the eastern laydown area.	■ Construction of nitrogen fertiliser works within Flixborough Industrial Estate on land immediately to the north of the proposed ERF and Core Scheme. ■ Ironstone Quarry adjacent to the north of the proposed eastern laydown area, with several associated opencast ironstone pits surrounding the area to the east and south. ■ The western side of the eastern laydown area is shown as a slag heap. ■ Construction and expansion of a Steel Works east of the central area of the site (associated development and mitigation), c.500m southeast of Flixborough village). ■ Significant industrial/railway development is present c.1km south east of the site, part of the Ironworks. ■ Construction of Grove Wharf and associated buildings/jettys/tanks c.1km southwest.	Lincolnshire 1950; OS 1956, 1966, 1968-1969, 1969
1971 - 1987	■ A refuse tip is shown in the eastern laydown area to the south of the quarry railway line.	■ Further significant residential expansion of the town of Scunthorpe c.1km to the east. ■ Further development of the Ironstone Quarry adjacent to the east of the site. ■ Further development of the Steelworks adjacent and c.500m to the east of the site. ■ The nitrogen fertiliser works has been renamed as a chemical works within Flixborough Industrial Estate, with a sludge bed adjacent to the site boundary.	OS 1971, 1977, 1982, 1982-1987; Additional SIMs 1980-1985
1989-1995	■ Tanks are no longer present in the centre of the site, warehouse buildings are now shown to be present here adjacent to the boundary with Flixborough Industrial Estate (the northern end of the proposed ERF and core scheme). ■ An unspecified works is shown to the west of the southern end of	■ The sludge bed and chemical works is no longer labelled adjacent to the east of the site, this is now labelled Flixborough Industrial Estate. ■ Park Ings Farm buildings have been built adjacent to the east of the site (c.800m south of Flixborough village). ■ Construction of the M180 c.900m south.	Additional SIMs 1989-1991; Large Scale National Grid Data 1994, 1995; OS 1991, 1991-1994

Date	On Site	Off Site (up to 1km)	Source(s)
	the proposed ERF and Core Scheme. - Construction of the A1077 and M181 roads in the south of the site. - Slight expansion in the size of the refuse tip.	- The ironstone quarry to the north of the proposed eastern laydown area and associated pits to the east and south have become disused and the railway lines/sidings associated with the quarry are no longer shown. - The steel works to the east of the central area of the site (proposed associated development and mitigation area), is no longer operational with tanks and railway sidings having been removed. This site has now been replaced with warehousing and tanks as part of Foxhills Industrial Estate and expanded further south. - Additional commercial / industrial development, including some tanks, is identifiable adjacent to the east (west of Foxhills Industrial Estate) labelled Skippingdale Industrial Park.	
1999-2020	- Minor expansion of the warehousing at the northern end of the proposed ERF and Core Scheme. - By c.2020 the refuse tip is no longer identified on mapping.	- Further warehousing development north of Foxhills Industrial Estate across the land of the former quarry. - Minor residential expansion of Scunthorpe adjacent to the east (east of A1077).	10k Raster Mapping 1999-2000, 2000; Street View 2020; Google Earth

3.2 Previous Works

3.2.1.1 A Report on Ground Investigation was carried out by Ian Farmer Associates (1998) Limited for a proposed Energy from Waste (EFW) Plant immediately north of Stather Road, at the southern end of the Flixborough Industrial Estate in 2018, to support the suitability of the site to support the construction of the power plant. Six boreholes were advanced across the area of the proposed EFW Plant; *"The ground conditions encountered on the site was principally a thin covering of Made Ground overlying alluvial deposits of soft laminated clay, organic clay and peat onto a gravelly sand. The alluvial deposits overlay the Mercia Mudstone which appeared to be initially weathered to a gravelly clay with bedrock found at 20.10 to 22.60mbgl. Groundwater was encountered at 11.70/12.3mbgl rising to 6.3/ 6.7mbgl due to the nearby influence of the River Trent"*, with ten soil samples, one groundwater sample and four soil leachate samples scheduled for chemical analysis (metals, EPH, PAH, pH, total cyanide, soil organic matter, sulphate, sulphur and asbestos):

- The results were screened against Suitable 4 Use Levels (S4ULs), determined by Land Quality Management (LQM) and Chartered Institute of Environmental Health (CIEH), or CLEA soil guidance values (SGVs) published in EA Science Reports SC050021/SR3, and SC050021 and Department for Environment, Farming and Rural Affairs (DEFRA) C4SL (Category 4 Screening Levels) for lead, in accordance with current legislation and guidance.
- Only Nickel was detected above the Generic Assessment Criteria (GAC) in one location (BH2 at 0.5m below ground level (BGL)) at 1200mg/kg. A mean value test was applied to the results and determined the *"elevated contaminant is unlikely to present a*

significant risk to human health in relation to the proposed site end use and requires no further consideration".

- Leachate analysis of the soils was carried out to determine risks to controlled waters "A sample of Made Ground from BH4 at 1.0mbgl indicated leachable values for arsenic, copper and lead above the water supply regulations but the content of these metals in the soil from this sample was low and below residential with gardens usage. In light of this the risk to the River Trent is considered to be a low risk".

3.2.1.2 Three rounds of ground gas analysis were also carried out at the monitoring well standpipes. Gas Screening Values were calculated and gas protection measures of Characteristic Situation 3 were calculated, however, the gas sampling rounds were not undertaken in compliance with guidelines *(CIRIA Document C659)*. Ian Farmer Associates (1998) Limited recommended *"that a continued programme of monitoring be carried out to comply more closely with these guidelines before final design is undertaken"*.

3.3 Summary of Site Conditions

3.3.1 Observed Geology on Site

3.3.1.1 The observed geological sequence at the proposed EFW Plant on Stather Road, from the Report on Ground Investigation carried out by Ian Farmer Associates (1998) Limited, is presented in Table 4. Observed on site geology is in line with the Alluvium and Mercia Mudstone identified by the BGS.

Table 4: Geological Sequence

Strata Encountered	Depth encountered (m bgl)		Strata Thickness (m)
	From	To	
Made Ground	0.00	0.60 to 2.10	0.60 to 2.10
Light brown sandy gravelly Clay	0.6 to 1.40	1.0 to 2.0	0.40 to 1.25
Laminated light brown sandy Clay	1.0 to 2.0	1.85 to 3.20	0.85 to 1.70
Laminated organic light grey brown sandy Clay	1.85 to 3.20	4.70 to 6.70	2.85 to 4.60
Laminated brown sandy Clay with peat	6.20 to 6.70	12.20 to 12.50	5.80 to 6.0
Peat	4.70 to 6.70	11.70 to 12.30	5.60 to 7.0
Gravelly Sand	11.70 to 12.50	17.10 to 19.40	4.90 to 7.10
Brown sandy gravelly Clay	17.20	18.50	1.30
Red brown sandy gravelly Clay	17.10 to 19.40	20.10 to 22.60	1.80 to 4.20
Mercia Mudstone	20.10 to 22.60	30.0 to 30.10	7.40 to 9.30

3.3.1.2 BGS borehole (SE81SE21) within the area of the proposed ERF and Core Scheme recorded the depth of the Alluvium to c.17m bgl, underlain by the Mercia Mudstone in line with the observations by Ian Farmers Associates. This included silts, peat and clay within the top 11 m with sands and gravels to c.17m bgl.

3.3.1.3 From BGS information the geological sequence in Table 4 is likely to be predominant across the majority of the site within the red line boundary, with the exception in the east where blown sands are present, and an ironstone bedrock is present beneath the eastern laydown area. A conceptual east to west geological cross section using BGS boreholes across the site, is provided in Appendix A, Figure 3 (**Document Reference 6.2.8, Appendix A**) with a corresponding BGS borehole location plan.

3.3.2 Hydrogeology on Site

3.3.2.1 Depth to groundwater across the site recorded by Ian Farmers Associates (1998) Ltd noted groundwater strike was c.12m bgl rising to c.6.5m bgl 20 minutes after installation. On subsequent visits depth to water ranged between 1.65m bgl and 2.08m bgl, suggesting the groundwater beneath the site is confined and the potentiometric head was broadly equivalent of the level of the River Trent. Due to the topography of the surrounding area and the proximity of the River Trent adjacent to the west, groundwater flow is inferred to be towards the west, however, groundwater flow may be affected by tidal influences from the River Trent.

3.3.2.2 Based on the above, ERM considers groundwater resources at the site to be of moderate vulnerability and of moderate sensitivity.

4. PUBLIC DATABASE REVIEW

4.1 Introduction

4.1.1.1 This section summarises known current / recent land use at the site and in the vicinity of the site, by reference to regulatory permitting records and other relevant contemporary records. These were obtained by ERM as part of the Envirocheck report for the specific purposes of this assessment, or are publicly available from other sources (for example the EA public registers).

4.2 Active / Operational Permits

4.2.1.1 The site is located adjacent to Flixborough Industrial Estate, with other Industrial Estates located within 1 km of the site. As such, numerous permitted activities are registered within a 1km distance of the site as are summarised in the following section.

4.2.2 Integrated Pollution Prevention and Control (IPPC) Permits

4.2.2.1 Three IPPC permits / permit variations are registered to the site:

- two entries for Pet Polymers Ltd for ‘Organic Chemicals; Plastic Materials Eg Polymers’, dated January 2005 and April 2013. These are considered to be obsolete since the permit has been varied and then surrendered; and
- one entry appears registered to North Lincolnshire Council (Conesby Quarry Landfill) for ‘Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste’, dated January 2005. This permit is considered to be obsolete since the permit has been superseded by variation.

4.2.2.2 A further 40 IPPC permits / permit variations are reported within 1km of the site. The two nearest of these (located within 50m of the site boundary), listed as ‘effective’, relate to:

- Arl 018 Limited, Stather Road, located c.27m northwest of the site boundary for a ‘New Medium Combustion Plant’, dated July 2019; and
- North Lincolnshire Council (Conesby Quarry Landfill), located c.32m northwest of the site boundary for ‘Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste’, dated March 2016.

4.2.3 Integrated Pollution Control (IPC) Permits

4.2.3.1 Three superseded IPC permits / permit revocations are registered to the site:

- three entries for Crystal Polymers Ltd for ‘Manufacture and use of Organic Chemicals within the Chemical Industry’, dated February 1994, November 1998 and August 2000. These are considered to be obsolete since the permits were superseded then revoked.

4.2.3.2 A further 17 superseded IPC permits / permit revocations are registered within 500m of the site, as below:

- nine entries appear registered to Fibrogen Ltd for ‘Combustion processes within the fuel and power industry’. These are reported at distances of c.111m northeast from the site;
- five entries appear registered to Koppers Uk Ltd for ‘Tar And Bitumen Processes’. These are reported at distances of c.281m-286m southeast of from the site;

- two entries appear registered to Edinburgh Oil and Gas Ltd for ‘Petroleum processes within the Fuel & Power Industry’. These are reported at distances of c.352m-355m southwest from the site; and
- one entry registered to Jotun Paints (Europe) Ltd, Stather Road for ‘Inorganic Chemical processes within the Chemical Industry’. This is reported at a distance of c.108m west from the site.

4.2.4 Local Authority Integrated Pollution Prevention and Control

4.2.4.1 Four local authority Integrated Pollution Prevention and Control permits are registered within 1km of the site, relating to:

- Can Pack Uk Ltd for 6/23 Production and Processing of Metals, c.151m south;
- Mondi Packaging 6/17 Coating, c.213m southeast;
- Corus Uk Ltd for SG6 Other Activities, c.835m southeast; and
- William Blyth Ltd for SG7 Mineral Industries, c.835m southeast;

4.2.5 Local Authority Pollution Prevention and Controls

4.2.5.1 Thirty-five local authority Pollution Prevention and Controls permits are registered within 1 km of the site, two of which are located within the site’s red line boundary. The two on-site permits relate to:

- Am Fletcher, for PG6/34 Respraying of road vehicles; and
- Just Car Clinic, for PG6/34 Respraying of road vehicles.

4.2.5.2 Eight permits are registered within 100m of the site boundary. These relate to:

- Murco Petroleum Ltd for PG1/14 Petrol filling station, c.11 west;
- Faber Prest Ports Ltd for PG3/5 Coal, coke and coal product processes, c.26m northeast;
- Stoneacre Motor Group for PG6/34 Respraying of road vehicles, c.46m northwest;
- Minelco Minerals Ltd for PG3/15 Mineral drying and roadstone coating processes, c.48m northeast;
- Minelco Minerals Ltd for PG3/8 Quarry processes including roadstone plants and the size reduction of bricks, tiles and concrete, c.54m northeast;
- Hygena Ltd for PG6/33 Wood coating, c.58m south;
- Just Car Clinic for PG1/14 Petrol filling station, c.69m southwest; and
- Tolsa Uk Ltd for PG3/8 Quarry processes including roadstone plants and the size reduction of bricks, tiles and concrete, c.79m northeast.

4.2.6 Local Authority Pollution Prevention and Control Enforcements

4.2.6.1 One entry relating to Winterton Road for Air Pollution Control Enforcement Notice (reference P35/3.5/04), c.245m north. No other details supplied.

4.2.7 Control of Major Accident Hazards (COMAH) Sites

4.2.7.1 Seven active COMAH permits are registered within 1km of the site, as below:

- an Upper Tier registration for Koppers Uk Limited, c.281m southeast;
- an Upper Tier registration for Boc Limited, c.487m north;
- an Upper Tier registration for Tata Steel Uk Limited, c.886 southeast;
- an Upper Tier registration for Haven Warehousing and Distribution Limited, c.116m northeast;
- a Lower Tier registration for Groveport Logistics Limited, c.937m south;
- an Upper Tier registration for Jotun Paints (Europe) Limited, c.108m west; and
- a Lower Tier registration for Colepccl Uk Ltd. C.216m southeast.

4.2.8 Planning Hazardous Substance Consents

4.2.8.1 A total of ten Hazardous Substance Consents (HSC) are reported within 1km of the site, five of which are within 250 m of the site relating to:

- two consents for Jotun Paints (Europe) Ltd c.31m and c.138m west for ‘Combination of Dangerous Substances’, no date supplied;
- two consents for C C L Industries Ltd c.197m and c.202m southeast for ‘Part C, Flammable Substance (Not in Parts A&B), Liquefied petroleum gas held at >1.4 bar where amount held is greater than or equal to 25 tonnes’, both dated November 1992; and
- British Gas Ltd c.239m southeast for ‘Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15tonnes’, dated January 1992.

4.3 Waste

4.3.1 Landfilling

4.3.1.1 A currently operational (as far as known) registered landfill site is reported within the site boundary, at the proposed eastern laydown area, located at Dragonby Landfill and licensed to Sita Products & Services Ltd (dated 1997). The site was previously licensed to Drinkwater Sabey Ltd (two licences dated 1992 and 1995) for a mixture of wastes including but not limited to contaminated rubbish/bags, fats, waxes, greases, paint waste, pulverised fuel ash, bitumen and waste treated timber. A second registered landfill site is located at Glebe Pit, along the eastern boundary of the southern extent of the area designated CHP Offtake to council offices, registered to Onward Holdings Ltd (dated 1978) for non-hazardous construction and excavation wastes, recorded as site dormant. A further 14 registered landfill sites are reported within 1km of the site boundary.

4.3.1.2 Two historical landfills are reported to be located within the site’s red line boundary at the proposed eastern laydown area. The first is registered to Onwards Holdings Ltd at Bessemer Way Landfill, first input date August 2000. No further information supplied. The second is registered to Drinkwater Sabey Ltd at Dragonby Landfill, first input date July 1990 and last input date April 1994 for Inert and Industrial Wastes. A further eleven historical landfill sites are reported within 1km of the site's red line boundary.

4.3.1.3 One BGS Recorded Landfill site is reported to be adjacent to the east of the site boundary at the eastern extent of the CHP Offtake to Council Offices, registered to Hornsby and Goodwyn at Dawes Lane.

4.3.1.4 Two Licensed Waste Management Facilities (Landfill Boundaries) are registered within the site's red line boundary at the proposed eastern laydown area: Conesby Quarry Phase I for 'Other Landfill Sites Taking Special Waste' issued March 1988; and Conesby Quarry Landfill Epr/Bv0627il for 'Waste Landfilling; >10 T/D with Capacity >25,000T Excluding Inert Waste' effective March 2016. A further Licensed Waste Management Facility (Landfill Boundaries) is located within the site's red line boundary, registered at the Dragonby Landfill but listed as closed. A further two are registered c.765m southeast and c.961m southeast at Crosby North Landfill both for 'Waste Landfilling; >10 T/D with Capacity >25,000T Excluding Inert Waste'.

4.3.1.5 Thirty-one Licensed Waste Management Facilities (Locations) are registered within 1km of the site boundary and one surrendered Licensed Waste Management Facilities (Locations) within the red line boundary. The surrendered on-site licence relates to land/premises at Stather Road for composting. The nearest currently issued licence relates to Normanby Road c.189m northwest for Household, Commercial and Industrial Waste Landfills.

4.3.2 Waste Treatment or Disposal Sites

4.3.2.1 Fifteen registered waste treatment or disposal sites are reported within 1km of the site, three are registered within 250 m of the site boundary:

- Partco Autoparts Ltd, Glebe Industrial Estate c.3m northwest of the site for waste produced by the licence holder 'Very Small (Less than 10,000 tonnes per year)';
- Anglian Water Services Ltd, Scunthorpe Depot c.193m north of the site for waste produced by the licence holder 'Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year)'; and
- Quay Minerals Ltd, Gunness Wharf c.149m northeast for waste produced by the licence holder 'Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year)'.

4.4 Pollution Incidents

4.4.1 Pollution Incidents to Controlled Waters

4.4.1.1 Fifty-six Pollution Incidents to Controlled Waters have been recorded within 1km of the site, 15 of these incidents have occurred within the site's red line boundary, all relating to Category 3 – Minor Incidents. These incidents generally comprise accidental spills of waste oils or chemicals (paints/dyes) entering the River Trent or Bottesford Beck between 1995 and 1998.

4.4.2 Prosecutions Relating to Authorised Processes

4.4.2.1 Two Prosecutions Relating to Authorised Processes are recorded within 1km of the site, relating to:

- Santon Business Park c.465m east for 'Depositing, keeping and treating waste on land without a WML - 8 Month custodial sentence served' dated June 2006; and

- Site on Sterling Business Park c.534m southeast for ‘Operating a waste facility without an environmental permit’ dated August 2012.

4.4.3 Substantiated Pollutant Incident Register

4.4.3.1 Nineteen Substantiated Pollutant Incident Register entries are recorded with 1km of the site boundary, two of which are recorded within the site boundary. The on-site entries relate to:

- Category 2 – Significant Impact to Air by Atmospheric Pollutants and Effects: Other Atmospheric Pollutant or Effect, dated June 2006; and
- Category 2 – Significant Impact to Land and Category 3 – Minor Impact to Water by Specific Waste Materials: Household Waste, dated June 2017.

4.4.4 Flixborough Disaster

4.4.4.1 On 1 June 1974 an explosion in a cyclohexane plant at Nypro UK (a chemical plant) occurred at the Flixborough industrial estate, resulting in the deaths of 28 people and 36 people were seriously injured. The HSE website[5] summarises the incident: “During the late afternoon on 1 June 1974 a 20 inch bypass system ruptured, which may have been caused by a fire on a nearby 8 inch pipe. This resulted in the escape of a large quantity of cyclohexane. The cyclohexane formed a flammable mixture and subsequently found a source of ignition. At about 16:53 hours there was a massive vapour cloud explosion which caused extensive damage and started numerous fires on the site”.

4.4.4.2 At the time of the disaster, Nypro UK produced the chemical caprolactam, used in the production of nylon, from cyclohexanone. Cyclohexanone was produced by partially oxidising hot liquid cyclohexane by compressed air. Nypro UK was situated within Flixborough Industrial Estate, north of the proposed ERF.

4.4.4.3 Due to the chemical plant being destroyed by this disaster, there is potential that other chemicals, including Poly Aromatic Hydrocarbons (PAHs), metals, asbestos and PFAS (Per- and polyfluoroalkyl substances), from firefighting foam, to have had an impact on the surrounding soil and groundwater.

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[5] Flixborough (Nypro UK) Explosion 1st June 1974 (hse.gov.uk)

5. CONCEPTUAL SITE MODEL

5.1 Introduction

5.1.1.1 The purpose of the Conceptual Site Model (CSM) is to identify potential contaminant linkages, based on the information available at this stage. The presence (or likely presence) of the following three elements is essential to the identification of a contaminant linkage:

- A potential contaminant (source) in, on, or under the land at a concentration which may cause harm or pollution;
- A receptor which may suffer harm as a result of contact with the above; and
- An exposure pathway by which the receptor may come into contact with the contaminant source.

5.1.1.2 Where all three of the above are present (or may be present), a “plausible contaminant linkage” is said to exist.

5.1.1.3 This section describes the potential contaminant sources, receptors and exposure pathways identified at the site in the context of the environmental setting and a proposed commercial end use. Based on this, the plausible contaminant linkages present at the site are determined.

5.2 Sources

5.2.1.1 Figure 4, Appendix A (**Document Reference 6.2.8, Appendix A**) presents the potential areas of concern based on the sources listed in sections 5.2.2 to 5.2.5.

5.2.2 Onsite Current Land Use

5.2.2.1 The majority of the site is undeveloped agricultural land with some brownfield land to the centre (in the area of the proposed ERF and Core Scheme), adjacent to Flixborough Wharf and Flixborough Industrial Estate. There is potential for some onsite storage of fuels and various other process chemicals. One registered landfill site is assumed to be operational within the red line boundary at the proposed eastern laydown area, authorised to accept a wide variety of wastes including but not limited to non-hazardous excavation wastes, contaminated rubbish, fats, waxes, greases, paint waste, pulverised fuel ash, bitumen and waste treated timber.

5.2.3 Onsite Historical Land Use

5.2.3.1 ERM’s review of the available historical mapping also indicates that tanks were present in the centre (in the area of the proposed ERF and Core Scheme) of the site between the dates of c.1946 and 1989 and the presence of railway/railway sidings and two historical landfills in the eastern laydown area since c.1950. This will likely have involved some onsite storage of fuels and various other process chemicals as well as inert wastes associated with the landfill. From the Envirocheck report a significant impact to land from household wastes has been recorded on site, at the southern end of the proposed eastern laydown area, from an incident in 2017 as well as 15 pollution incidents to controlled waters arising from locations within the red line boundary.

5.2.4 Offsite Historical Impact

5.2.4.1 ERM's review of the available historical mapping indicates that the area to the east of the site operated as an Ironworks, Steelworks, and various landfills between c.1950 and the late 1990s. A nitrogen fertiliser plant and later a chemical works with sludge bed was also present within Flixborough Industrial Estate to the north of the proposed ERF and Core Scheme area (likely to have been Nypro UK, see section 4.3.4). As above, this will likely have involved storage (and release due to the Flixborough disaster) of various process chemicals close to the site boundary.

5.2.5 Offsite Current Land Use

5.2.5.1 The site is located within a mixed agricultural and brownfield land use area. As such, numerous permitted activities / industrial installations are currently present within the vicinity of the site, at which bulk fuel / chemical storage and use is likely. Of these, the closest / likely most relevant is Jotun Paints (Europe) Ltd located to the immediate west for their use of 'dangerous substances' and a petrol filling station adjacent to the west.

5.3 Receptors

5.3.1.1 A summary of the statutory receptors considered for inclusion in the CSM is provided in Table 5. Further detail relating to the receptors identified within the table is presented in sections 5.4.1 and 5.4.2.

Table 5: Statutory Receptors Checklist

Receptor	On Site	Off Site
Human beings	✓	✓
Ecological systems (statutory designation)	✓	✓
Property - crops/livestock	✓	✓
Property – buildings	✓	✓
Property - domestically grown produce	✗	✓
Controlled waters – groundwater	✓	✓
Controlled waters – surface water	✓	✓

5.3.2 Human Health

Onsite Permanent Workers

5.3.2.2 In the context of a commercial land use (i.e. operation of a power station), the primary human health receptor at the site is likely to be an adult member of the regular site workforce. This is likely to include male and female workers between the ages of 18 and 65.

The primary consideration relating to these workers is likely to be harmful effects caused by long term exposure to low contaminant concentrations (chronic effects).

Onsite Temporary Workers

5.3.2.3 In addition to the regular workforce, it is likely that construction /ground workers will be present onsite in the future, undertaking works during which exposure to ground contamination is likely (i.e. earthworks). Given the temporary nature of this work, the primary consideration relating to these receptors is likely to be harmful effects caused by short term exposure to contaminants at higher concentrations (acute effects).

Other Human Receptors

5.3.2.4 Given the site's location, it is highly likely that numerous human health receptors will be present in the area surrounding the site (up to 1 km – i.e. neighbouring workers / residents etc.). For the purposes of the conceptual model, with the exclusion of vapour exposure associated with migratory groundwater, risk assessment of the onsite permanent receptors is considered protective of all offsite and / or temporary equivalents.

5.3.3 Controlled Waters

Groundwater

5.3.3.2 EA digital mapping indicates that the superficial deposits (Alluvium, Warp and Blown Sands) are designated as Secondary A Aquifer units and the underlying bedrock (Mercia Mudstone and Scunthorpe Mudstone) are designated as Secondary B aquifer units.

5.3.3.3 The groundwater resources at the site have previously been classified by the EA as having 'Good' quantitative status and 'Good' chemical quality in 2019 under the WFD. Five groundwater abstractions are known to be present within 1km of the site, all for spray irrigation, and the site does not lie within a groundwater SPZ of any type. As such groundwater within the superficial deposits is likely to provide a baseflow to surface waters rather than a sensitive resource in its own right.

Surface Waters

5.3.3.4 The nearest surface water feature is the River Trent which is located adjacent to the western boundary. Several other minor watercourses/field drains are present within the site's red line boundary and surrounding the site (<250 m). The River Trent is part of the Upper Humber Catchment and has been rated by the EA as overall water body classification as Moderate in 2019 under the WFD. The River Trent is included within the Humber Estuary SSSI, SAC and Ramsar Site.

5.3.4 Property

Buildings / Buried Utilities

5.3.4.2 The closest residential properties to the site are at Scunthorpe (immediately south of the associated development and mitigation area) or Flixborough Village to the north of the Rail

Line Upgrade, neither are in close proximity to an area of potential concern. There are currently no buildings on site.

5.3.4.3 The proposed ERF and Core Scheme is located on a former tank farm, and immediately to the south of the Flixborough Industrial Estate.

5.4 Potential Pathways

5.4.1 Observed Geology

5.4.1.1 From the Report on Ground Investigation as carried out by Ian Farmer Associates (1998) Limited, the observed geology on site in the area of the proposed ERF and Core Scheme is predominantly clays to depths of c.20m bgl, where the bedrock is then encountered. An organic peat layer is present in this area between 4.7m bgl and 6.7m bgl.

5.4.2 Hydrogeology

5.4.2.1 From the Report on Ground Investigation as carried out by Ian Farmer Associates (1998) Limited, depth to groundwater was struck at depths between 11.70m bgl and 12.30m bgl. Groundwater levels 20 minutes after well installation were recorded at depths between 6.30m bgl and 6.80m bgl, suggesting the groundwater beneath the site is confined. Subsequent water level measurements on return visits were recorded at depths between 1.65m bgl and 2.08m bgl.

5.4.2.2 The potential pathways through which a contaminant source could plausibly be exposed to one of the receptors identified at the site are listed below:

Human Health:

- migration of gases (from the landfills) / vapours by diffusion and along pressure gradients and subsequent inhalation;
- direct / dermal contact with contaminated soils and / or groundwater;
- ingestion of contaminated soils and groundwater;
- inhalation of particles in windblown dusts; and
- inhalation of groundwater derived vapours;

Controlled Waters:

- vertical migration of mobile substances;
- dissolution of contaminants in percolating rainwaters to shallow groundwater;
- lateral migration of shallow groundwater to nearby surface waters;
- migration of water via preferentially permeable subsurface structures (drainage runs etc.); and
- surface water runoff.

Property

- direct contact with contaminated soil and / or groundwater.

Potential Pollutant Linkages

5.4.2.3 Based on the above detailed sources, receptors and pathways, the potential pollutant linkages identified at the site are illustrated in the Conceptual Site Model, Figure 5, Appendix A (**Document Reference 6.2.8, Appendix A**) and further discussed in Section 6 of this report.

6. REFINEMENT OF CONCEPTUAL SITE MODEL

6.1 Assessment of Potential Pollutant Linkages

6.1.1.1 The majority of the site has an agricultural history and as such is unlikely to present a risk to either Human Health or Controlled Waters. However, the potential pollutant linkages related to the potential areas of concern detailed in Section 4 is discussed below.

6.1.2 Soil Gas Risks

6.1.2.1 Historical industrial landfill sites and historical waste management facilities have been identified in this Phase I assessment within the red line boundary of the site. These are located at the proposed eastern laydown area, identified on Figure 4, Appendix A (**Document Reference 6.2.8, Appendix A**). Given the unknown nature of the burial/capping of waste, below ground migration of gases may occur. However, due to the location of the landfills being towards the east of the site/beneath a laydown area the risk of soil gases resulting from landfills and impacting on the site is therefore likely to be low as earthworks or construction works are unlikely to occur at the laydown areas.

6.1.2.2 Based on the previous investigation carried out by Ian Farmers Associates (1998) Ltd the organic clays and peats beneath the site are also a potential sources of ground gases, in the area of the proposed ERF and Scheme Core, therefore a programme of ground gas monitoring in this area may be recommended to characterise the ground gases to determine any ground protective requirements.

6.1.3 Risks to Human Health

Contamination of Soil

6.1.3.2 Based on the CSM and the limited site investigation carried out by Ian Farmers Associates (1998) Ltd, any soil contamination identified at the site in the vicinity of the proposed ERF and Core Scheme (derived from onsite storage of fuels and various other process chemicals) may, in theory, present a risk to human health by direct contact, by ingestion or via the inhalation of vapours / particulates. As the previous intrusive investigation was limited to a small area within the red line boundary there is insufficient information available to identify the underlying soil conditions. Based on the unknown underlying ground conditions across the areas of potential concern and presence of historical tank farm in the centre (northern end of the proposed ERF and Corse Scheme) shown on Figure 4, Appendix A (**Document Reference 6.2.8, Appendix A**), information from an intrusive site investigation would be recommended in this area in determining the level of risk to human health.

Groundwater Vapours

6.1.3.3 Based on the CSM and the limited site investigation carried out by Ian Farmers Associates (1998) Ltd, potential groundwater impacts at the Flixborough Industrial Estate may, in theory, present a risk to human health through inhalation of groundwater derived vapours at the northern end of the proposed ERF and Core Scheme. As the previous intrusive investigation was limited to a small area within the red line boundary there is insufficient information available to identify the underlying soil conditions across the site. Based on this, information from an intrusive site investigation would be recommended in this area in determining the level of risk to human health.

6.1.4 Risks to Controlled Waters

6.1.4.1 Based on the CSM and the limited site investigation carried out by Ian Farmers Associates (1998) Ltd, impacts present in the subsurface soils at or near the Flixborough Industrial Estate may come into contact with the shallow groundwater at the site via vertical migration of mobile substances and by dissolution within percolating rainwater. Once present in the shallow groundwater these potential contaminants may migrate laterally within groundwater flow itself or via preferentially permeable structures (such as drainage runs). Depth to groundwater across the site recorded by Ian Farmers Associates (1998) Ltd noted groundwater strike was c.12m bgl rising to c.6.5m bgl 20 minutes after installation. On subsequent visits depth to water ranged between 1.65m bgl and 2.08m bgl, suggesting the groundwater beneath the site is confined and the potentiometric head was broadly equivalent of the level of the River Trent. As no previous groundwater sampling analysis is available to ERM at the time of writing this report there is no information available to identify the underlying groundwater conditions across the site. Therefore, an intrusive site investigation in this area would be recommended to assess the level of risk to controlled waters.

6.1.5 Risk to Property

6.1.5.1 If ground is contaminated with hydrocarbon compounds, there is a potential risk of chemical attack from these compounds on foundations or other underground structures (plastic pipes and ducts etc.). Currently there are no buildings on site, however the proposed ERF and Core Scheme are located in an area formerly containing a tank farm, and to the south of the Flixborough Industrial Estate.

7. RECOMMENDATIONS

7.1.1.1 The majority of the site has an agricultural history. Based on this, development in these areas is unlikely to present a risk to either Human Health or Controlled Waters due to historical residual contamination.

7.1.1.2 There are a number of small areas of potential concern for which limited intrusive information is available, including the area immediately surrounding the Flixborough Industrial Estate, the historical tank farm, and the proposed eastern laydown areas (historical and potentially current landfill).

7.1.1.3 The historical and potentially current landfill below the eastern laydown area is unlikely to present a risk to Human Health or Controlled Waters due to the nature of the end use (limited below surface activity, non enclosed space) and distance to River Trent.

7.1.1.4 The land immediately to the north of the Flixborough Industrial Estate is to be used for mitigation and is therefore unlikely to present a risk to either Human Health or Controlled Waters due to the non intrusive nature of the work in this area.

7.1.1.5 As discussed in Section 4.3.4, the Flixborough Disaster had the potential to release metals, asbestos PAHs and PFAS into the surrounding area which could potentially be disturbed by the development of the ERF and Core Scheme, wharf extension and rail line upgrade.

7.1.1.6 The proposed ERF and Core Scheme, wharf extension and the western end of the rail line upgrade are on the boundary of, or close to the Flixborough Industrial Estate. In addition, there is the historical tank farm at the northern end of the proposed ERF and Core Scheme. Whilst there has been a site investigation carried out by Ian Farmers Associates (1998) at the Flixborough Industrial Estate, information provided by this investigation is limited, however it is believed that the potential for gross contamination in need of whole scale remediation is considered to be unlikely, particularly based on the fact that the scheme has been designed to allow for commercial/industrial development on those higher risk areas.

7.1.1.7 In conclusion, based on the available information, it is likely that the bulk of the site poses a low risk to Human Health and Controlled Waters.

7.1.1.8 ERM therefore recommends a Phase II Intrusive Environmental Site Assessment be undertaken in order to confirm this conclusion and to establish a site baseline.

7.1.1.9 The site investigation should be predominantly focused on the areas of potential concern; close to the Flixborough Industrial Estate, the northern area of the ERF and Core Scheme, and eastern laydown area, however it would be considered prudent to have some limited investigation data from other areas of the site to establish a baseline that should also capture any potential contaminants released due to the Flixborough disaster.

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APPENDIX E PHASE TWO ENVIRONMENTAL SITE INVESTIGATION, ERM (2021)

Date: May 2022

North Lincolnshire Green Energy Park

Appendix E - Phase II Environmental Site Assessment

March 2022

Project No.: EN010116

The business of sustainability

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Version	Revision	Author	Reviewed by	Name	Date	Comments
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Signature Page

March 2022

North Lincolnshire Green Energy Park

Appendix E - Phase II Environmental Site Assessment

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Acronyms and Abbreviations

Name	Description
BGS	*British Geological Society*
C4SL	*Category 4 Screening Level*
CAT	*Cable Avoidance Tool*
CHP	*Combined Heat and Power*
CLEA	*Contaminated Land Exposure Assessment*
CSM	*Conceptual Site Model*
DCO	*Development Consent Order*
DEFRA	*Department for Environment, Farming and Rural Affairs*
DHPWN	*District Heat and Private Wire Network*
DO	*Dissolved Oxygen*
DQRA	*Detailed Quantitative Risk Assessment*
EA	*Environment Agency*
EQS	*Environmental Quality Standards*
ERF	*Energy Recovery Facility*
ERM	*Environmental Resources Management Ltd*
ESA	*Environmental Site Assessment*
GAC	*Generic Assessment Criteria*
GQRA	*Generic Quantitative Risk Assessment*
HASP	*Health and Safety Plan*
LCRM	*Land Contamination Risk Management*
m bgl	*Metres below ground level*
MWe	*Electrical generation in megawatt-hours (electric)*
MWth	*Heat generation in megawatt-hours (thermal)*
NGLEP	*North Lincolnshire Green Energy Park*
ORP	*Oxidization-Reduction Potential*
PAC	*Potential Area of Concern*
PAH	*Polycyclic Aromatic Hydrocarbons*
PID	*Photoionisation Detector*
PNEC	*Predicted No Effect Concentration*
ppm	*Parts per million*
QA/QC	*Quality Assurance and Quality Control*
REACH	*Registration, Evaluation, Authorisation and Restriction of Chemicals*
SAC	*Special Area of Conservation*
SGV	*Soil Guideline Values*
SI	*Site Investigation*
SPOSH	*Significant Possibility of Significant Harm*
SPOSPOCW	*Significant Possibility of Significant Pollution of Controlled Waters*

Name	**Description**
SSSI	*Site of Specific Scientific Interest*
SVOC	*Semi Volatile Organic Compounds*
TPH	*Total Petroleum Hydrocarbons*
UKAS	*United Kingdom Accreditation Scheme*
VOC	*Volatile Organic Compounds*
WFD	*Water Framework Directive*

1. INTRODUCTION

1.1 General Introduction

1.1.1.1 Environmental Resources Management Limited (ERM) is pleased to provide the Applicant with a report detailing the work undertaken to complete an intrusive baseline site investigation, as originally set out in the proposal dated 21 June 2021.

1.2 Background

1.2.1.1 ERM understands that the Applicant intends to construct a new Energy Recovery Facility (ERF) and the Project on land near Flixborough which constitutes a thermal combustion combined heat and power (CHP) plant with a potential power output capacity of up to 100 MWe from a total thermal capacity of 316 MWth.

1.2.1.2 The main part of the site is located on brownfield and agricultural land to the south and east of Flixborough Wharf and south of the Flixborough Industrial Estate in North Lincolnshire. The site includes land within and adjacent to Flixborough Port (RMS Trent Ports) on the River Trent in North Lincolnshire. The site location is presented in Figure 1 and the site layout is presented in Figure 2.

1.2.1.3 A Phase I ESA has been previously completed for the site[1]. The assessment reported a number of potential areas of concern (PAC), mainly at the north of the core area close to the Flixborough Industrial Estate. A site investigation was recommended to establish a soil, groundwater and ground gas baseline, but that would also focus on the PAC identified. The results of the site investigation will be used to inform the Environmental Statement in support of the DCO application.

1.2.1.4 On-site and laboratory geotechnical testing was undertaken as part of this site investigation under instruction from BuroHapold. The results of the geotechnical testing are included in Appendix E.

1.3 Project Objectives

1.3.1.1 The objectives of this phase of works were to:

- Investigate potential sources of contamination in the PACs identified in the Phase I desktop assessment;
- Identify the potential for soil or groundwater contamination at the development site as a result of the Flixborough disaster;
- Provide soil, groundwater and ground gas baseline data; and
- Obtain geotechnical information where possible under instruction from BuroHapold. The information obtained has been provided to and will be interpreted by BuroHapold. The results of the geotechnical testing are presented in Appendix E.

1.4 Limitations

1.4.1.1 This report is based upon the application of scientific principles and professional judgment to certain facts with resultant subjective interpretations. Professional judgments expressed herein are based on the information currently available within the limits of the existing data, scope of work, budget and schedule. To the extent that more definitive conclusions are desired by the Client than are warranted by the currently available information, it is specifically ERM's intent that the conclusions and recommendations stated herein will be intended as guidance and not necessarily a firm course of action except where explicitly

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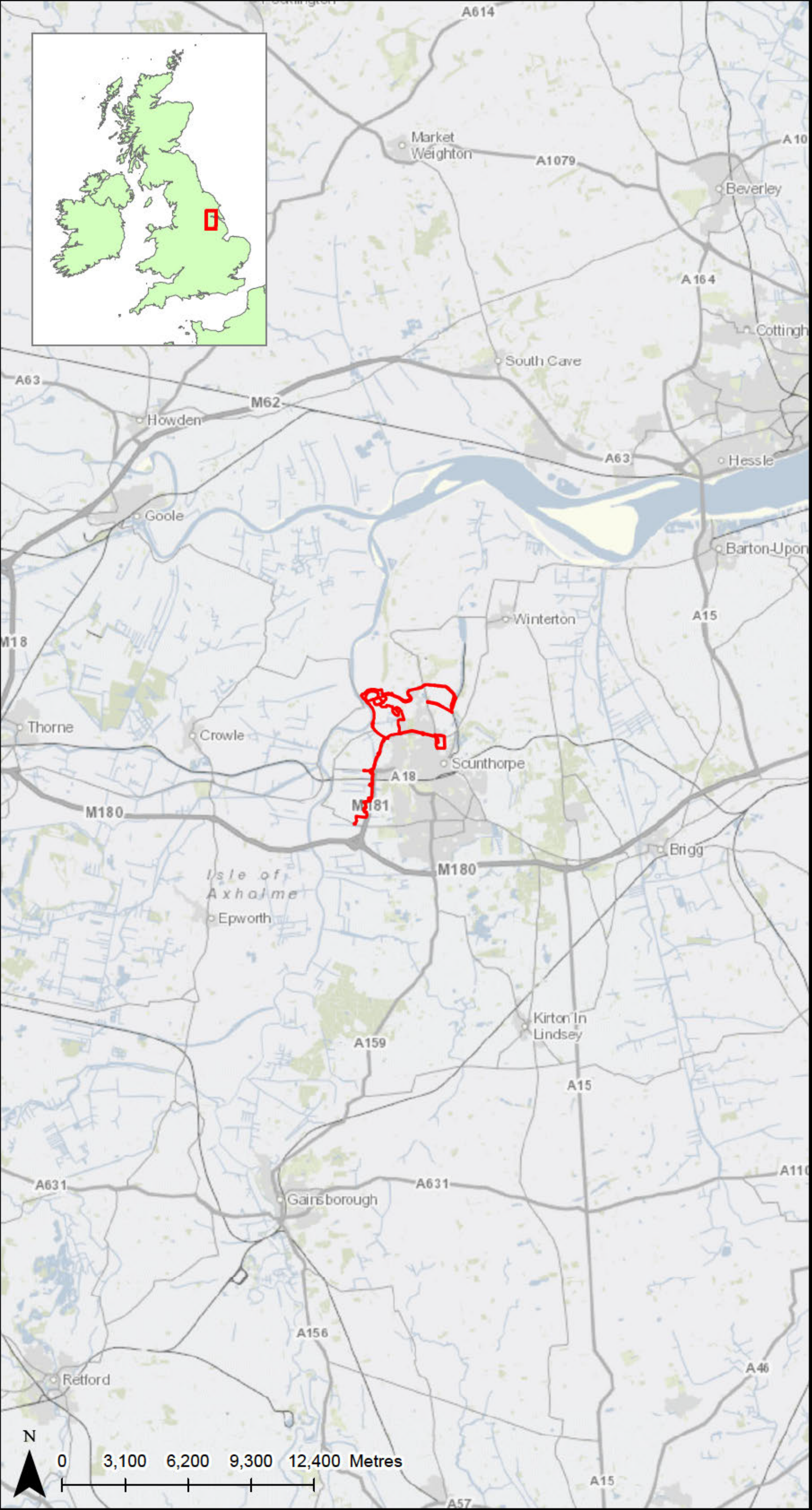
[1] North Lincolnshire Green Energy Park, Phase I Environmental Site Assessment, January 2021, ERM

stated as such. ERM makes no warranties, express or implied, including, without limitation, warranties as to merchantability or fitness for a particular purpose. In addition, the information provided to the Client in this report is not to be construed as legal advice. Nothing contained in this report shall be construed as a warranty or affirmation by ERM that the Site described in the report is free of any potential environmental liability.



North Lincolnshire Green Energy Park

Title	Figure 1 Site Location

Client Information

Client	North Lincolnshire Green Energy Park Ltd.
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	250,000

ArcMap File

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SI_ES_SiteLocation_A01

Legend

🟥 Order Limits

Layer Source Information

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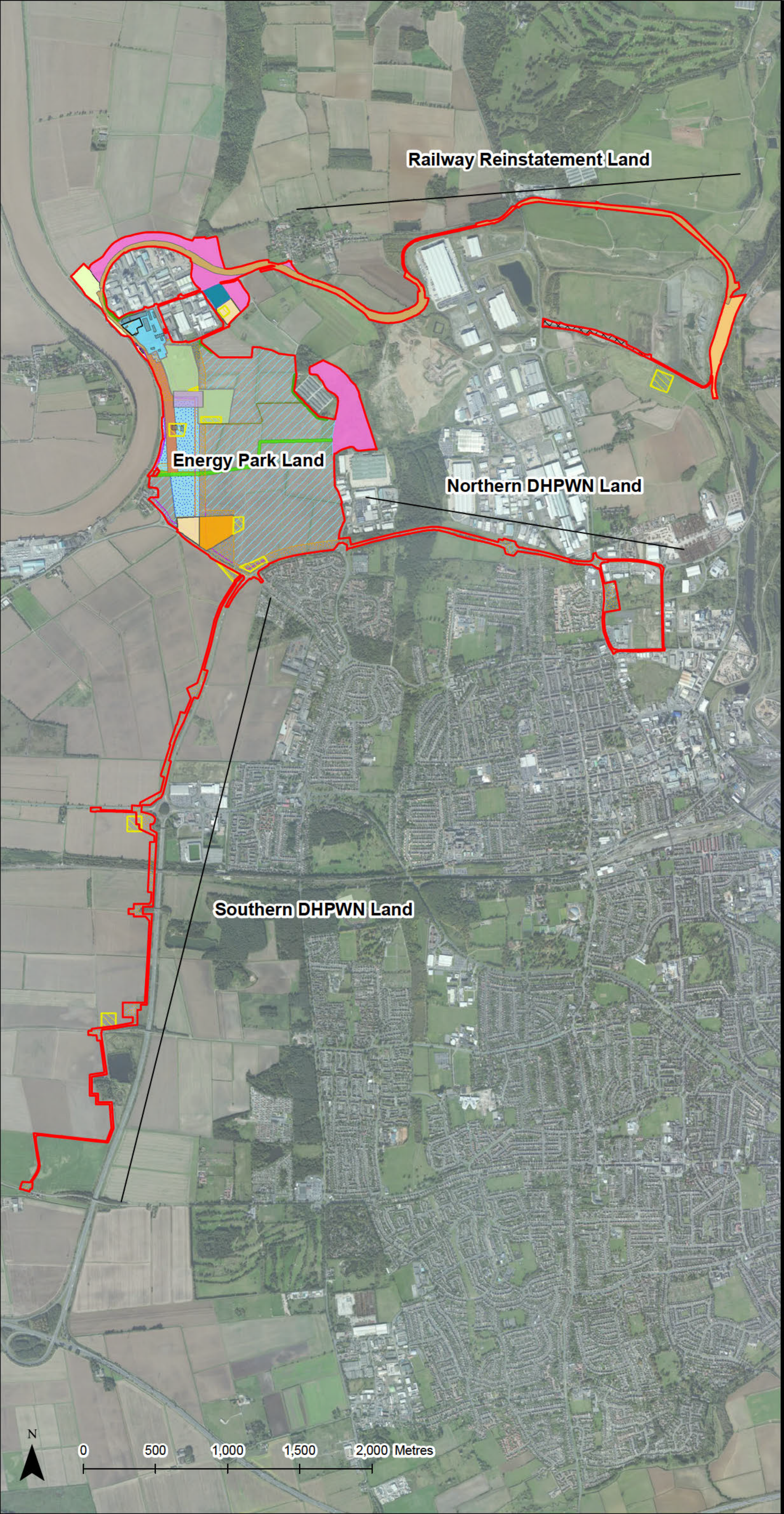

NORTH LINCOLNSHIRE GREEN ENERGY PARK

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North Lincolnshire Green Energy Park

Title	Figure 2 Site Layout

Client Information

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Map Information

CRS EPSG	27700
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Scale	25,001
ArcMap File	\\UKSSMBNAF- SI_ES_SiteLayout_A01

Legend

- 🟦 Additional study area outside the order limits
- 🟥 Order Limits
- ⬜ Demolition
- 🟩 Existing Port
- 🟪 Areas for Potential Future Mitagation
- ▨ Surface Access
- ▨ Utilites
- 🟫 Temporary Construction Haul Road
- 🟩 Non-motorised Paths with Landscape Planting
- ▨ Construction Laydown (Indicative Size / Location)*
- ▦ Construction Laydown Limits of Deviation
- ▨ Flood Management
- ▨ Wetland / SuDs

Landuse

- 🟦 Sub Station
- ▨ Carbon capture and associated curtilage landscape
- 🟦 EFW and associated curtilage landscape
- 🟪 Visitor Centre
- 🟩 Concrete manufacturing and polymer plant and associated curtilage landscape
- 🟨 Gas AGI and associated curtilage landscape
- 🟧 Energy storage and refueling station and associated curtilage landscape
- 🟩 Flood Defence Bund

Railway Reinstated

- 🟨 Dragonby Siding Expansion
- 🟫 Railhead
- 🟫 Railspur Upgrade

*Not all laydown areas are shown on the plan.
Where laydown areas would be located within
the footprint of the the building to be constructed,
they have been omitted from the plan to improve clarity.

Layer Source Information

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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2. ENVIRONMENTAL SITE SETTING

2.1 Introduction

2.1.1.1 The following section describes the site's location and environment risk setting using a literature based review. It provides a summary of the geology, hydrogeology and hydrology of the site, full details of which are presented in the Phase I ESA[1].

2.1.1.2 Figure 1 presents the site location and Figure 2 presents the site layout. The site has been split into four main areas, the NGELP land, the railway reinstatement land, the northern DHPWN land and the southern DHPWN land.

2.2 Geology and Hydrogeology

2.2.1 Geology

2.2.1.1 The geology underlying the Order Limits is summarised in Table 1 based on the British Geological Survey (BGS) digital mapping[2] and 1982 BGS drift map, Sheet 89, Brigg 1:50,000.

Table 1: Geological Summary

Area	Superficial Deposits	Bedrock Geology
The Energy Park Land	Alluvium (sand, silt and clay), overlying the Vale of York Glacial Lake Deposits (sand and gravel)	The majority is underlain by Mercia Mudstone Formation. The eastern side is underlain by the Penarth Group (mudstone).
Railway reinstatement land	Blown sand overlying the Vale of York Glacial Lake Deposits (sand and gravel). At the far east of the Order Limits, no superficial deposits are indicated and bedrock (Scunthorpe Mudstone Formation and Frodingham Ironstone Member) is anticipated to be near surface.	The eastern end is underlain by the Scunthorpe Mudstone Formation (mudstone and ironstone) with the central and eastern sections underlain by the Frodingham Ironstone Member.
The Northern DHPWN land	Blown sand overlying the Vale of York Glacial Lake Deposits (sand and gravel). At the far east of the Order Limits, no superficial deposits are indicated and bedrock (Scunthorpe Mudstone Formation and Frodingham Ironstone Member) is anticipated to be near surface.	The western end is underlain by the Penarth Mudstone, with the Scunthorpe Mudstone Formation (mudstone and limestone) underlying the central section. The eastern side is underlain by the Frodingham Ironstone Member.
The Southern DHPWN land	Predominantly Warp (clay and silt) overlying the Vale of York Glacial Lake Deposits (sand and gravel).	Mercia Mudstone Formation.

2.2.1.2 The alluvial deposits are described as unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta. Blown sand is described as sand that has been

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[1] North Lincolnshire Green Energy Park, Phase I Environmental Site Assessment, January 2021, ERM

[2] [redacted]

transported by wind, or sand consisting predominantly of wind borne particles. Warp (clay and silt), is described as alluvium deposited by artificial flooding.

2.2.1.3 Based on BGS borehole logs, the alluvial deposits, including the Warp, are identified as being in the region of 3 to 17m thickness and the blown sands are identified as being approximately 1.5m in thickness.

2.2.2 Hydrogeology

2.2.2.1 The superficial deposits have been classified as Secondary A Aquifers. These are permeable layers that can support local water supplies and may form an important source of base flow to rivers.

2.2.2.2 The Mercia and Penarth Mudstones have been classified as Secondary B Aquifers, the Scunthorpe Mudstone Formation as a Secondary Undifferentiated Aquifer and the Frodingham Ironstone Member as a Secondary A Aquifer.

3. FIELD WORK METHODOLOGIES ADOPTED

3.1 Introduction

3.1.1.1 An original proposal dated 21 June 2021 was submitted to Solar 21 based on the findings of the Phase I ESA and the order limits provided to ERM at that time. For the purposes of the site investigation the locations were split into three areas;

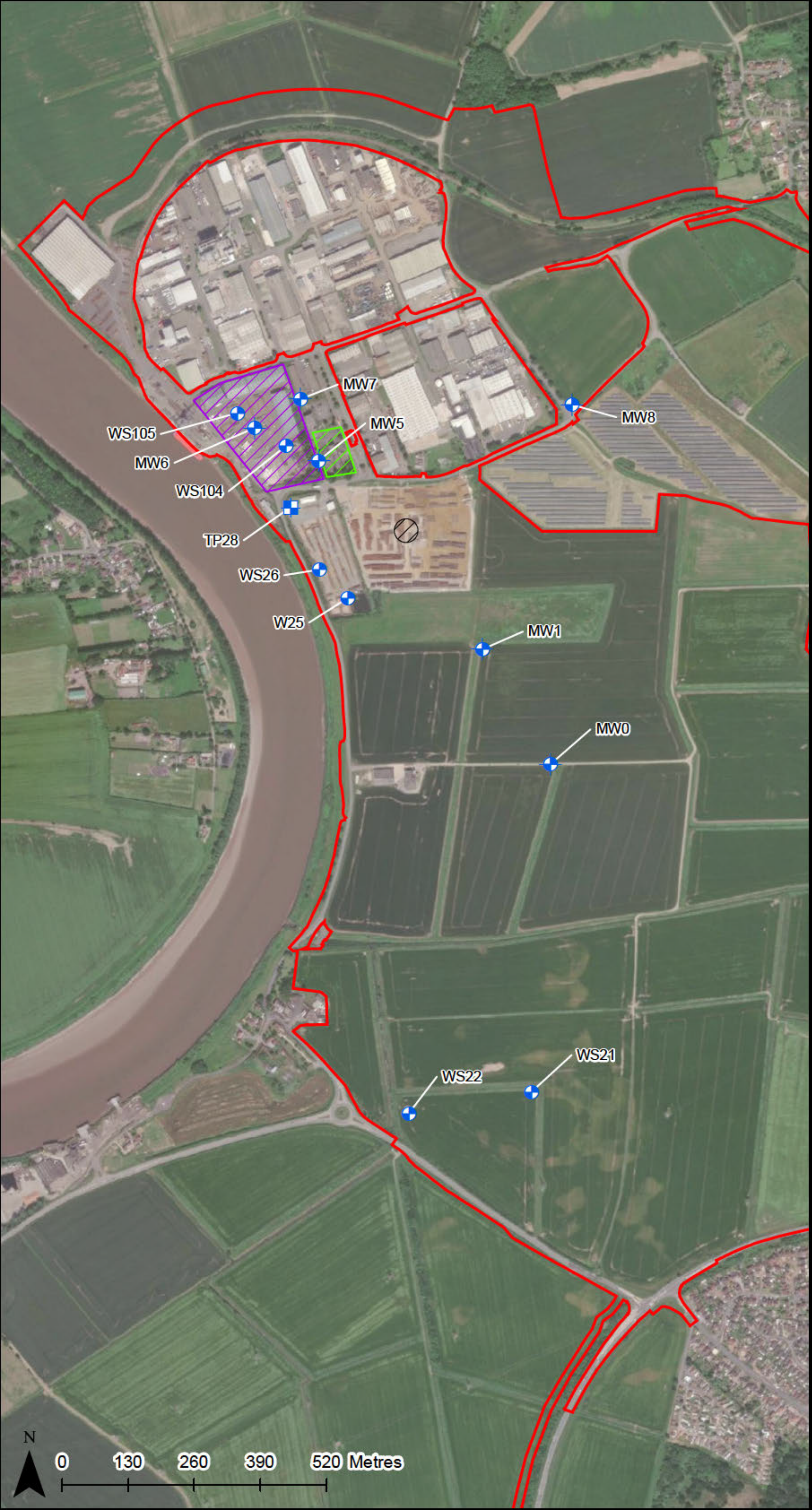
- the core area (predominantly NGLEP land),
- the eastern construction laydown area (railway reinstatement land); and,
- the western construction laydown area (southern DHPWN land).

3.1.1.2 There were no PACs identified on the northern DHPWN land. It is assumed that construction work on the northern DHPWN land would only be to a maximum depth of 2m bgl to allow for the laydown of cables/utilities. Therefore no locations on the northern DHPWN land were included.

3.1.1.3 Since submission of the proposal the order limits have been amended and a number of locations have been removed. In addition there were access restrictions to some areas included in the original proposal and locations in these areas were not completed. Figure 3 and Figure 4 present the site investigation locations. Table 2 presents rationale for the locations included in this site investigation.

Table 2: Location Rationale

Area	Borehole Number	Rationale
NGLEP land	MW0, MW1	To collect baseline data for the area of the Polymer Plant
NGLEP land	MW5, MW6, MW7 WS104, WS105	Northern area of the site that may have been impacted by the Flixborough disaster, also in area of historical tank farm. To collect baseline data for the area of the EFW.
NGLEP land	MW8	To collect baseline data for the area of the Gas AGI.
NGLEP land	WS21	Baseline data for battery storage and charging area
NGLEP land	WS22	Baseline data for Gas AGI
NGLEP land	WS23, WS24	Areal coverage – unable to complete due to access issues.
NGLEP land	WS25, WS26, TP28	Adjacent to the wharf.
Southern DHPWN land	WS11, WS12, WS14, WS16, WS32, WS35	To provide areal coverage for baseline data.



North Lincolnshire Green Energy Park

Title	Figure 3 Site Investigation Locations – Energy Park Land

Client Information

Client	North Lincolnshire Green Energy Park Ltd
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Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	10,000

ArcMap File

SI_ES_SiteInvestigationLocations_NLGEP_Land_A01

Legend

▭	Order Limits
▨	Approximate Location of Rainham Steel Trial Pits
▨	Ian Farmer GI
▨	Former Glanford House SI

Locations Accessed

⊕	Monitoring Well
◐	Soil Bore
⊞	Trial Pit

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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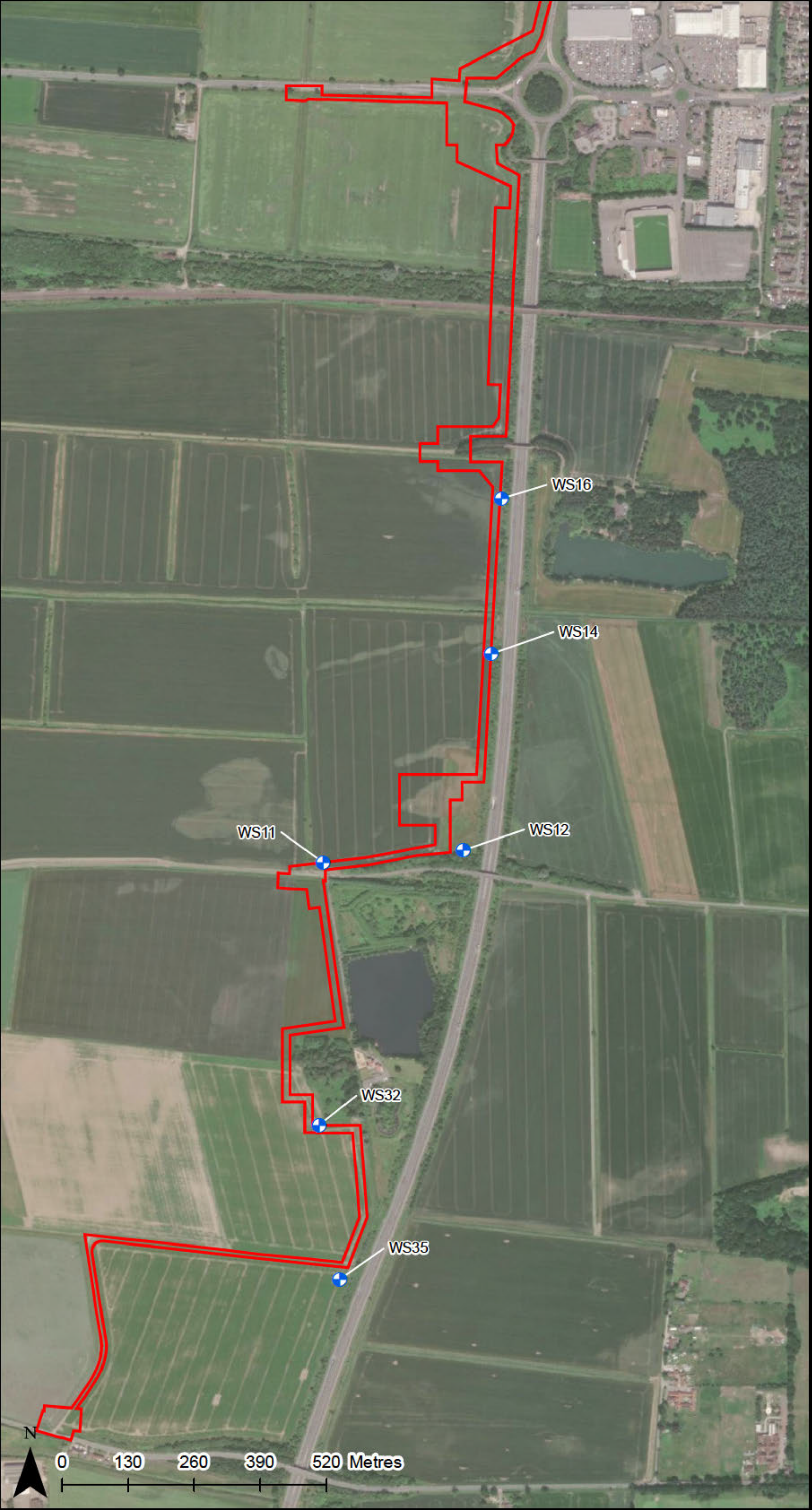

North Lincolnshire Green Energy Park

Title	Figure 4 Site Investigation Locations – Southern DHPWN

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	10,000

ArcMap File

SI_ES_SiteInvestigationLocations_SouthernDHPWN_Land_A01

Legend

▭	Order Limits

Locations

⊕	Monitoring Well
◐	Soil Bore
⊞	Trial Pit

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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3.2 Pre Drilling Works

3.2.1.1 In order to ensure that the works were undertaken in a safe and competent manner, a Site specific Health and Safety Plan (HASP) was produced prior to the fieldwork commencing.

3.2.1.2 ERM also requested publically available and site specific utility drawings for the Site. In order to further reduce the likelihood of a subsurface utility/service strike during the works, each investigation location was surveyed by a specialist utilities tracing company (Subsight Surveys) prior to the commencement of any intrusive works.

3.2.1.3 Subsight Surveys employed the use of a cable avoidance tool (CAT) with a signal generator and a Ground Penetrating Radar (GPR) to trace utilities. During this procedure, a subsurface clearance checklist was completed by the ERM fieldworks manager.

3.3 Drilling Works

3.3.1.1 Site works were undertaken between 23rd August and 14th September 2021. All hand pitting and drilling was carried out by a specialist subcontractor (Geotron) and were supervised by the ERM fieldworks manager.

3.3.1.2 Of the locations for which access was provided:

- TP28 was terminated at 0.45m bgl due to a concrete slab under the initial layer of Made Ground;
- MW6, WS104 and WS25 were terminated at 0.45m bgl, 0.65m bgl and 1m bgl respectively due to concrete cobbles.
- WS105 could not be advanced due to onsite activities in the wharf area.
- WS23 and WS24 could not be advanced due to being located too far into the field.

3.3.1.3 The boreholes were advanced using a percussion window sampling rig with dedicated single use plastic liners operated by Getron Ltd to depths of up to 5m bgl where possible. Five boreholes were installed as monitoring wells using 50mm pipe. At all monitoring locations a gas monitoring well (0.5m plan screen above 0.5m slotted screen) and a groundwater monitoring well (maximum 5m depth) were installed. Bentonite seals were installed between the screening zones. Metals headworks were installed flush to ground surface where located on tarmac/concrete and above ground level on agricultural land.

3.4 Soil Sampling

3.4.1 Sample Acquisition & Field Screening

3.4.1.1 The geological succession at each location was logged by an experienced ERM field specialist and samples were taken for visual/olfactory assessment, field head space screening and laboratory analysis. Geological logs and details are presented in Appendix A.

3.4.1.2 Soil arising's recovered from each of the investigation locations were field screened for the presence of Volatile Organic Compounds (VOCs) using a handheld 10.6 eV Photoionisation Detector (PID) calibrated against a standard gas (100 parts per million isobutylene). Samples were recovered at 0.5m – 1.5m intervals throughout the encountered soil profile and transferred to polyethylene bags. A stabilisation period of no less than five minutes was then allowed to elapse prior to field headspace testing using the PID. The results of the field screening are presented on the borehole logs provided in Appendix A.

3.4.1.3 During sample collection, relevant information such as field observations were noted prior to transferring the samples to laboratory supplied and prepared sample containers. In the course of sampling, particularly for samples destined for VOC analysis, sample jars were completely filled, to minimise any remaining headspace.

3.4.2 Soil Analysis

3.4.2.1 A minimum of one soil sample was recovered from each location and submitted to Element Materials Technology, a UKAS accredited laboratory. The laboratory scheduling was designed to ensure that a good areal extent was undertaken, as well as targeting any strata showing evidence of potential contamination (visual or olfactory evidence or high PID readings). Soil samples were submitted for analysis including:

- VOCs;
- SVOCs;
- TPH-CWG;
- Pesticides;
- Herbicides;
- Metals
- Ammoniacal Nitrogen;
- Asbestos (screening); and
- TOC

3.5 Groundwater Sampling

3.5.1.1 Groundwater sampling was undertaken by ERM on September 14th 2021. Samples were recovered from all monitoring wells (MW0, MW1, MW5, MW7 and MW8). The sampling of the wells was carried out as per the methodology described below.

3.5.1.2 The sampling works included measuring the depth to the resting water level in each well. The wells were sampled using a low-flow technique with a peristaltic pump. Groundwater field readings for physico-chemical parameters (pH, temperature, dissolved oxygen (DO), conductivity & oxidation-reduction potential (ORP) were recorded using a handheld SmarTroll multi parameter probe during purging. Once the parameters had stabilised, the groundwater samples were obtained. The field readings together with observations (visual/olfactory) and level monitoring are provided in Section 4.2.

3.5.2 Groundwater Analysis

3.5.2.1 A total of five groundwater samples and one duplicate sample were recovered and were scheduled for the following analysis:

- VOCs;
- SVOCs;
- TPH-CWG;
- Pesticides;
- Herbicides;
- Metals
- Ammoniacal Nitrogen; and
- PAHs.

3.6 Soil and Groundwater Sampling and Decontamination Procedures

3.6.1.1 During the course of the investigation, potential sources of cross-contamination were avoided during sampling. During sampling and decontamination activities, disposable nitrile gloves were worn to prevent transfer of contaminants from other sources.

3.6.1.2 As part of the overall sampling QA/QC package, sample tags and ‘Chain-of-Custody’ travel documents were filled out. This allowed tracking of the samples from acquisition through to analysis. These forms were enclosed in the sample coolers shipped to the laboratory. The data included in the chain of custody, comprised sample identification, date sampled, matrix type, analysis required, sampler and analysis turnaround.

3.6.1.3 Soil and groundwater analysis was undertaken by Element Materials Technology, providing UKAS accredited analysis for applicable suites. The laboratory certificates are included in Appendix C and an assessment of the significance of analytical results is provided in Section 5.

4. FIELD OBSERVATIONS AND GROUND CONDITIONS ENCOUNTERED

4.1 Soil Conditions

4.1.1.1 A generalised summary of the ground conditions encountered during the investigation (as recorded by the ERM fieldworks manager) is provided below. A full description of the geological sequence recorded at each specific borehole location is provided in the borehole logs, Appendix A.

4.1.2 NGLEP Land

Made Ground

4.1.2.2 The wharf area (MW6 and WS104) is underlain by Made Ground consisting of medium sand containing concrete and slag cobbles. Due to the size of the cobbles, boreholes could not be advanced beyond 0.65 m bgl and were therefore terminated within the Made Ground.

4.1.2.3 Outside of the wharf area, but still at the northern end of the NGLEP land (MW5, MW7, TP28, WS25, WS26) Made Ground was encountered to a depth of 2.2 m bgl, consisting of sandy gravelly clay or gravelly sand containing slag, concrete, brick, and sandstone cobbles.

4.1.2.4 Made ground was not encountered at the north-eastern corner of the NGLEP Land (MW8) or the central and southern end of the NGLEP land (MW0, MW1, WS21 and WS22) where the land is predominantly agricultural Superficial Deposits

4.1.2.5 Due to the difficulties in drilling on the Wharf area, all locations here were terminated within the Made Ground.

4.1.2.6 At the northern end of the NGLEP Lane the Made Ground overlies a silty or sandy clay or sandy silt layer containing rootlets and decomposed vegetation matter. At MW7 (between 3.4 and 5m bgl) and WS26 (at 4.9m bgl) peat was identified. Boreholes were advanced to a maximum depth of 5.45m bgl.

4.1.2.7 At MW8 the geology consisted of organic gravelly clay overlying gravelly or clayey sand. The borehole was advanced to 5m bgl.

4.1.2.8 At the central and southern end of the NGLERP land (currently agricultural) topsoil, consisting of sandy or silty clay with rootlets (up to a depth of 0.6 m bgl) was foundto overly a silty sandy clay overlying a peat layer of varying thickness (approximately 0.6 – 4.7 m thickness) which in turn overlies medium sand. The boreholes were advanced to a maximum depth of 5.5 m bgl.

4.1.2.9 Bedrock was not encountered at any locations on site.

Field Observations

4.1.2.10 All soil arising's were systematically screened for VOCs at 0.5m intervals, or changes in geology, throughout the drilling process using a handheld PID. The highest headspace reading recorded on the NGLEP Land was 24.3 parts per million (ppm) at 1m bgl in WS26 within the Made Ground. A fish type odour was noted however there was no visual observation of contamination. The concentrations decreased with depth.

4.1.2.11 No visual observations of contamination were observed during the works, however a distinct egg odour was noted at MW0 and MW1 within the peat layer.

4.1.3 Southern DHPWN Land

Made Ground

4.1.3.2 All locations on the Southern DHPWN Land were on agricultural land and Made Ground was not encountered. Made Ground was encountered up to 0.3m bgl as topsoil, described as organic sandy or silty clay with rootlets, or vegetated top cover with sand.

Superficial Deposits

4.1.3.3 Across the Southern DHPWN topsoil was encountered, described as organic sandy or silty clay with rootlets, or vegetated top cover with sand.

4.1.3.4 At the southern end of the Southern DHPWN Land (WS32 and WS35) topsoil was underlain by brown or orange sand containing some clay over grey, sometimes silty, sand.

4.1.3.5 In the central and northern area of the Southern DHPWN Land (WS11, WS12, WS14 andWS16) the topsoil was underlain by orange or brown clayey or silty sand with intervening layers of grey sand at some locations. This overlies peaty silty clay or silty sand with peat, overlying a brownish grey or grey silty sand or sand. Boreholes were advanced to a maximum depth of 5m bgl.

4.1.3.6 Bedrock was not encountered at any locations on the Southern DHPWN Land.

Field Observations

4.1.3.7 All soil arising's were systematically screened for VOCs at 0.5m intervals, or changes in geology, throughout the drilling process using a handheld PID. The highest headspace reading recorded through the works was 13.8ppm at 2.5m bgl in WS35 within grey silty medium sand. No visual or olfactory evidence of contamination were noted during the works.

4.2 Groundwater Conditions

4.2.1.1 Groundwater was encountered in MW8 at 3.5m bgl during drilling in light brown medium to fine sand. Groundwater was not encountered at any of the other locations advanced during drilling or excavation, however groundwater was recorded at each of the five monitoring wells following installation.

4.2.1.2 All monitoring wells were within the NGLEP land.

4.2.2 Field Observations & Measurements

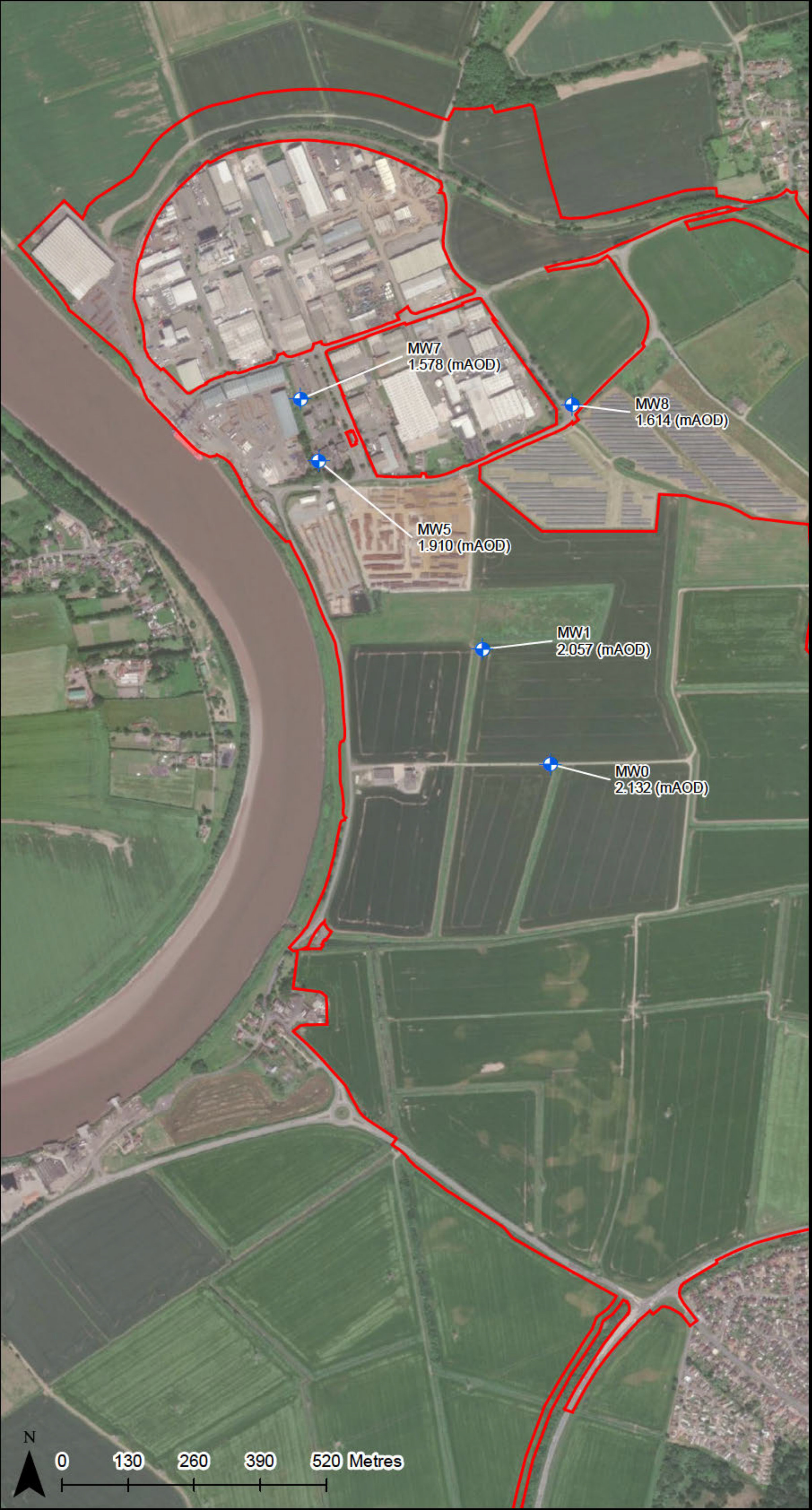
4.2.2.1 The resting groundwater levels were measured in all monitoring wells prior to groundwater sampling. A summary of the groundwater levels are presented in Table 3 below, adjusted for localised ground levels. Groundwater field readings for temperature, dissolved oxygen, conductivity, pH and redox are provided in Table 4.

Table 3: Groundwater Levels

Location	Depth of rest water level (m bgl)	Depth to base of monitoring well (m bgl)	Ground level (m AOD)	Groundwater elevation (m AOD)
MW0	0.840	4.945	2.972	2.132
MW1	1.715	4.965	3.772	2.057
MW5	1.770	4.860	3.68	1.910
MW7	1.920	4.930	3.498	1.578

Location	Depth of rest water level (m bgl)	Depth to base of monitoring well (m bgl)	Ground level (m AOD)	Groundwater elevation (m AOD)
MW8	2.450	4.620	4.064	1.614

4.2.2.2 Figure 5 presents the groundwater elevations at the five monitoring wells. It was originally assumed that groundwater flow would be westwards towards the River Trent. However it has since been calculated from the groundwater elevations measured at MW5, MW7 and MW8, that groundwater would potentially be flowing eastwards towards MW8. Based on the lack of groundwater encountered during drilling, and the groundwater elevations recorded during the monitoring, it can therefore be assumed that groundwater encountered within the monitoring wells is representative of a shallow discontinuous perched water body, rather than a continuous groundwater body.



North Lincolnshire Green Energy Park

Title	Figure 5 Groundwater Elevations – NLGEP Land

Client Information

Client	North Lincolnshire Green Energy Park
PINS Proj No	EN010116
Date	15/03/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	10,000

ArcMap File

SI_ES_GroundwaterElevations_NLGEP_Land_A01

Legend

Locations Accessed

⊕ Monitoring Well

🟥 Order Limits

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING

Table 4: Groundwater Field Readings

Locations	Temp (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/l)	pH	ORP (Redox potential mV)
MW0	13.3	5,865	0.35	6.6	-248.2
MW1	12.99	10,311	0.1	6.95	-226.6
MW5	14.11	3,266.4	0.56	6.95	-62.2
MW7	13.95	2,028.9	0.19	6.65	-41.1
MW8	13.97-	1,415.2	0.66	7.17-	-42.0-

4.2.2.3 Field monitoring data reported groundwater temperatures between 12.99 and 14.11°C. The groundwater pH values were broadly neutral, ranging between 6.65 and 7.17 and the dissolved oxygen and redox potential indicate that the groundwater environment is mildly anaerobic.

4.3 Soil Gas Monitoring

4.3.1.1 An initial round of soil gas monitoring of the installed wells was undertaken on September 14th 2021. Weekly soil gas monitoring is currently ongoing and will be reported as an addendum report. Table 5 presents the results from the first round of soil gas monitoring. The ‘s’ series wells are the specific gas monitoring wells installed to 1m bgl. The ‘d’ series wells are the specific groundwater monitoring wells installed to between 3 and 5m bgl. Both series were included for the gas monitoring rounds.

Table 5: Ground Gas Monitoring Results

Borehole	Flow (L/hr)	VOC (ppm)	MaxCH_4 (%)	Steady CO_2 (%)	O_2 (%) (min)	H_2S (ppm)	CO (ppm)
MW0s	0.1	0.2	0.2	1.0	20.1	0.0	0.0
MW0d	0.1	0.2	0.8	0.3	20.5	0.0	1.0
MW1s	0.1	1.8	0.3	4.1	19.2	0.0	1.0
MW1d	10.0	0.0	19.8	13.0	11.0	0.0	32.0
MW5s	0.0	0.2	0.2	1.6	19.7	0.0	0.0
MW5d	0.0	1.2	0.2	2.3	18.9	0.0	0.0
MW7s	0.0	0.7	0.1	0.2	20.5	0.0	0.0
MW7d	0.0	0.0	0.1	0.1	20.9	0.0	0.0
MW8s	-0.1	0.6	0.3	3.0	18.9	0.0	0.0
MW8d	0.0	2.7	0.1	5.0	15.9	0.0	1.0

5. ASSESSMENT OF ANALYTICAL RESULTS

5.1 UK Technical and Legislative Framework

5.1.1.1 This section provides background information on the regulatory context which governs the assessment and remediation of potentially contaminated sites in England and Wales.

5.2 The Risk Based Assessment of Land Contamination

5.2.1.1 The UK takes a risk-based and suitable for use approach for dealing with land contamination. An assessment of risk is based on either current or proposed future land use, depending upon the circumstances of the assessment. A guidance framework for risk assessment and management is set out in the Environment Agency (EA) online Land Contamination Risk Management guidance (LCRM)(1). This provides the basis for good practice in dealing with brownfield and industrial land, whether subject to sale or acquisition, development for new use, or assessment in the context of risks posed to current users and the wider environment.

5.2.1.2 LCRM sets out a tiered framework, where decisions may initially be informed by a preliminary or qualitative risk assessment or by Generic or Detailed Quantitative Risk Assessments (GQRA or DQRA respectively). DQRA is generally appropriate where generic guideline values are exceeded or are not available, or where they are not appropriate given the specific circumstances of the contaminant linkage. DQRA may also be required where a greater level of certainty is needed to support the decision making process.

5.2.1.3 At the preliminary stage, a conceptual site model (CSM) is formed, which characterises the Site by identifying relationships between possible sources of contamination, receptors which may be affected, and where feasible, the likely pathways of exposure. A contaminant-pathway-receptor relationship is known as a contaminant linkage. As the risk assessment moves on through each stage of investigation, the CSM can be refined to reflect the increasing level of knowledge about the Site. Contaminants of concern may be added or deleted from the model as site investigation data becomes available, and similarly pathways may be confirmed, refined or eliminated from further consideration. The objective of the risk assessment should be to provide a clear picture of what, if any, significant risks are present, identify if remedial actions are required or identify areas of uncertainty where further information/assessment is required before a conclusion can be reached.

5.3 Part 2A & Statutory Designated Contaminated Land

5.3.1.1 For sites where existing contamination poses a potentially unacceptable risk to the current site users or the wider environment, then Part 2A of the Environmental Protection Act (1990) is likely to be applicable. Under the Part 2A regime, local authorities have a duty to inspect their areas and identify land, which meets the definition of contaminated land, as set out in the Statutory Guidance. Specifically, contaminated land is defined as:

> “any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of the substances in, on, or under the land, that:
>
> a. significant harm is being caused or there is a significant possibility of such harm being caused: or
>
> b. significant pollution of Controlled Waters is being caused or there is a significant possibility of such pollution being caused.”

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[1] https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

5.3.1.2 Under Part 2A, the receptors which may be considered are limited to those set out in the Statutory Guidance(1), and specifically include humans, Controlled Waters, designated ecological systems, property (domestic and commercial crops, livestock, wild animals subject to shooting and fishing rights), and property in the form of buildings.

5.3.1.3 For both human health and Controlled Waters, the statutory guidance has subdivided contaminated land determinations into four categories as summarised below. Sites falling within Category 1 and 2 are capable of being determined as contaminated land but those within categories 3 and 4 are not:

5.3.1.4 Human Health:

- Category 1: Similar land, situations or similar levels of exposure are known or strongly suspected to cause significant possibility of significant harm (SPOSH);
- Category 2: Little or no direct evidence of similar land, situations or similar levels of exposure having caused significant harm previously but strong case for taking action;
- Category 3: No strong case for action although risks are not low but regulatory intervention is not warranted under Part 2A; and
- Category 4: No risk or level of risk is low – no relevant contaminant linkage, 'normal' levels of contamination, no exceedance of relevant generic assessment criteria, or exposure is small compared to other sources of environment exposure.

5.3.1.5 Controlled Waters:

- Category 1: Strong or compelling case that significant possibility of significant pollution of Controlled Waters (SPOSPOCW) exists or will occur;
- Category 2: Little or no direct evidence that SPOSPOCW exists but risks of sufficient concern to adopt precautionary approach;
- Category 3: Regulatory intervention is not warranted under Part 2A as very unlikely that serious pollution will occur or low likelihood that less serious pollution will occur; and
- Category 4: No risk or level of risk is low – no relevant contaminant linkage, types of pollution are not considered significant or levels similar to 'background' contamination.

5.3.1.6 With regard to the Water Resources Act 1991 Section 85, substances must be entering Controlled Waters in concentrations, which are considered to be poisonous, noxious, polluting and/or solid waste matter. Under Part 2A, significant pollution of Controlled Waters constitutes:

- Pollution equivalent to 'environmental damage' as defined by the Environment Damage (Prevention and Remediation) Regulations 2009. With respect to groundwater, this means damage such that the level or concentration of pollutants changes sufficiently to lower its status' with respect to the Water Framework Directive (2);
- Inputs result in deterioration of a potable water abstraction such that additional treatment is required;
- A breach of a statutory surface water environmental quality standard (EQS); or
- Input of a pollutant resulting in a significant and sustained upward trend in concentrations with respect to the Groundwater Daughter Directive (3).

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[1] DEFRA, April 2012, Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance.

[2] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

[3] Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration

5.3.1.7 In addition, it must be determined that substances are continuing to enter Controlled Waters and/or are likely to enter Controlled Waters in the future where Controlled Waters are defined as territorial waters which extend seawards for three miles, coastal waters, inland freshwaters and groundwater excluding the unsaturated zone.

5.4 Assessment Rationale

5.4.1.1 The risk based assessment of land contamination is undertaken in accordance with the 'suitable for use' approach and follows the tiered framework detailed in Section 5.2.

5.4.1.2 For the assessment of identified plausible contaminant linkages at this Site, ERM has undertaken a GQRA with respect to human health, controlled waters and ground gas whereby analytical results are compared to risk-based GAC. The methodologies and results of these assessments have been detailed in the following section.

5.4.1.3 Data assessment tables comparing the soil and groundwater results with the GAC are presented in Appendix B with the laboratory analytical certificates provided in Appendix C.

5.5 Human Health Effects

5.5.1 Background

5.5.1.1 This section summarises the methodology adopted in undertaking the human health GQRA and the results of the assessment.

5.5.2 General Rationale

5.5.2.1 Whilst the area at the northern of the NGLEP land will have a commercial/industrial end use, there will still be a large amount of agricultural land within the order limits on both the NGLEP land and southern DHPWN land. Generic assessment criteria (GAC) are available for a commercial end use however to allow for crops for human consumption, soil results have initially been conservatively screened assuming a residential end use with plant uptake[1]. The following potential exposure pathways have been included:

- Direct contact with soils (ingestion and dermal contact);
- Inhalation of fugitive dust / fibres;
- Inhalation of soil and groundwater derived vapours; and
- Consumption of home grown vegetables.

5.5.2.2 The exposure pathways, frequencies and durations defined in the contaminated land exposure assessment (CLEA) standard commercial land use scenario (SR3 - Environment Agency 'Updated technical background to the CLEA Model', August 2008) are considered to be appropriate for a preliminary assessment of the potential use of the Site.

5.5.2.3 Where available, recorded soil concentrations have been compared against the Category 4 Screening Level's (C4SL) published by DEFRA(2) and Soil Guideline Values (SGV) published by the EA for a residential land use, to indicate the potential chronic risks to human health. In the absence of a C4SL or SGV, soil concentrations have been compared with ERM GAC which have been developed in general accordance with the "CLEA Framework" of documents published by the EA. The derivation of ERM human health GAC is detailed in Appendix D.

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[1] The Commercial GAC do not allow for ingestion via plant uptake.

[2] SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document, DEFRA, December 2014

5.5.3 *Data Evaluation*

5.5.3.1 A comparison of the recorded soil concentrations with human health GAC assuming a residential land use with plant uptake is presented in Appendix B. A maximum value comparison is undertaken as the first level of assessment where each individually recorded concentration has been compared against the GAC irrespective of depth and/or location. This is a conservative assumption, particularly for the ingestion and dermal contact pathways at the northern end of the NGLEP (ERF plant), since significant exposure via these pathways here is unlikely below approximately 0.5 m or where hardstanding is present, no crops are present or are likely to be grown in the future, and the end use is commercial.

5.5.4 *Soil Data Assessment*

5.5.4.1 Twenty-seven soil samples were taken from seventeen locations and tested for a wide range of organic and inorganic analytes. The soil results showed minor concentrations of metals, TPH, VOCs and SVOCs were detected, however, with the exception of beryllium, nickel and chloromethane none of the soils exceeded any of the residential with plant uptake ERM GAC screening values. Table 6 presents a summary of the exceedances recorded in the soils.

Table 6: Summary of Soil Exceedances (Residential with Plant Uptake)

CoC	GAC (residential with plant uptake)	GAC (commercial)	Range of exceedances (residential with plant uptake) (mg/kg)	Location	Maximum concentration	Location
Nickel	136	1,718	1,272	MW6	1,272	MW6
Beryllium	1.7	14	2 - 8	MW0, MW1, MW5, MW6 MW7, WS25, WS26,TP28	8	TP28
Chloromethane	0.005	0.42	0.023-0.025	MW7, WS21	0.025	WS21

5.5.4.2 Beryllium concentrations above the GAC for a residential with plant uptake end use were recorded at eight locations across the northern and central area of the NGELP. The main risk driver for beryllium with a residential GAC is the indoor inhalation of fugitive dust in a residential setting, which is not a current or likely future pathway. The beryllium concentrations are below the GAC for a commercial end use. Therefore, the beryllium concentrations are not considered to present a significant risk to Human Health based on the current or likely future land use.

5.5.4.3 The concentration of nickel at MW6 in the wharf area exceeded the residential with plant uptake end use GAC. The main risk drivers for nickel are soil ingestion, consumption of home-grown vegetables or indoor inhalation of fugitive dust in a residential setting. None of these are currently or likely to be a future pathway at the wharf area. The nickel concentration is below the GAC for a commercial end use. Therefore, the nickel concentration is not considered to present a significant risk to Human Health.

5.5.4.4 The concentration of chloromethane at two locations (MW7 and WS21) was found to exceed the GAC for a residential with plant uptake end use. The main risk driver for chloromethane is indoor vapour inhalation in a residential setting which is not a current or likely future pathway on this site. The chloromethane concentration is below the GAC for a commercial end use (including indoor vapour inhalation). Therefore, the chloromethane concentration is not considered to present a significant risk to Human Health.

5.5.4.5 Asbestos was identified in two of the eleven soil samples tested. At MW6 the asbestos was identified as Anthophyllite in fibre bundles and at WS104 as chrysotile in fibre bundles. Quantification analysis was completed on each of the asbestos containing samples, the results of which identified that asbestos is present at concentrations less that <0.001%, equivalent to the method detection limit. The concentrations have been detected below the method detection limits and whilst a positive result was returned in the screening exercise, the quantification has returned results that are not considered to pose a potential risk to human health, particularly as the samples were taken from below hardstanding. However, the potential for asbestos to be encountered during excavation works in the Made Ground of this area cannot however be discounted and a watching brief should be adopted during any construction works. It would be prudent for the Contractor undertaking work in this area to develop an asbestos management plan in the event that hotspots of suspected Asbestos Containing Materials are encountered.

5.5.5 Groundwater Vapour Assessment

5.5.5.1 A comparison of the groundwater concentrations recorded in the five monitoring wells against the ERM groundwater vapour inhalation GAC assuming a commercial end use has been undertaken. The results are presented in Table B2 in Appendix B.

5.5.5.2 No exceedances of the GAC for groundwater derived vapours was recorded. Therefore, the current groundwater concentrations are unlikely to present a significant risk to human health.

5.6 Controlled Waters Effects

5.6.1 Rationale

5.6.1.1 Whilst the superficial deposits are classified as Secondary A aquifers, this is likely due to their supply of groundwater to the River Trent rather than their use as a drinking water resource and there are no drinking water abstractions registered within 1 km of the Order Limits. The underlying mudstone bedrock is classified as a Secondary B aquifer and the Site is not located within a groundwater Source Protection Zone. For this reason, the groundwater results have been assessed against the appropriate UK freshwater Environmental Quality Standard (EQS). Where no such value is available, they have been compared against an appropriate alternative.

5.6.2 Groundwater Data Assessment

5.6.2.1 A maximum value comparison of the recorded groundwater concentrations against Controlled Waters EQS are presented in Table B3 within Appendix B.

5.6.2.2 There were no detections of VOCs, pesticides or herbicides. Table 7 presents a summary of the exceedances for metals, TPH, SVOCs including PAHs and ammoniacal nitrogen.

Table 7: Groundwater exceedances of EQS GAC

Analyte	EQS µg/l	No. of exceedances	Range of exceedances µg/l	Location of highest exceedance	Location of other exceedances
Dibenzofuran	3.7 (US EPA)	1	8	MW8	-
Dissolved barium	114.7 (ECHA)	4	160 -504	MW1	MW0, MW5, MW7

Analyte	EQS µg/l	No. of exceedances	Range of exceedances µg/l	Location of highest exceedance	Location of other exceedances
TPH Aromatic C16-C21	90 (WHO DWS)	1	100	MW8	-
Naphthalene	2	1	2.2	MW8	-
Fluorene	3 (USEPA)	1	9.2	MW8	-
Phenanthrene	0.4 (USEPA)	1	24.5	MW8	-
Anthracene [#]	0.1	1	10.573	MW8	-
Fluoranthene [#]	0.0063	4	0.047 - 20.192	MW8	MW1, MW5, MW7
Pyrene [#]	0.025	4	0.042 - 14.7	MW8	MW1, MW5, MW7
Benzo(a)anthracene	0.018 (US EPA)	2	0.14 - 4.428	MW8	, MW7
Benzo(bk)fluoranthene	0.00017	3	0.037 - 4.32	MW8	MW5, MW7
Benzo(a)pyrene	0.00017	3	0.017 - 2.701	MW8	MW5, MW7
Indeno(123cd)pyrene	0.00017	2	0.095 - 1.135	MW8	MW7
Benzo(ghi)perylene	0.00017	3	0.017 - 1.131	MW8	MW5, MW7
Ammoniacal nitrogen as N	600 (WFD good classification)	4	1,650-31,700	MW0	MW1, MW5, MW7

5.6.3 Groundwater Evaluation Summary

5.6.3.1 In total 5 water samples were collected from 5 monitoring wells across the northern end of the Energy Park land.

5.6.3.2 No metals were detected above the EQS with the exception of dissolved barium which was detected in four of the five samples above the EQS with the highest concentration being detected at MW1 away from the industrial areas and may therefore be indicative of background concentrations. There is no UK WFD EQS for barium, and the value used is based on the PNEC[1] information provided in the ECHA REACH Registration Brief profile. The concentrations recorded are less than 5 times the EQS and are therefore unlikely to present a risk to the River Trent when other factors such as retardation or dilution are taken into account.

5.6.3.3 No VOCs, herbicides or pesticides were detected in any of the samples.

5.6.3.4 TPH was detected at MW8 only; Aliphatic C21-C35 and Aromatic C12-C16 and C16-C21. There is no UK EQS for TPH fractions, and they have therefore been assessed against the WHO DWS. There is a minor exceedance of C16-C21 (100ug/l compared against the WHO DWS of 90ug/l) which is unlikely to present a risk to the River Trent.

5.6.3.5 There are a number of exceedances of SVOCS, predominantly PAHs, with the highest concentrations recorded at MW8, approximately 650m from the River Trent. Concentrations at MW5 and MW7, between MW8 and the River Trent are generally one to two orders of magnitude lower. As discussed previously, the encountered groundwater is considered to be perched water rather than representative of a groundwater body. Historic third party site investigation reports indicate that the deeper groundwater body is confined by the Alluvium

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[1] Predicted no effect concentration

at a depth greater than 5m bgl. Whilst there may be some downward vertical migration of the perched water to the underlying deeper groundwater body and from there potentially westwards migration towards the River Trent, the intervening low permeability clay or silt layers of Alluvium will reduce infiltration. If attenuation effects such as degradation or retardation is taken into account, the concentrations at MW8 are unlikely to present a significant risk to the River Trent.

5.6.3.6 Detected ammoniacal nitrogen concentrations ranges from 90ug/l (MW8) to 31,700ug/l (MW0). The employed ammoniacal nitrogen EQS is based on the WFD classification of good for the River Trent. In 2019 the River Trent in the vicinity of the site was classified as having poor quality in relation to ammoniacal nitrogen, most likely due to agriculture and rural land management.

5.7 Soil Gas Evaluation

5.7.1.1 Following construction and during operation of the Proposed Development, the risk to workers includes the inhalation of gases and vapours.

5.7.1.2 It is possible for ground gas to accumulate to form an explosive and/or asphyxiating atmosphere when the right conditions are present. Methane is a flammable, colourless and odourless gas and is potentially explosive in the range 5% to 15% by volume, in the presence of oxygen of at least 13% by volume. In confined spaces, carbon dioxide can displace oxygen and accumulate to form asphyxiating conditions.

5.7.1.3 Ground gas concentrations were assessed against the guidance detailed within CIRIA report C665 “Assessing Risks Posed by Hazardous Ground Gases to Buildings”, 2015 British Standard “Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings” BS 8485:2015.

5.7.1.4 The guidance identifies that the assessment of risks from ground gases requires consideration of both gas concentrations and borehole flow rates whereby the combination of the two can be used to define a characteristic situation for a site based on the limiting borehole gas volume flow for methane and carbon dioxide known as the Gas Screening Value (GSV).

5.7.1.5 The GSV is calculated by multiplying the borehole flow rate (l/h) by the gas concentration (%).

5.7.1.6 Eight rounds of ground gas monitoring will be undertaken onsite and is currently ongoing. The first round of results is presented in Table 8.

Table 8: Ground Gas Assessment

Borehole	Flow (L/hr)	VOC (ppm)	MaxCH$_4$ (%)	Steady CO$_2$ (%)	O$_2$ (%) (min)	H$_2$S (ppm)	CO (ppm)	Gas Screening Value (L/hr) CH$_4$	Gas Screening Value (L/hr) CO$_2$	Gas Hazard Potential (CIRIA C665)
MW0s	0.1	0.2	0.2	1.0	20.1	0.0	0.0	0.0002	0.001	Very Low (CS1)
MW0d	0.1	0.2	0.8	0.3	20.5	0.0	1.0	0.0008	0.0003	Very Low (CS1)
MW1s	0.1	1.8	0.3	4.1	19.2	0.0	1.0	0.0003	0.0041	Very Low (CS1)
MW1d	10.0	0.0	19.8	13.0	11.0	0.0	32.0	1.98	1.3	Medium (CS3)

Borehole	**Flow (L/hr)**	**VOC (ppm)**	**MaxCH$_4$ (%)**	**Steady CO$_2$ (%)**	**O$_2$ (%) (min)**	**H$_2$S (ppm)**	**CO (ppm)**	**Gas Screening Value (L/hr) CH$_4$**	**Gas Screening Value (L/hr) CO$_2$**	**Gas Hazard Potential (CIRIA C665)**
MW5s	0.0	0.2	0.2	1.6	19.7	0.0	0.0	0	0	Very Low (CS1)
MW5d	0.0	1.2	0.2	2.3	18.9	0.0	0.0	0	0	Very Low (CS1)
MW7s	0.0	0.7	0.1	0.2	20.5	0.0	0.0	0	0	Very Low (CS1)
MW7d	0.0	0.0	0.1	0.1	20.9	0.0	0.0	0	0	Very Low (CS1)
MW8s	-0.1	0.6	0.3	3.0	18.9	0.0	0.0	-0.0003	-0.003	Very Low (CS1)
MW8d	0.0	2.7	0.1	5.0	15.9	0.0	1.0	0.00001	0.0005	Very Low (CS1)

5.7.1.7 The majority of locations show a gas characteristic scenario 1 (very low) indicative of natural ground with low organic content or ‘typical’ Made Ground. At MW1, the proposed site of the Polymer Plant, there is a gas characteristic scenario 3 (medium) and gas remedial measures may be required. However, gas monitoring is ongoing and the gas characteristic scenario will be re-evaluated on completion of the eight rounds of monitoring.

6. REVISED CONCEPTUAL SITE MODEL

6.1 Introduction

6.1.1.1 The following Section highlights the potential sources of impact on and off-Site and identifies potential receptors and plausible pollutant linkages in the context of the Site setting and continued commercial land use at the northern end of the Energy Park Land, and continued agricultural use for the southern DHWPH Land, and central and southern end of the Energy Park Land.

6.1.2 Potential Primary Sources

6.1.2.1 Primary sources are man-made activities that have the potential to introduce contamination into the ground. Based on the information gathered with respect to the current site activities, the history of the site and the surrounding area, it is considered highly likely that historic activities undertaken at the northern end of Energy Park Land may have affected the land quality, although it is noted that generally low levels of contamination were observed on site. No evidence of soil contamination was identified in this investigation. However, although three boreholes were proposed at the northern end of the Energy Park land in the wharf area, due to ground conditions and site activities these could not be completed to their maximum depths. Therefore, there may be small areas of as yet undiscovered impact in this area.

6.1.2.2 Low concentrations of PAHs in excess of the screening criteria were detected within the groundwater at MW8, and in lesser concentrations at MW5 and MW7.

6.1.3 Potential Pathways

6.1.3.1 Potential pathways of exposure to on-site personnel include:

- Direct / dermal contact with contaminated soils and / or groundwater;
- Ingestion of contaminated soils and groundwater; and
- Inhalation of particles in windblown dusts.

6.1.3.2 Based on the low soil concentrations detected in the agricultural areas and low groundwater concentrations recorded during the site investigation, ingestion of crops and inhalation of groundwater vapours are not considered to be potential pathways.

6.1.3.3 Potential pathways for the migration of mobile perched groundwater contamination into deeper groundwater and from there, lateral groundwater flow include:

- Vertical downwards migration of mobile substances through the superficial alluvium deposits into the deeper groundwater body within the underlying sands and gravels; and
- Once in the deeper groundwater, lateral groundwater flow in the aquifer to the offsite surface water receptor (River Tees).

6.1.4 Potential Receptors

6.1.4.1 Potential receptors of any soil and/or groundwater impact at the site are considered in the context of the environmental site setting described above and potential future end users during construction and operation. The potential receptors are listed in Table 9 and discussed below:

Table 9: Statutory Receptors Checklist

Receptor	On Site	Off Site
Human beings	✓	✓
Ecological systems (statutory designation)	✓	✓
Property - crops/livestock	✓	✓
Property – buildings	✓	✓
Property - domestically grown produce	✗	✓
Controlled waters – groundwater	✓	✓
Controlled waters – surface water	✓	✓

Human Health

Onsite Permanent Workers

6.1.4.2 In the context of a commercial land use (i.e. operation of power station), the primary human health receptor at the site is likely to be an adult member of the regular site workforce. This is likely to include male and female workers between the ages of 18 and 65. The primary consideration relating to these workers is likely to be harmful effects caused by long term exposure to low contaminant concentrations (chronic effects).

Onsite Temporary Workers

6.1.4.3 In addition to the regular workforce, it is likely that construction /ground workers will be present onsite in the future, undertaking works during which exposure to ground contamination is likely (i.e. earthworks). Given the temporary nature of this work, the primary consideration relating to these receptors is likely to be harmful effects caused by short term exposure to contaminants at higher concentrations (acute effects).

Other Human Receptors

6.1.4.4 Given the site's location, there will be numerous human health receptors will be present in the area surrounding the site (up to 1km – i.e. neighbouring workers / residents etc.). For the purposes of the conceptual model, with the exclusion of vapour exposure associated with migratory groundwater, risk assessment of the onsite permanent receptors is considered protective of all offsite and / or temporary equivalents.

Controlled Waters

Groundwater

6.1.4.5 UK EA digital mapping indicates that the superficial deposits (Alluvium, Warp and Blown Sands) are designated as Secondary A Aquifer units and the underlying bedrock (Mercia Mudstone and Scunthorpe Mudstone) are designated as Secondary B aquifer units.

6.1.4.6 The groundwater resources at the site have previously been classified by the UK EA as having 'Good' quantitative status and 'Good' chemical quality in 2019 under the Water Framework Directive (WFD). Five groundwater abstractions are known to be present within 1km of the site, all for spray irrigation, and the site does not lie within a groundwater Source Protection Zone (SPZ) of any type.

6.1.4.7 Groundwater was only encountered at MW8 during drilling, and although groundwater was collected from each of the five monitoring wells installed, it is likely that the water was discontinuous and perched above the lower permeability clays and silts. As such groundwater within the superficial deposits is likely to provide a baseflow to surface waters rather than a sensitive resource in its own right.

Surface Waters

6.1.4.8 The nearest surface water feature is the River Trent which is located adjacent to the western boundary. Several other minor watercourses/field drains are present within the site's red line boundary and surrounding the site (<250m). The River Trent is part of the Upper Humber Catchment and has been rated by the UK EA as overall water body classification as Moderate in 2019 under the WFD.

Ecology

6.1.4.9 The River Trent, in the vicinity of the site, is within the Humber Estuary SSSI, SAC and Ramsar site. Risks to the River Trent have been assessed under the controlled waters risk assessment.

Property

6.1.4.10 Whilst much of the site area is agricultural, soil concentrations in these areas are unlikely to present a risk to crops. The lack of a shallow continuous groundwater body indicates that there is unlikely to be lateral mobilisation of contaminants from the northern end of the NGLEP Land, to the agricultural areas or offsite to domestically grown produce.

7. SUMMARY OF KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

7.1.1.1 Environmental Resources Management Ltd (ERM) was commissioned by Solar 21 to conduct an intrusive site investigation one land near Flixborough for their proposed new Energy Recovery Facility (ERF) and Associated Development (the Project).

7.1.1.2 In total twelve locations were advanced on the NGLEP land, and six locations on the Southern DHPWN Land. Five locations at the northern end of the NGLEP Land were installed as gas and groundwater monitoring wells. One round of groundwater sampling was undertaken at these locations. Gas monitoring at the site is ongoing and should be completed by the end of November 2021.

7.1.1.3 Recorded soil concentrations were initially and conservatively compared against GAC for a residential with plant uptake end use to allow for the use of much of the land as agricultural. At the northern end of the NGLEP land soil concentrations of beryllium, chloromethane and nickel exceeded the residential with plant uptake GAC. However, based on the current or likely future end use in these areas, the risk drivers for a residential with plant uptake scenario were not considered present or likely to be present in the future i.e. these areas are not going to be used for agricultural purposes and are all below the commercial GAC. Therefore the concentrations recorded are not considered to present a risk to Human Health.

7.1.1.4 No other recorded soil concentrations or groundwater concentrations, based on a conservative residential with plant uptake end use are likely to present a risk to Human Health on either the NGLEP land or the Southern DHPWN Land.

7.1.1.5 No evidence of soil contamination was identified in this investigation and it is therefore unlikely that there is widespread soil impact. However, although three boreholes were proposed at the northern end of the NGELP land in the wharf area, due to ground conditions and site activities these could not be completed to their maximum depths. Therefore there may be small areas of as yet undiscovered impact in this area.

7.1.1.6 A positive identification of asbestos was made at MW6 and WS104 in Made Ground in the wharf area, although at very low concentrations and below the method detection limits (<0.001%). It would be prudent for the Contractor undertaking work in this area to develop an asbestos management plan in the event that hotspots of suspected Asbestos Containing Materials are encountered.

7.1.1.7 Groundwater samples were collected from all five locations installed, indicating that the groundwater collected is representative of discontinuous perched water and not a true groundwater body. Based on the site observations and previous third party site investigation reports, the deeper groundwater is likely to be confined by the alluvium superficial deposits.

7.1.1.8 Low concentrations of PAHs in excess of the screening criteria were detected at MW8, and in lesser concentrations at MW5 and MW7. However, based on the groundwater observations, there is likely to be only limited connectivity between MW8 and the River Trent. Whilst the current concentrations are unlikely to present a risk to the River Trent, any design in these areas should ensure that no pathway between the perched water and deeper groundwater is created e.g. appropriate piling techniques.

7.1.1.9 Based on the results of this site investigation ERM does not considered there to be a significant risk to human health or controlled waters due to construction or operation of the proposed facility.

APPENDIX A BOREHOLE LOGS

MW0
MW1
MW5
MW6
MW7
MW8
WS104
WS11
WS12
WS14
WS16
WS21
WS22
WS25
WS26
WS32
WS35

Boring/ Well ID: **MW0**

Drill Start/End Date: 08-Sep-2021 / 08-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: M.W
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

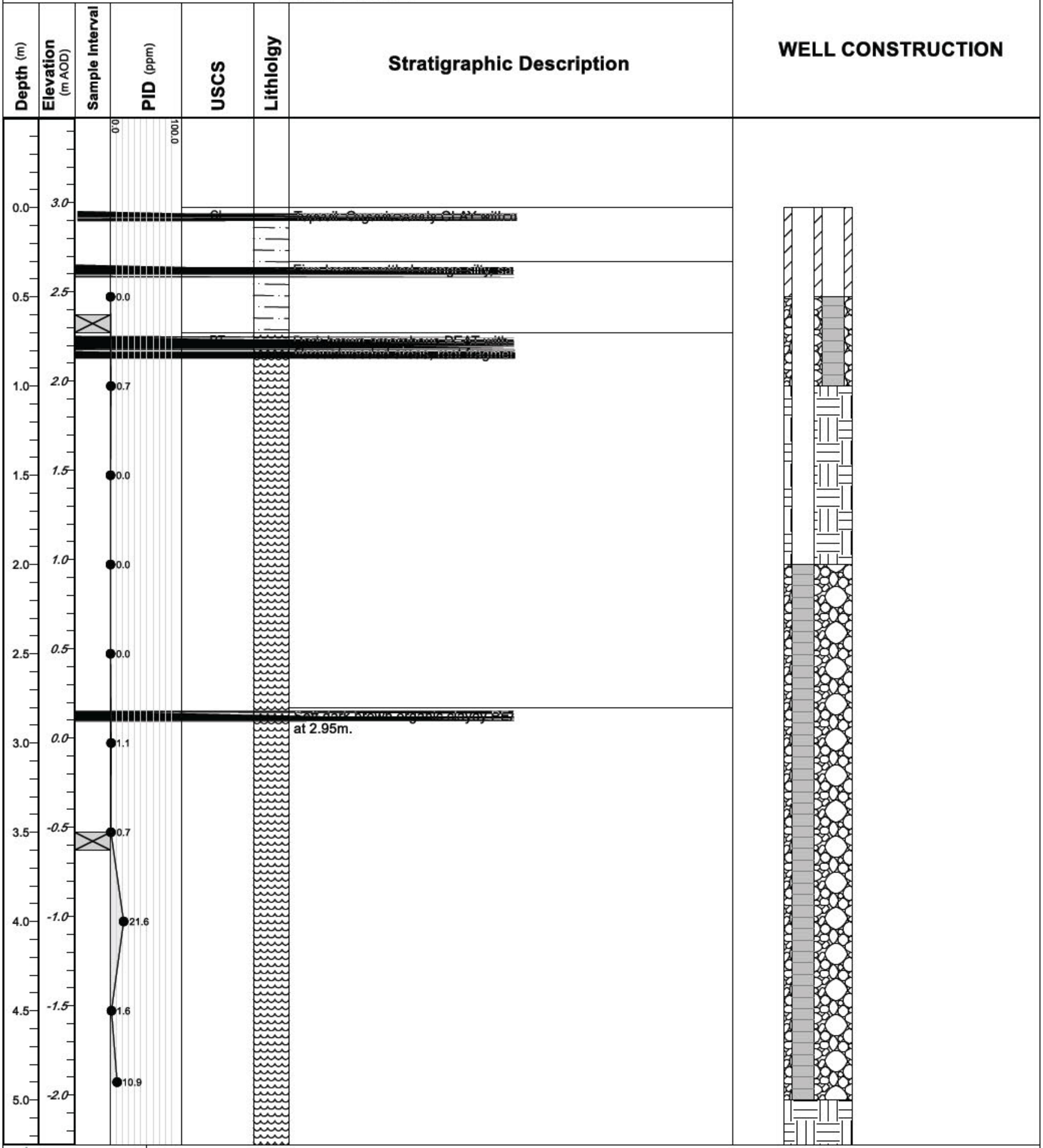
Northing: 413791.06
Easting: 486659.05
Surface Elevation: 3.0 m AOD
Datum Elevation: 3.0 m AOD
Borehole Diam./Depth: 100 mm / 5.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

WELL CONSTRUCTION



~~Topsoil: Orgainicaaly CLAY with~~

~~Fine brown mottled orange silty, sa~~

~~Dark brown amorphous PEAT with~~
~~decomposed woody, root fragmen~~

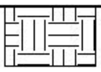
~~Soft dark brown organic clayey PE~~
at 2.95m.

Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
~~mm - millimeter~~	~~m bgs - meters below ground surfa~~

Boring/ Well ID: **MW0**

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithology	Stratigraphic Description	WELL CONSTRUCTION
			0.0	~~PT~~		~~Soft dark brown organic clayey PE~~ at 2.95m.	
				SW		Grey medium SAND.	
5.5	-2.5						
6.0	-3.0						
6.5	-3.5						
7.0	-4.0						
7.5	-4.5						
8.0	-5.0						
8.5	-5.5						
9.0	-6.0						
9.5	-6.5						
10.0	-7.0						
10.5	-7.5						
11.0	-8.0						
11.5	-8.5						
12.0	-9.0						

ERM

Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
~~mm - millimeter~~	~~m bgs - meters below ground surfac~~

Boring/ Well ID: **MW1**

Drill Start/End Date: 08-Sep-2021 / 08-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0.3 m

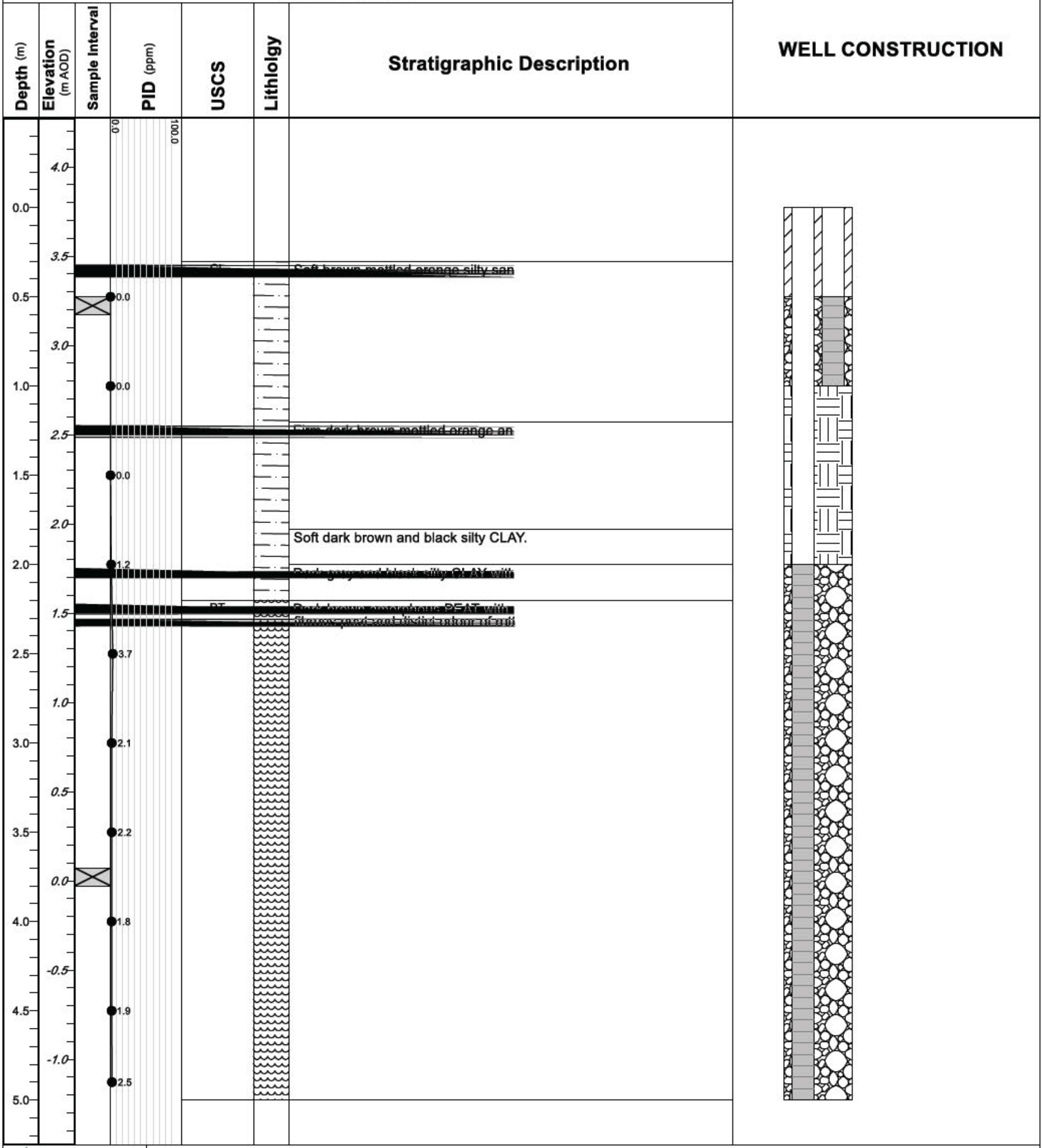
Northing: 413999.65
Easting: 486534.98
Surface Elevation: 3.8 m AOD
Datum Elevation: 3.8 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location:
Flixborough

SOIL PROFILE

WELL CONSTRUCTION



~~Soft brown mottled orange silty san~~

~~Firm dark brown mottled orange an~~

Soft dark brown and black silty CLAY.

~~Dark grey and black silty CLAY with~~

~~Dark brown amorphous PEAT with~~

~~fibrous peat and distinct odour of rot~~

Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm ~~- millimeter~~	~~m bgs - meters below ground surfa~~

Sheet: Page 1 of 1

Boring/ Well ID: **MW5**

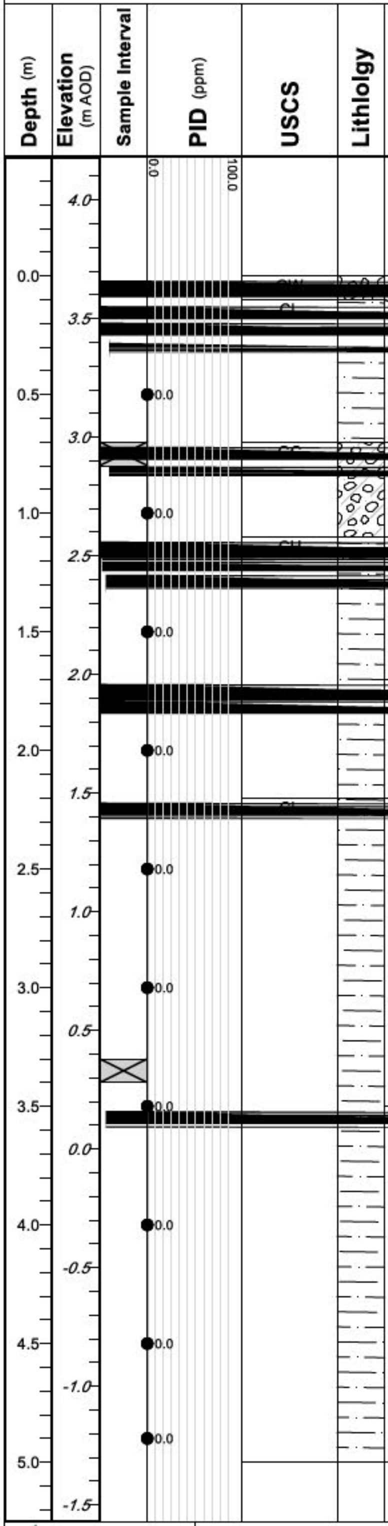
Drill Start/End Date: 31-Aug-2021 / 31-Aug-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

Northing: 414370.75
Easting: 486199.44
Surface Elevation: 3.7 m AOD
Datum Elevation: 3.7 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

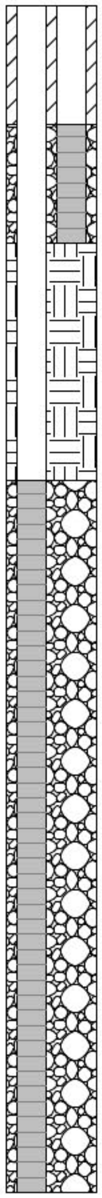
Site Name: Solar 21 NLGEP
Location:
Flixborough

SOIL PROFILE



USCS	Stratigraphic Description
GW	[illegible] Ground: Brown sandy landsc
CL	Brown sandy, gravelly low plasticity [illegible] Cobbles are angular of slag and agg
GC	Brown sandy, clayey, GRAVEL with [illegible]
CH	Soft brown sandy gravelly medium [illegible] [illegible]
[illegible]	Soft brown mottled grey sandy grav rootlets. Sand is fine to coarse. Gra to medium slags and concrete.
CL	[illegible] CLAY with [illegible] rare rootlets.
[illegible]	[illegible]

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm - millimeter	m bgs - meters below ground surfa

Sheet: Page 1 of 1

Boring/ Well ID: **MW6**

Drill Start/End Date: 02-Sep-2021 / 10-Nov-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

Northing: 414435.05
Easting: 486073.20
Surface Elevation: 4.2 m AOD
Datum Elevation: 4.2 m AOD
Borehole Diam./Depth: 50 mm / 0.7 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

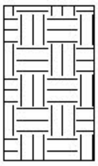
Client: Solar 21

Site Name: Solar 21 NLGEP
Location:
Flixborough

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithology	Stratigraphic Description
	4.5		0.0 100.0			
0.0				ASPHALT		MADE GROUND: Tarmacadam
	4.0	[redacted]	[redacted]	GP [redacted]		[redacted] medium.
0.5		[redacted]	[redacted]	[redacted]		[redacted] (300mm x 200mm).
	3.5	[redacted]	[redacted]	[redacted]		[redacted]
1.0	3.0					
1.5	2.5					
2.0	2.0					
2.5	1.5					
3.0	1.0					
3.5	0.5					
4.0	0.0					
4.5	-0.5					
5.0	-1.0					

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm ~~- millimeter~~	~~m bgs - meters below ground surfa~~

Sheet: Page 1 of 1

Boring/ Well ID: MW7

Drill Start/End Date: 01-Sep-2021 / 01-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 414488.84
Easting: 486164.50
Surface Elevation: 3.5 m AOD
Datum Elevation: 3.5 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

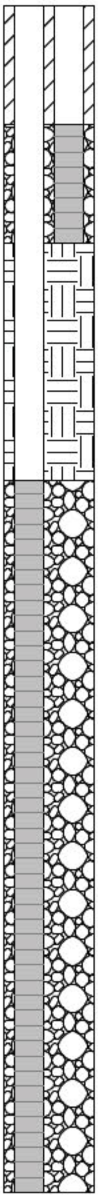
Client: Solar 21

Site Name: Solar 21 NLGEP
Location:
Flixborough

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm) 0.0 – 100.0	USCS	Litholgy	Stratigraphic Description
0.0	3.5			ASPHALT		Made ground: TARMACADAM and
				SP		Made ground: Brown gravelly SAN[illegible] coarse. Gravel is fine to coarse of s[illegible] [illegible] of slag, concrete and br[illegible]
0.5	3.0		0.0			
		☒		CL		Soft to firm dark brown mottled grey [illegible] CLAY with dark organic staining.
1.0	2.5		0.1			
1.5	2.0		0.4			
2.0	1.5		0.4			
2.5	1.0		[illegible]	[illegible]		Soft to very soft grey/brown mottled [illegible] plasticity CLAY with dark organic st[illegible]
3.0	0.5		0.0	No Recovery		No recovery
				[illegible]		Soft to very soft grey/brown mottled [illegible] plasticity CLAY with dark organic st[illegible]
3.5	0.0	☒	0.1	[illegible]		Soft grey/brown [illegible] silty CLAY [illegible] root/stem fragments.
4.0	-0.5		0.0			
4.5	-1.0		0.2			
						[illegible]
5.0	-1.5		0.2			

WELL CONSTRUCTION



Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter

m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surfa[illegible]

Sheet: Page 1 of 1

Boring/ Well ID: **MW8**

Drill Start/End Date:	31-Aug-2021 / 31-Aug-2021
Drilling Contractor:	Geotron
Drilling Method:	Direct Push
Rig Make/Model:	Dart
Driller:	MW
SSC Contractor:	Geotron
SSC Method:	Shovel
SSC Diam./Depth:	100 mm / 1.5 m

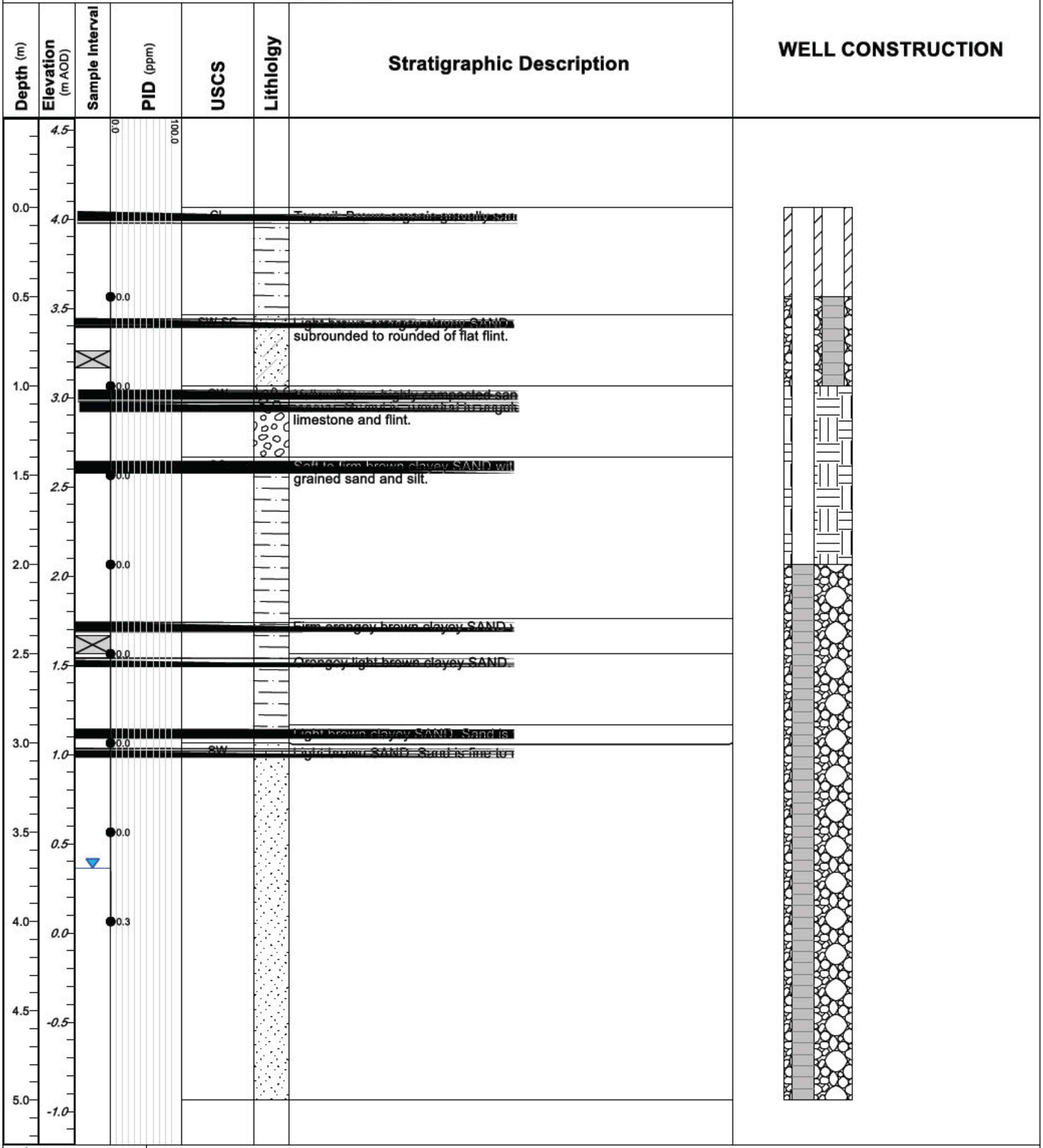
Northing:	414480.80
Easting:	486698.36
Surface Elevation:	4.1 m AOD
Datum Elevation:	4.1 m AOD
Borehole Diam./Depth:	100 mm / 5.0 m
Water Encountered:	3.7 m bgs
Logged By:	LR
Reviewed By:	SFD

Client: Solar 21

Site Name: Solar 21 NLGEP

Location: Flixborough

SOIL PROFILE



Topsoil: Brown organic gravelly san

Light brown orangey clayey SAND
subrounded to rounded of flat flint.

Yellowish brown highly compacted san
subrounded to angular
limestone and flint.

Soft to firm brown clayey SAND wit
grained sand and silt.

Firm orangey brown clayey SAND

Orangey light brown clayey SAND.

Light brown clayey SAND. Sand is

Light brown SAND. Sand is fine to

Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm - millimeter	m bgs - meters below ground surfa

Sheet: Page 1 of 1

Boring/ Well ID: **WS104**

Drill Start/End Date: 02-Sep-2021 / 02-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 414399.91
Easting: 486135.36
Surface Elevation: 3.7 m AOD
Datum Elevation: 3.7 m AOD
Borehole Diam./Depth: 100 mm / 0.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

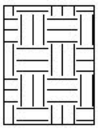
Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithlolgy	Stratigraphic Description
0.0			0.0 100.0	ASPHALT		Made ground: Tarmacadam.
				GW		~~Made ground: Grey sandy GRAVEL~~ slag and concrete.
				SW		Brown/grey SAND. Sand is medium.
0.5						~~Made Ground: Grey/brown gravelly~~ ~~and plastic. Gravel is angular to sub~~ ~~[illegible] of concrete and slag. Termin~~

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0
Elevation (m AOD): 4.0, 3.5, 3.0, 2.5, 2.0, 1.5, 1.0, 0.5, 0.0, -0.5, -1.0, -1.5

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm ~~- millimeter~~	~~m bgs - meters below ground surfa~~

ERM

Sheet: Page 1 of 1

Boring/ Well ID: **WS11**

Drill Start/End Date: 06-Sep-2021 / 06-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 409586.12
Easting: 485820.10
Surface Elevation: 2.5 m AOD
Datum Elevation: 2.5 m AOD
Borehole Diam./Depth: 100 mm / 4.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

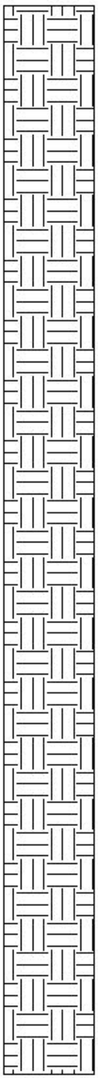
SOIL PROFILE

PID (ppm) scale: 0.0 – 100.0

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)
0.0	2.5		
0.5	2.0	☒	0.0
1.0	1.5		0.1
1.5	1.0		0.0
2.0	0.5		0.0
2.5	0.0		0.1
3.0	-0.5		0.1
3.5	-1.0		0.0
4.0	-1.5		0.0
4.5	-2.0		0.1
5.0	-2.5		

USCS	Stratigraphic Description
Top Soil	Topsoil.
~~CL~~	~~Firm brown slightly sandy CLAY wit~~
~~SC~~	~~Loose brown mottled orange clayey~~
	~~Grey/brown mottled orange clayey~~
~~CL~~	~~Black highly organic peaty silty CLA~~
~~SP~~	~~Brownish grey poorly graded silty S~~ Sand is fine to coarse.

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm ~~- millimeter~~

m - meter
ppm - parts per million
AOD - Above Ordance Datum
~~m bgs - meters below ground surfa~~

ERM

Sheet: Page 1 of 1

Boring/ Well ID: WS12

Drill Start/End Date: 02-Sep-2021 / 02-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 409609.34
Easting: 486096.60
Surface Elevation: 2.7 m AOD
Datum Elevation: 2.7 m AOD
Borehole Diam./Depth: 100 mm / 4.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

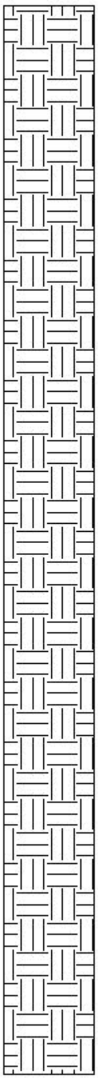
SOIL PROFILE

USCS	Stratigraphic Description
SP	Yellowish brown poorly sorted SAND cover.
OL/OH	Loose dark brown-dark brown sand
SP	Grey brown light grey SAND [illegible]
SW	Loose dark brown mottled grey/dark coarse.
SM	Dark grey highly organic silty SAND fine to medium.
	Dark grey highly organic silty SAND

Depth (m)	Elevation (m AOD)	PID (ppm)
	3.0	
0.0		
	2.5	
0.5		0.2
	2.0	
1.0		0.5
	1.5	
1.5		0.1
	1.0	
2.0		0.4
	0.5	
2.5		4.0
	0.0	
3.0		1.0
	-0.5	
3.5		1.1
	-1.0	
4.0		0.0
	-1.5	
4.5		0.0
	-2.0	
5.0		
	-2.5	

PID scale: 0.0 – 100.0

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm - millimeter	m bgs - meters below ground surface

Sheet: Page 1 of 1

Boring/ Well ID: **WS14**

Drill Start/End Date: 01-Sep-2021 / 01-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

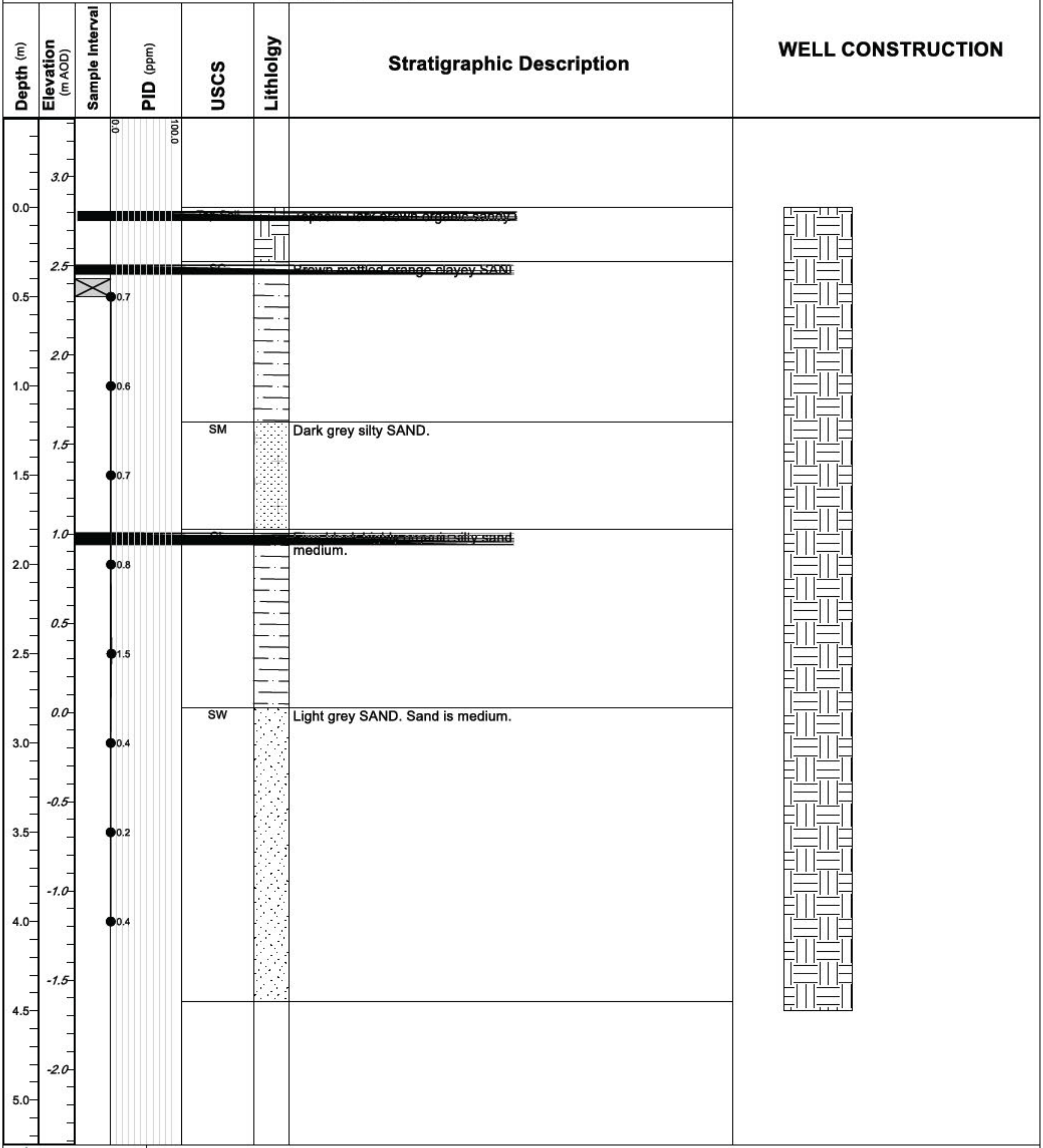
Northing: 409995.19
Easting: 486151.39
Surface Elevation: 2.8 m AOD
Datum Elevation: 2.8 m AOD
Borehole Diam./Depth: 100 mm / 4.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location:
Flixborough

SOIL PROFILE

WELL CONSTRUCTION



Depth (m)	PID (ppm)
0.5	0.7
1.0	0.6
1.5	0.7
2.0	0.8
2.5	1.5
3.0	0.4
3.5	0.2
4.0	0.4

USCS	Stratigraphic Description
~~Top Soil~~	~~Topsoil: Dark brown organic sandy~~
~~SC~~	~~Brown mottled orange clayey SAN~~
SM	Dark grey silty SAND.
~~OL~~	~~Fine black highly organic silty sand~~ medium.
SW	Light grey SAND. Sand is medium.

Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm ~~- millimeter~~
m - meter
ppm - parts per million
AOD - Above Ordance Datum
~~m bgs - meters below ground surfa~~

Sheet: Page 1 of 1

Boring/ Well ID: WS16

Drill Start/End Date: 01-Sep-2021 / 01-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 410300.79
Easting: 486171.40
Surface Elevation: 2.9 m AOD
Datum Elevation: 2.9 m AOD
Borehole Diam./Depth: 100 mm / 4.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location:
Flixborough

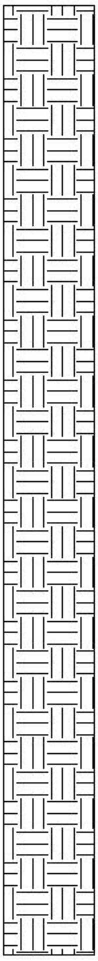
SOIL PROFILE

Depth (m)	Elevation (m AOD)	USCS	Stratigraphic Description
0.0	3.0	~~CL~~	~~Topsoil: Dark brown organic sandy~~ ~~Approximately 5cm band of white n~~
0.3		SM	Light grey silty SAND. Sand is medium.
0.9	2.0	~~SW~~	~~Light brown orangey SAND. Sand i~~
1.3			Light brown SAND. Sand is medium.
3.0	0.0	No Recovery	No recovery.
4.0	-1.0		

PID (ppm) 0.0 – 100.0

Depth (m)	Elevation (m AOD)	PID (ppm)
0.5	2.5	0.7
1.0	2.0	0.3
1.5	1.5	1.0
2.0	1.0	0.8
2.5	0.5	6.0
3.0	0.0	0.8
3.5	-0.5	0.8
4.0	-1.0	1.0
4.5	-1.5	0.0
5.0	-2.0	

WELL CONSTRUCTION



Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
~~mm - millimeter~~
m - meter
ppm - parts per million
AOD - Above Ordance Datum
~~m bgs - meters below ground surfa~~

Sheet: Page 1 of 1

Boring/ Well ID: **WS21**

Drill Start/End Date: 09-Sep-2021 / 09-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

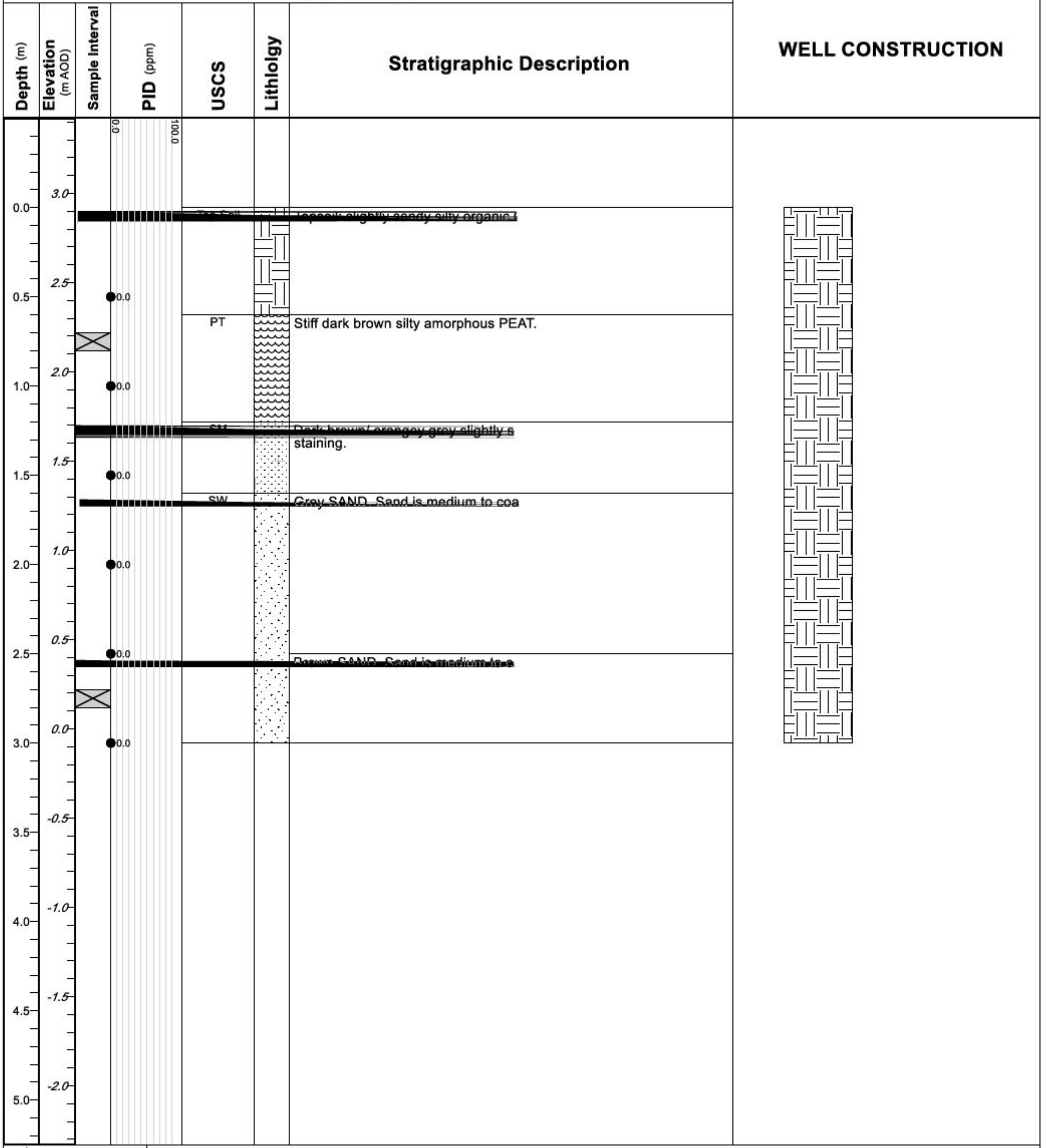
Northing: 413130.22
Easting: 486618.22
Surface Elevation: 2.9 m AOD
Datum Elevation: 2.9 m AOD
Borehole Diam./Depth: 100 mm / 3.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

WELL CONSTRUCTION



USCS	Stratigraphic Description
~~Top Soil~~	~~Topsoil: slightly sandy silty organic~~
PT	Stiff dark brown silty amorphous PEAT.
~~SM~~	~~Dark brown/ orangey grey slightly s~~ staining.
~~SW~~	~~Grey SAND. Sand is medium to coa~~
	~~Brown SAND. Sand is medium to c~~

Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm ~~- millimeter~~	~~m bgs - meters below ground surfa~~

ERM

Sheet: Page 1 of 1

Boring/ Well ID: **WS22**

Drill Start/End Date: 09-Sep-2021 / 10-Nov-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 413088.11
Easting: 486376.99
Surface Elevation: 3.0 m AOD
Datum Elevation: 3.0 m AOD
Borehole Diam./Depth: 50 mm / 3.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

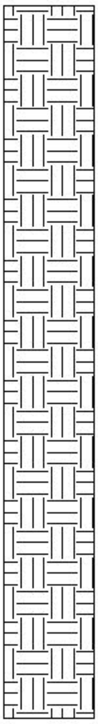
Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm) 0.0–100.0	USCS	Lithology	Stratigraphic Description
0.0	3.0					~~Grass over firm brown sandy silty C~~ rootlets. Sand is medium.
0.5	2.5		1.0			
		☒		~~ML~~		~~Firm light orangish brown sandy SI~~
1.0	2.0		0.1	~~PT~~		~~Organic dark brownish black slightl~~ ~~slight sulphurous odour. Sand is m~~
1.5	1.5		0.5			
				SW		Dark brown SAND. Sand is medium.
						~~Light orangish brown SAND. Sand~~
2.0	1.0		0.8			
2.5	0.5	☒	3.7			
						~~Dark brownish grey SAND. Sand is~~
3.0	0.0		1.3			
3.5	-0.5					
4.0	-1.0					
4.5	-1.5					
5.0	-2.0					

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
~~mm - millimeter~~	~~m bgs - meters below ground surfa~~

ERM

Sheet: Page 1 of 1

Boring/ Well ID: **WS25**

Drill Start/End Date: 02-Sep-2021 / 02-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: Michael Ward
SSC Contractor: SubSite
SSC Method: Shovel
SSC Diam./Depth: 300 mm / 1 m

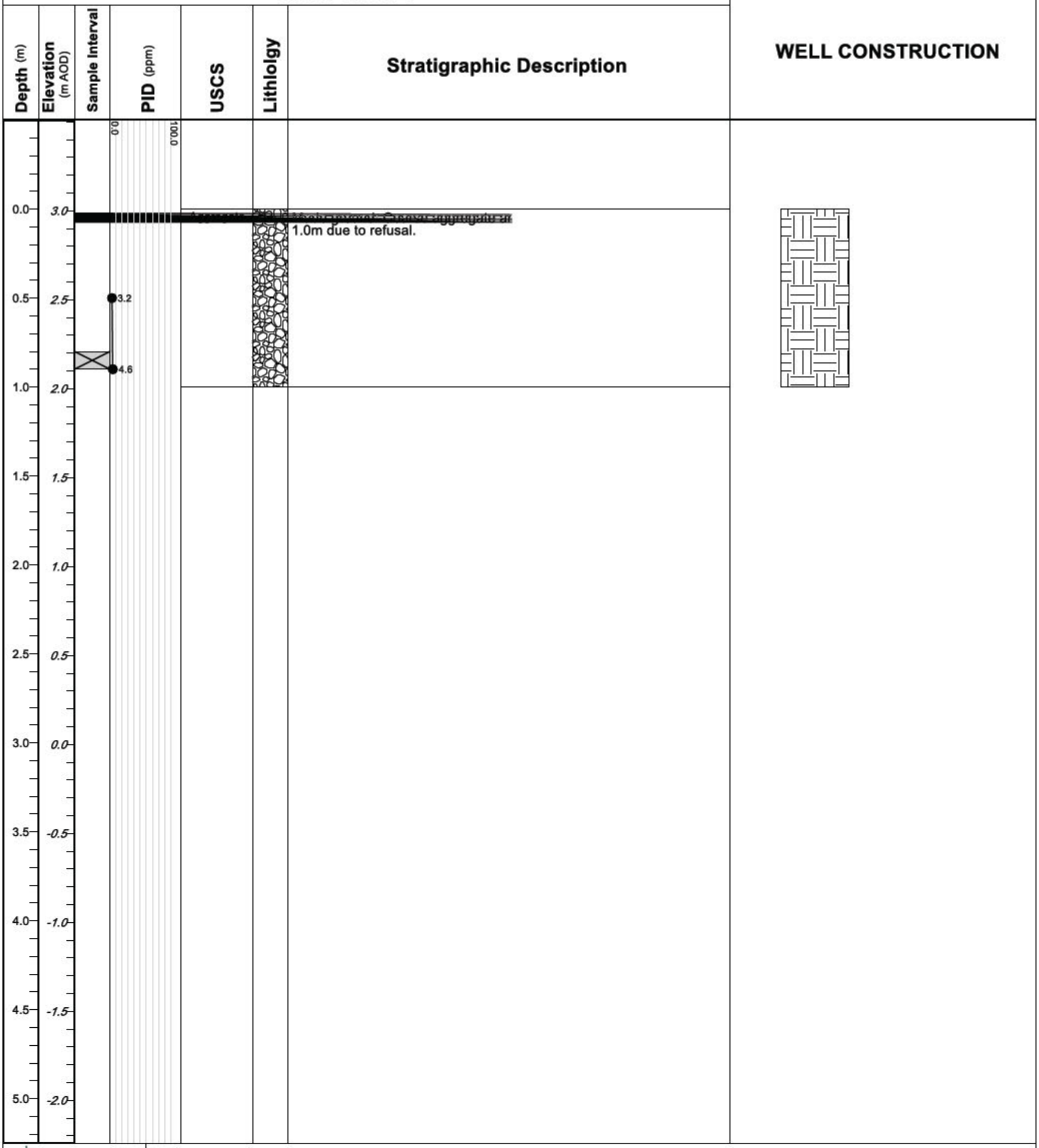
Northing: 414101.31
Easting: 486257.05
Surface Elevation: 3.0 m AOD
Datum Elevation: 3.0 m AOD
Borehole Diam./Depth: 150 mm / 1.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

WELL CONSTRUCTION



[illegible] Gravel aggregate ar[illegible] 1.0m due to refusal.

Remarks:

SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
~~mm - millimeter~~
m - meter
ppm - parts per million
AOD - Above Ordance Datum
~~m bgs - meters below ground surfa~~

Sheet: Page 1 of 1

Boring/ Well ID: WS26

Drill Start/End Date: 01-Sep-2021 / 01-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

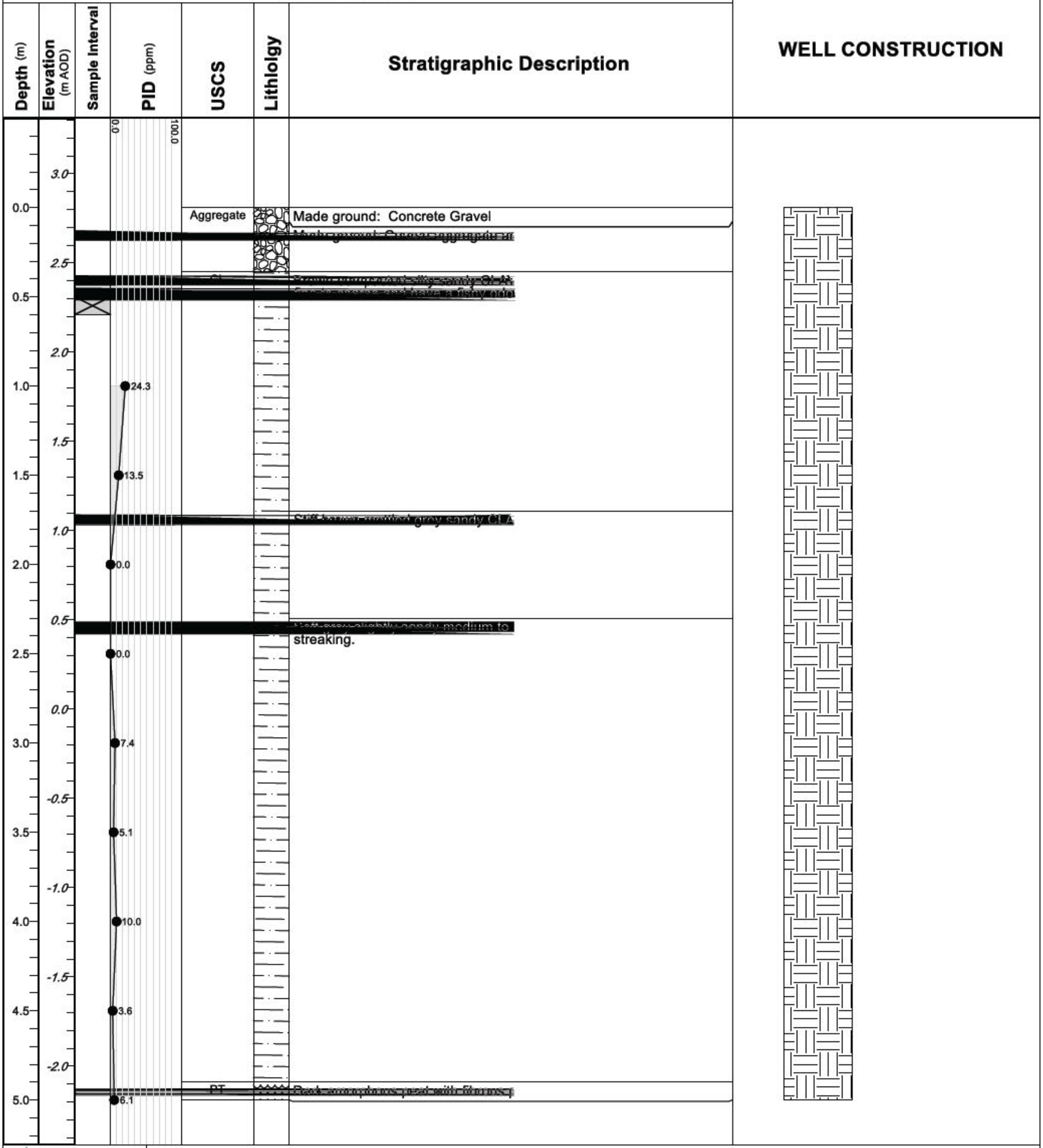
Northing: 414156.85
Easting: 486200.94
Surface Elevation: 2.8 m AOD
Datum Elevation: 2.8 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

WELL CONSTRUCTION



Made ground: Concrete Gravel

[redacted]

[redacted]

[redacted]

[redacted]

streaking.

[redacted]

Remarks:

SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm [redacted]

m - meter
ppm - parts per million
AOD - Above Ordance Datum
[redacted]

Sheet: Page 1 of 1

Boring/ Well ID: WS32

Drill Start/End Date: 02-Sep-2021 / 02-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 409068.70
Easting: 485812.67
Surface Elevation: 4.2 m AOD
Datum Elevation: 4.2 m AOD
Borehole Diam./Depth: 100 mm / 3.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

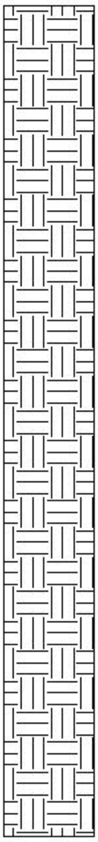
Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithiolgy	Stratigraphic Description
			0.0 100.0			
	4.5					
0.0				~~Top Soil~~		~~Topsoil/Made Ground: Organic sand~~
				~~CL~~		~~brown dark brown organic sandy cla~~
	4.0					
0.5		☒	0.6	~~SW~~		~~Light brown SAND with laminations~~ medium.
	3.5					
1.0			0.0			
	3.0					
1.5			0.8			
	2.5					
2.0			0.7			
	2.0					
2.5			0.7			Light grey SAND. Sand is medium.
	1.5					
3.0			0.6	No Recovery		No recovery
	1.0					
3.5						
	0.5					
4.0						
	0.0					
4.5						
	-0.5					
5.0						

WELL CONSTRUCTION



Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm ~~- millimeter~~
m - meter
ppm - parts per million
AOD - Above Ordance Datum
~~m bgs - meters below ground surfac~~

Sheet: Page 1 of 1

Boring/ Well ID: **WS35**

Drill Start/End Date: 09-Sep-2021 / 09-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

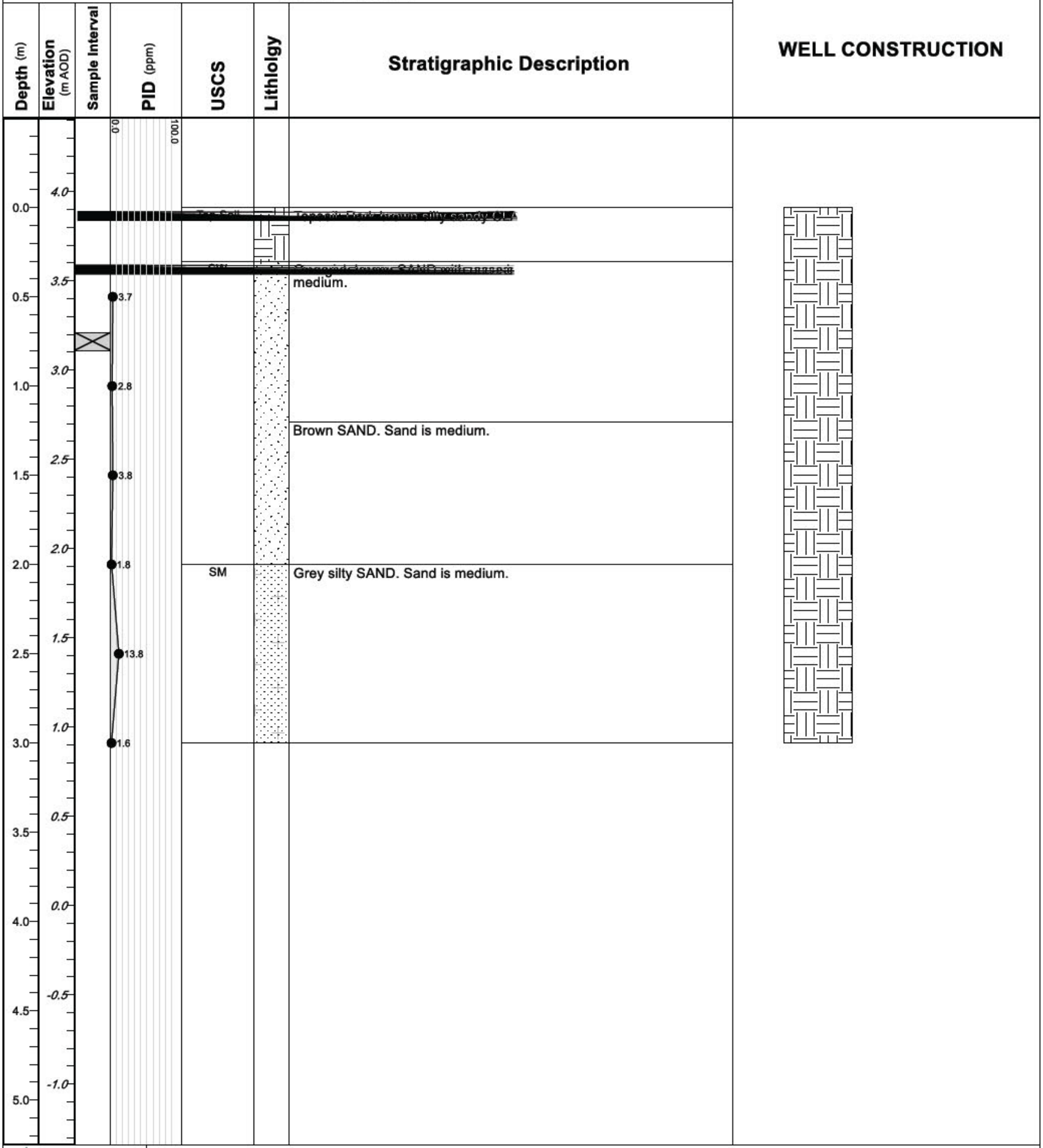
Northing: 408765.69
Easting: 485853.67
Surface Elevation: 3.9 m AOD
Datum Elevation: 3.9 m AOD
Borehole Diam./Depth: 100 mm / 3.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

WELL CONSTRUCTION



USCS	Stratigraphic Description
~~Top Soil~~	~~Topsoil: Dark brown silty sandy CLA~~
~~SW~~	~~Greyish brown SAND with occasi~~ medium.
	Brown SAND. Sand is medium.
SM	Grey silty SAND. Sand is medium.

Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm ~~- millimeter~~
m - meter
ppm - parts per million
AOD - Above Ordance Datum
~~m bgs - meters below ground surfa~~

ERM

Sheet: Page 1 of 1

APPENDIX B DATA ASSESSMENT TABLES

Table B1: Soil Screening Assessment

ID	Residential with plant uptake GAC		TP28	MW8	MW8	MW5	MW5	WS26	WS26	WS25	MW7	MW7	MW6	WS104	WS11	WS12	WS12	WS14	WS16	WS32	WS35	MW1	MW1	MW0	MW0	WS21	WS21	WS22	WS22
Sample Depth	Units	mg/kg	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5	3.7	0.6	3.5	0.7	2.7	0.7	2.5
VOC MS																													
BTEX																													
Benzene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Toluene	mg/kg	150	<0.003	<0.003	-	**0.009**	<0.003	**0.009**	<0.003	**0.013**	**0.014**	**0.028**	**0.026**	**0.015**	**0.005**	<0.003	-	**0.010**	<0.003	**0.014**	**0.011**	**0.023**	-	<0.003	-	<0.003	<0.003	**0.012**	-
Ethylbenzene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Xylenes (sum of isomers)	mg/kg	57	<0.008	<0.008	-	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	-	<0.008	<0.008	<0.008	<0.008	**0.011**	-	<0.008	-	<0.008	<0.008	<0.008	-
m/p-Xylene	mg/kg	See sum	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.007**	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	**0.011**	-	<0.005	-	<0.005	<0.005	<0.005	-
o-Xylene	mg/kg	See sum	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Chloroethenes																													
Tetrachloroethene (PCE)	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Trichloroethene (TCE)	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,1-Dichloroethene (1,1 DCE)	mg/kg		<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	-	<0.006	<0.006	<0.006	-
cis-1-2-Dichloroethene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
trans-1-2-Dichloroethene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Vinyl Chloride	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
Chloroethanes																													
1,1,1,2-Tetrachloroethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,1,2,2-Tetrachloroethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,1,1-Trichloroethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,1,2-Trichloroethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,1-Dichloroethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,2-Dichloroethane	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
Chloroethane	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
Chlorobenzenes																													
1,2,3-Trichlorobenzene	mg/kg		<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	-	<0.007	<0.007	<0.007	-
1,2,4-Trichlorobenzene	mg/kg		<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	-	<0.007	<0.007	<0.007	-
1,2-Dichlorobenzene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
1,3-Dichlorobenzene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
1,4-Dichlorobenzene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
Chlorobenzene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Chloromethanes																													
Carbon tetrachloride	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
Chloroform	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Dichloromethane (DCM)	mg/kg		<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	-	<0.007	<0.007	<0.007	-
Chloromethane	mg/kg	0.005	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	**0.023**	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	**0.025**	<0.003	<0.003	-
Chloropropanes																													
1,2,3-Trichloropropane	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
1,2-Dichloropropane	mg/kg		<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	-	<0.006	<0.006	<0.006	-
2,2-Dichloropropane	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
1,3-Dichloropropane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Chloropropenes																													
1,1-Dichloropropene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
cis-1-3-Dichloropropene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
trans-1-3-Dichloropropene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Other VOCs																													
Bromobenzene	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
Bromochloromethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Bromodichloromethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Bromoform	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Bromomethane	mg/kg		<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	<0.001	-
n-Butylbenzene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
sec-Butylbenzene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
tert-Butylbenzene	mg/kg		<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	<0.005	-
2-Chlorotoluene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
4-Chlorotoluene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Isopropylbenzene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,2-Dibromo-3-chloropropane	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
Dibromochloromethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
1,2-Dibromoethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Dibromomethane	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Dichlorodifluoromethane	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
4-Isopropyltoluene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
Propylbenzene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-
Styrene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Trichlorofluoromethane	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
1,2,4-Trimethylbenzene	mg/kg		<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	-	<0.006	<0.006	<0.006	-
1,3,5-Trimethylbenzene	mg/kg		<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Methyl Tertiary Butyl Ether	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
Hexachlorobutadiene	mg/kg		<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	-	<0.004	<0.004	<0.004	-

ID		Residential with plant uptake GAC	TP28	MW8	MW8	MW5	MW5	WS26	WS26	WS25	MW7	MW7	MW6	WS104	WS11	WS12	WS12	WS14	WS16	WS32	WS35	MW1	MW1	MW0	MW0	WS21	WS21	WS22	WS22
Sample Depth	Units	mg/kg	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5	3.7	0.6	3.5	0.7	2.7	0.7	2.5
Naphthalene	mg/kg		<0.027	<0.027	-	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	-	<0.027	<0.027	<0.027	<0.027	<0.027	-	<0.027	-	<0.027	<0.027	<0.027	-
Metals																													
Arsenic	mg/kg	37	13	14	-	10	9	17	8	22	10	9	-	-	19	7	-	15	3	10	10	14	-	14	-	2	1	11	-
Barium	mg/kg	776	325	84	-	212	114	248	145	301	217	100	-	-	370	80	-	342	22	212	192	107	-	145	-	27	16	188	-
Beryllium	mg/kg	1.7	8	1	-	5	2	2	2	2	3	2	-	-	1	1	-	1	<0.5	1	1	2	-	2	-	<0.5	<0.5	1	-
Cadmium	mg/kg	22	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	-	-	0	<0.1	-	0	<0.1	0	<0.1	<0.1	-	<0.1	-	0	<0.1	<0.1	-
Chromium	mg/kg	1370	78	49	-	53	65	64	59	74	50	47	-	-	78	99	-	76	111	63	69	72	-	61	-	5	110	53	-
Hexavalent Chromium	mg/kg	21	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	-	<15.0	<0.3	<0.3	-
Copper	mg/kg	3870	17	13	-	14	19	27	16	27	12	17	-	-	31	12	-	24	3	13	13	19	-	19	-	3	5	12	-
Lead	mg/kg	200	37	18	-	13	27	48	21	82	17	19	-	-	111	31	-	103	11	65	64	24	-	39	-	<5	7	28	-
Mercury	mg/kg	41	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	0	<0.1	0	-	-	0	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Nickel	mg/kg	136	10	17	-	17	48	31	33	31	29	36	-	-	26	14	-	26	7	22	19	46	-	41	-	6	7	29	-
Selenium	mg/kg	376	4	<1	-	1	1	2	1	1	2	1	-	-	<1	<1	-	1	<1	<1	<1	2	-	2	-	1	<1	1	-
Vanadium	mg/kg	222	198	36	-	41	60	55	49	82	61	49	-	-	44	24	-	42	11	35	31	64	-	73	-	5	12	48	-
Zinc	mg/kg	9930	135	44	-	52	112	110	90	121	71	90	-	-	148	57	-	130	12	79	74	115	-	101	-	<5	11	86	-
TPH CWG																													
Aliphatics																													
>C5-C6	mg/kg	50	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
>C6-C8	mg/kg	128	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
>C8-C10	mg/kg	35	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	0.1	<0.1	<0.1	-
>C10-C12	mg/kg	3491	<0.2	3	-	<0.2	<0.2	<0.2	13	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	<0.2	<0.2	<0.2	-
>C12-C16	mg/kg	6144	<4	6	-	<4	<4	<4	26	<4	<4	<4	<4	<4	<4	<4	-	<4	<4	<4	<4	<4	-	<4	-	<4	<4	<4	-
>C16-C21	mg/kg	-	34	<7	-	<7	<7	<7	29	<7	<7	<7	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	-	<7	-	<7	<7	<7	-
>C21-C35	mg/kg	-	110	<7	-	21	<7	<7	43	<7	<7	53	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	-	43	-	156	<7	<7	-
>C16-C35	mg/kg	127847	144	<14	-	21	<14	<14	72	<14	<14	53	<14	<14	<14	<14	-	<14	<14	<14	<14	<14	-	43	-	156	<14	<14	-
>C35-C44	mg/kg	127847	10	<7	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	-	<7	-	<7	<7	<7	-
Aromatics																													
>C5-EC7	mg/kg	85	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
>EC7-EC8	mg/kg	164	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
>EC8-EC10	mg/kg	40	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
>EC10-EC12	mg/kg	80	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	<0.2	<0.2	<0.2	-
>EC12-EC16	mg/kg	152	5	<4	-	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	-	<4	<4	<4	<4	<4	-	<4	-	<4	<4	<4	-
>EC16-EC21	mg/kg	318	28	<7	-	<7	<7	<7	<7	<7	14	<7	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	-	<7	-	21	<7	<7	-
>EC21-EC35	mg/kg	1115	121	<7	-	62	<7	<7	<7	<7	35	159	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	-	83	-	770	<7	<7	-
>EC35-EC44	mg/kg	1115	18	<7	-	12	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	-	12	-	102	<7	<7	-
BTEX / MTBE																													
Benzene	mg/kg	0.2	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Toluene	mg/kg	150	<0.003	<0.003	-	0.009	<0.003	0.009	<0.003	0.013	0.014	0.028	0.026	0.015	0.005	<0.003	-	0.010	<0.003	0.014	0.011	0.023	-	<0.003	-	<0.003	<0.003	0.012	-
Ethylbenzene	mg/kg	83	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Xylenes (sum of isomers)	mg/kg	57	<0.008	<0.008	-	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	-	<0.008	<0.008	<0.008	<0.008	0.011	-	<0.008	-	<0.008	<0.008	<0.008	-
m/p-Xylene	mg/kg	See sum	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	0.011	-	<0.005	-	<0.005	<0.005	<0.005	-
o-Xylene	mg/kg	See sum	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	<0.003	<0.003	<0.003	-
Methyl Tertiary Butyl Ether	mg/kg		<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	-
SVOC MS																													
Phenols																													
4-Chloro-3-methylphenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2-Chlorophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2-Methylphenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
4-Methylphenol	mg/kg	97	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2,4-Dichlorophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2,4-Dimethylphenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2-Nitrophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
4-Nitrophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Pentachlorophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Phenol	mg/kg	312	<0.01	<0.01	-	<0.01	<0.01	0.31	<0.01	1.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2,4,5-Trichlorophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2,4,6-Trichlorophenol	mg/kg		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
PAHs																													
Acenaphthene	mg/kg	206	0.03	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Acenaphthylene	mg/kg	231	0.11	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Anthracene	mg/kg	2750	0.22	<0.01	-	0.03	<0.01	0.03	<0.01	0.04	0.04	<0.01	0.03	<0.01	0.03	0.02	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2-Chloronaphthalene	mg/kg	55	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Fluoranthene	mg/kg	310	1.46	0.04	-	0.31	<0.01	0.11	<0.01	0.26	0.84	<0.01	0.16	<0.01	0.20	0.20	-	0.07	<0.01	0.02	<0.01	<0.01	-	0.02	-	<0.01	<0.01	0.02	-
Fluorene	mg/kg	204	0.04	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2-Methylnaphthalene	mg/kg	12	0.04	0.14	-	<0.01	<0.01	0.03	<0.01	0.05	<0.01	<0.01	0.04	0.01	0.05	0.02	-	0.02	<0.01	0.03	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	0.02	-
Naphthalene	mg/kg	13	0.10	0.05	-	<0.01	<0.01	0.03	<0.01	0.05	<0.01	<0.01	0.03	<0.01	0.03	0.02	-	<0.01	<0.01	0.02	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	0.01	-
Phenanthrene	mg/kg	120	0.67	0.03	-	0.14	<0.01	0.10	<0.01	0.16	0.12	<0.01	0.07	0.02	0.16	0.09	-	0.06	<0.01	0.03	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	0.03	-
Pyrene	mg/kg	674	1.41	0.03	-	0.28	<0.01	0.10	<0.01	0.24	0.86	<0.01	0.26	<0.01	0.18	0.19	-	0.07	<0.01	0.02	<0.01	<0.01	-	0.02	-	<0.01	<0.01	0.02	-
Benzo(a)pyrene	mg/kg	5	0.73	0.02	-	0.20	<0.01	0.03	<0.01	0.09	0.38	<0.01	0.10	<0.01	0.09	0.10	-	0.03	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Benzo(a)anthracene	mg/kg	13	0.91	0.05	-	0.22	<0.01	0.07	<0.01	0.14	0.45	<0.01	0.18	0.03	0.15	0.14	-	0.07	<0.01	0.04	<0.01	<0.01	-	0.05	-	<0.01	<0.01	0.04	-

ID	Residential with plant uptake GAC		TP28	MW8	MW8	MW5	MW5	WS26	WS26	WS25	MW7	MW7	MW6	WS104	WS11	WS12	WS12	WS14	WS16	WS32	WS35	MW1	MW1	MW0	MW0	WS21	WS21	WS22	WS22
Sample Depth	Units	mg/kg	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5	3.7	0.6	3.5	0.7	2.7	0.7	2.5
Benzo(b)fluoranthene	mg/kg	3.8	1.14	0.03	-	0.30	<0.01	0.06	<0.01	0.16	0.58	<0.01	0.19	<0.01	0.14	0.16	-	0.05	<0.01	0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Benzo(k)fluoranthene	mg/kg	113	0.44	0.01	-	0.11	<0.01	0.02	<0.01	0.06	0.22	<0.01	0.08	<0.01	0.05	0.06	-	0.02	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Benzo(ghi)perylene	mg/kg	461	0.51	<0.01	-	0.16	<0.01	0.02	<0.01	0.07	0.30	<0.01	0.08	<0.01	0.04	0.07	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Chrysene	mg/kg	23	0.88	0.03	-	0.26	<0.01	0.07	<0.01	0.13	0.42	<0.01	0.19	0.01	0.16	0.12	-	0.06	<0.01	0.02	<0.01	<0.01	-	0.02	-	<0.01	<0.01	0.02	-
Dibenzo(ah)anthracene	mg/kg	0.36	0.12	<0.01	-	0.04	<0.01	<0.01	<0.01	0.02	0.06	<0.01	0.02	<0.01	0.01	0.02	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Indeno(123cd)pyrene	mg/kg	41	0.45	<0.01	-	0.13	<0.01	0.01	<0.01	0.05	0.26	<0.01	0.07	<0.01	0.03	0.06	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Benzo(bk)fluoranthene	mg/kg	-	1.58	0.04	-	0.41	<0.01	0.08	<0.01	0.22	0.80	<0.01	0.27	0.01	0.19	0.22	-	0.07	<0.01	0.02	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Phthalates																													
Bis(2-ethylhexyl) phthalate	mg/kg	2622	0.300	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Butylbenzyl phthalate	mg/kg	1641	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Diethyl phthalate	mg/kg	164	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Dimethyl phthalate	mg/kg	72	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Di-n-butyl phthalate	mg/kg	33	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Di-n-Octyl phthalate	mg/kg	3163	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-
Amines																													
N-nitrosodi-n-propylamine	mg/kg	0.0008	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Anilines																													
4-Chloroaniline	mg/kg	2.82	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2-Nitroaniline	mg/kg	4.81	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
3-Nitroaniline	mg/kg	0.29	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
4-Nitroaniline	mg/kg	0.28	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Other SVOCs																													
Azobenzene	mg/kg	0.26	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Bis(2-chloroethoxy)methane	mg/kg	0.69	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Carbazole	mg/kg	0.97	0.060	<0.01	-	0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Dibenzofuran	mg/kg	2.9	0.040	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2,4-Dinitrotoluene	mg/kg	1.2	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
2,6-Dinitrotoluene	mg/kg	0.2	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Hexachlorobutadiene	mg/kg	0.26	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Hexachlorocyclopentadiene	mg/kg	0.18	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Isophorone	mg/kg	6.9	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Nitrobenzene	mg/kg	0.25	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Bis(2-chloroethyl)ether	mg/kg	0.0004	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
4-Bromophenylphenylether	mg/kg	0.0004	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
4-Chlorophenylphenylether	mg/kg	0.002	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Hexachloroethane	mg/kg	1.1	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Hexachlorobenzene	mg/kg	1.2	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
1,2,4-Trichlorobenzene	mg/kg	29	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
1,2-Dichlorobenzene	mg/kg	36	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
1,3-Dichlorobenzene	mg/kg	0.41	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
1,4-Dichlorobenzene	mg/kg	81	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	-
Water Soluble Boron	mg/kg		7.4	1.7	-	3.7	6.4	6.8	6.3	6.3	3.7	21.4	NDP	NDP	2.2	1.2	-	1.7	0.2	1.8	1.3	4.5	-	6.6	-	3.6	0.2	2.7	-
Arsenic	mg/kg	37	-	-	-	-	-	-	-	-	-	-	1.7	9.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	776	-	-	-	-	-	-	-	-	-	-	148.0	203.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	1.7	-	-	-	-	-	-	-	-	-	-	2.6	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	22	-	-	-	-	-	-	-	-	-	-	<0.1	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	1370	-	-	-	-	-	-	-	-	-	-	202.4	18.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	3870	-	-	-	-	-	-	-	-	-	-	11.0	12.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	200	-	-	-	-	-	-	-	-	-	-	9.0	67.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	41	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	136	-	-	-	-	-	-	-	-	-	-	1272.1	19.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	376	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	222	-	-	-	-	-	-	-	-	-	-	115.0	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Soluble Boron	mg/kg		-	-	-	-	-	-	-	-	-	-	5.9	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	9930	-	-	-	-	-	-	-	-	-	-	46.0	79.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																													
Organochlorine Pesticides																													
Aldrin	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Alpha-HCH (BHC)	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Beta-HCH (BHC)	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Delta-HCH (BHC)	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Dieldrin	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Endosulphan I	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Endosulphan II	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Endosulphan sulphate	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Endrin	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Gamma-HCH (BHC)	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Heptachlor	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Heptachlor Epoxide	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
p,p'-DDE	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-

ID		Residential with plant uptake GAC	TP28	MW8	MW8	MW5	MW5	WS26	WS26	WS25	MW7	MW7	MW6	WS104	WS11	WS12	WS12	WS14	WS16	WS32	WS35	MW1	MW1	MW0	MW0	WS21	WS21	WS22	WS22
Sample Depth	Units	mg/kg	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5	3.7	0.6	3.5	0.7	2.7	0.7	2.5
p,p'-DDT	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
p,p'-TDE	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Total Methoxychlor	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Organophosphorus Pesticides																													
Azinphos methyl	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Diazinon	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Dichlorvos	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Disulfoton	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Ethion	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Ethyl Parathion (Parathion)	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Fenitrothion	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Malathion	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Methyl Parathion	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Mevinphos	mg/kg		-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	-	<0.01	<0.01	<0.01	-	-	-
Acid Herbicides																													
2,3,6 - TBA	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
2,4 - D	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
2,4 - DB	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
2,4,5 - T	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
4 - CPA	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Benazolin	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Bentazone	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Bromoxynil	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Clopyralid	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Dicamba	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Dichloroprop	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Diclofop	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Fenoprop	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Flamprop	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Flamprop – isopropyl	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Ioxynil	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
MCPA	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
MCPB	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Mecoprop	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Pentachlorophenol	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Picloram	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Triclopyr	mg/kg		-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	-
Natural Moisture Content	%		**22.3**	**13.8**	-	**18.4**	**39.4**	**24.7**	**37.6**	**25.6**	**26.2**	**152.2**	**11.2**	**9.3**	**26.7**	**11.8**	-	**24.2**	**3.9**	**15.7**	**31.4**	**33.5**	-	**54.1**	**253.6**	**48.4**	**17.1**	**21.3**	-
Ammoniacal Nitrogen as N	mg/kg		-	-	-	-	-	-	-	**10.9**	-	-	-	-	<0.6	-	-	<0.6	-	<0.6	-	-	-	<0.6	**84.5**	**1.0**	-	-	-
Chromium III	mg/kg	1370	**77.5**	**49.4**	-	**52.6**	**64.5**	**63.5**	**58.5**	**73.7**	**49.7**	**47.3**	-	-	**78.0**	**99.0**	-	**75.5**	**111.4**	**62.9**	**68.8**	**72.2**	-	**60.5**	-	**5.4**	**110.1**	**53.1**	-
Chromium III	mg/kg	1370	-	-	-	-	-	-	-	-	-	-	**202.4**	**18.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%		-	**0.67**	**0.09**	**0.68**	**1.74**	-	-	-	**0.72**	-	NDP	-	-	-	**10.40**	-	-	-	-	**1.07**	-	-	**12.05**	-	**0.06**	-	-
pH	pH units		-	**8.69**	**8.90**	**10.56**	**7.87**	-	-	-	**8.40**	**6.76**	**11.83**	-	-	-	-	-	-	-	-	**8.44**	**7.83**	**7.94**	**7.63**	**4.12**	**7.47**	**8.34**	**5.66**
Asbestos Screen & Identification																													
Asbestos Fibres	None		NAD	NAD	-	NAD	-	-	-	NAD	NAD	-	Fibre Bundles	Fibre Bundles	-	-	-	-	-	NAD	-	NAD	-	NAD	-	NAD	-	-	-
Asbestos ACM	None		NAD	NAD	-	NAD	-	-	-	NAD	NAD	-	NAD	NAD	-	-	-	-	-	NAD	-	NAD	-	NAD	-	NAD	-	-	-
Asbestos Type	None		NAD	NAD	-	NAD	-	-	-	NAD	NAD	-	Anthophyllite	Chrysotile	-	-	-	-	-	NAD	-	NAD	-	NAD	-	NAD	-	-	-
Asbestos Level Screen	None		NAD	NAD	-	NAD	-	-	-	NAD	NAD	-	< 0.1%	< 0.1%	-	-	-	-	-	NAD	-	NAD	-	NAD	-	NAD	-	-	-

<0.1	Below the laboratory limit of detection
22.3	Above the laboratory limit of detection
0.023	Greater than the generic assessment criteria

Prepared by SD
Checked by DG

Table B2: Groundwater Vapour Screening Assessment

	Sample ID		MW0	MW1	MW5	MW7	MW8
	Units	Screening Criteria					
VOC MS							
BTEX							
Benzene	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	ug/l		<5	<5	<5	<5	<5
Ethylbenzene	ug/l		<1	<1	<1	<1	<1
Xylenes (sum of isomers)	ug/l		<3	<3	<3	<3	<3
m/p-Xylene	ug/l		<2	<2	<2	<2	<2
o-Xylene	ug/l		<1	<1	<1	<1	<1
Chloroethenes							
Tetrachloroethene (PCE)	ug/l		<3	<3	<3	<3	<3
Trichloroethene (TCE)	ug/l		<3	<3	<3	<3	<3
1,1-Dichloroethene (1,1 DCE)	ug/l		<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	ug/l		<3	<3	<3	<3	<3
trans-1-2-Dichloroethene	ug/l		<3	<3	<3	<3	<3
Vinyl Chloride	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Chloroethanes							
1,1,1,2-Tetrachloroethane	ug/l		<2	<2	<2	<2	<2
1,1,2,2-Tetrachloroethane	ug/l		<4	<4	<4	<4	<4
1,1,1-Trichloroethane	ug/l		<2	<2	<2	<2	<2
1,1,2-Trichloroethane	ug/l		<2	<2	<2	<2	<2
1,1-Dichloroethane	ug/l		<3	<3	<3	<3	<3
1,2-Dichloroethane	ug/l		<2	<2	<2	<2	<2
Chloroethane	ug/l		<3	<3	<3	<3	<3
Chlorobenzenes							
1,2,3-Trichlorobenzene	ug/l		<3	<3	<3	<3	<3
1,2,4-Trichlorobenzene	ug/l		<3	<3	<3	<3	<3
1,2-Dichlorobenzene	ug/l		<3	<3	<3	<3	<3
1,3-Dichlorobenzene	ug/l		<3	<3	<3	<3	<3
1,4-Dichlorobenzene	ug/l		<3	<3	<3	<3	<3
Chlorobenzene	ug/l		<2	<2	<2	<2	<2
Chloromethanes							
Carbon tetrachloride	ug/l		<2	<2	<2	<2	<2
Chloroform	ug/l		<2	<2	<2	<2	<2
Dichloromethane (DCM)	ug/l		<3	<3	<3	<3	<3
Chloromethane	ug/l		<3	<3	<3	<3	<3
Chloropropanes							
1,2,3-Trichloropropane	ug/l		<3	<3	<3	<3	<3
1,2-Dichloropropane	ug/l		<2	<2	<2	<2	<2
2,2-Dichloropropane	ug/l		<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l		<2	<2	<2	<2	<2
Chloropropenes							
1,1-Dichloropropene	ug/l		<3	<3	<3	<3	<3
cis-1-3-Dichloropropene	ug/l		<2	<2	<2	<2	<2
trans-1-3-Dichloropropene	ug/l		<2	<2	<2	<2	<2
Other VOCs							
Bromobenzene	ug/l		<2	<2	<2	<2	<2
Bromochloromethane	ug/l		<2	<2	<2	<2	<2
Bromodichloromethane	ug/l		<2	<2	<2	<2	<2
Bromoform	ug/l		<2	<2	<2	<2	<2
Bromomethane	ug/l		<1	<1	<1	<1	<1
n-Butylbenzene	ug/l		<3	<3	<3	<3	<3
sec-Butylbenzene	ug/l		<3	<3	<3	<3	<3
tert-Butylbenzene	ug/l		<3	<3	<3	<3	<3
2-Chlorotoluene	ug/l		<3	<3	<3	<3	<3
4-Chlorotoluene	ug/l		<3	<3	<3	<3	<3
Isopropylbenzene	ug/l		<3	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	ug/l		<2	<2	<2	<2	<2
Dibromochloromethane	ug/l		<2	<2	<2	<2	<2
1,2-Dibromoethane	ug/l		<2	<2	<2	<2	<2
Dibromomethane	ug/l		<3	<3	<3	<3	<3
Dichlorodifluoromethane	ug/l		<2	<2	<2	<2	<2
4-Isopropyltoluene	ug/l		<3	<3	<3	<3	<3
Propylbenzene	ug/l		<3	<3	<3	<3	<3
Styrene	ug/l		<2	<2	<2	<2	<2
Trichlorofluoromethane	ug/l		<3	<3	<3	<3	<3
1,2,4-Trimethylbenzene	ug/l		<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	ug/l		<3	<3	<3	<3	<3
Methyl Tertiary Butyl Ether	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1

Table B2: Groundwater Vapour Screening Assessment

	Sample ID		MW0	MW1	MW5	MW7	MW8
	Units	Screening Criteria					
Hexachlorobutadiene	ug/l		<3	<3	<3	<3	<3
Naphthalene	ug/l		<2	<2	<2	<2	<2
SVOC MS							
Phenols							
4-Chloro-3-methylphenol	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l		<1	<1	<1	<1	<1
2-Methylphenol	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l		<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l	NRP	<1	<1	<1	<1	**6**
2-Nitrophenol	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
4-Nitrophenol	ug/l		<10	<10	<10	<10	<10
Pentachlorophenol	ug/l		<1	<1	<1	<1	<1
Phenol	ug/l		<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l		<1	<1	<1	<1	<1
PAHs							
2-Chloronaphthalene	ug/l		<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l	NRP	<1	<1	<1	<1	**1**
Phthalates							
Bis(2-ethylhexyl) phthalate	ug/l		<5	<5	<5	<5	<5
Butylbenzyl phthalate	ug/l		<1	<1	<1	<1	<1
Diethyl phthalate	ug/l		<1	<1	<1	<1	<1
Dimethyl phthalate	ug/l	NRP	<1	**2**	<1	<1	<1
Di-n-butyl phthalate	ug/l		<1.5	<1.5	<1.5	<1.5	<1.5
Di-n-Octyl phthalate	ug/l		<1	<1	<1	<1	<1
Amines							
N-nitrosodi-n-propylamine	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Anilines							
4-Chloroaniline	ug/l		<1	<1	<1	<1	<1
2-Nitroaniline	ug/l		<1	<1	<1	<1	<1
3-Nitroaniline	ug/l		<1	<1	<1	<1	<1
4-Nitroaniline	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Other SVOCs							
Azobenzene	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l	NRP	<0.5	<0.5	<0.5	<0.5	**11.4**
Dibenzofuran	ug/l	NRP	<0.5	<0.5	<0.5	<0.5	**8**
2,4-Dinitrotoluene	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l		<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l		<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l		<1	<1	<1	<1	<1
Isophorone	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l		<1	<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l		<1	<1	<1	<1	<1
4-Bromophenylphenylether	ug/l		<1	<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l		<1	<1	<1	<1	<1
Hexachloroethane	ug/l		<1	<1	<1	<1	<1
Hexachlorobenzene	ug/l		<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l		<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l		<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l		<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l		<1	<1	<1	<1	<1
Metals							
Arsenic	ug/l	NRP	**10.9**	**6.2**	<2.5	<2.5	<2.5
Barium	ug/l	NRP	**356**	**504**	**324**	**160**	**80**
Beryllium	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Total Chromium	ug/l	NRP	**5.9**	<1.5	<1.5	**2.8**	<1.5
Hexavalent Chromium	ug/l		<6	<6	<6	<6	<6
Copper	ug/l		<7	<7	<7	<7	<7
Lead	ug/l		<5	<5	<5	<5	<5
Mercury	ug/l		<1	<1	<1	<1	<1
Nickel	ug/l	NRP	**2**	**3**	**3**	**3**	<2
Selenium	ug/l		<3	<3	<3	<3	<3
Vanadium	ug/l	NRP	**3.1**	**3.5**	**1.7**	**2.6**	<1.5
Zinc	ug/l	NRP	<3	**3**	**5**	**13**	**21**
TPH CWG							

Table B2: Groundwater Vapour Screening Assessment

	Sample ID		MW0	MW1	MW5	MW7	MW8
	Units	Screening Criteria					
Aliphatics							
>C5-C6	ug/l		<10	<10	<10	<10	<10
>C6-C8	ug/l		<10	<10	<10	<10	<10
>C8-C10	ug/l		<10	<10	<10	<10	<10
>C10-C12	ug/l		<5	<5	<5	<5	<5
>C12-C16	ug/l		<10	<10	<10	<10	<10
>C16-C21	ug/l		<10	<10	<10	<10	<10
>C21-C35	ug/l	NRP	<10	<10	<10	<10	**260**
Aromatics							
>C5-EC7	ug/l		<10	<10	<10	<10	<10
>EC7-EC8	ug/l		<10	<10	<10	<10	<10
>EC8-EC10	ug/l		<10	<10	<10	<10	<10
>EC10-EC12	ug/l		<5	<5	<5	<5	<5
>EC12-EC16	ug/l	NRP	<10	<10	<10	<10	**50**
>EC16-EC21	ug/l	NRP	<10	<10	<10	<10	**100**
>EC21-EC35	ug/l		<10	<10	<10	<10	<10
BTEX / MTBE							
Benzene	ug/l		<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	ug/l		<5	<5	<5	<5	<5
Ethylbenzene	ug/l		<1	<1	<1	<1	<1
Xylenes (sum of isomers)	ug/l		<3	<3	<3	<3	<3
m/p-Xylene	ug/l		<2	<2	<2	<2	<2
o-Xylene	ug/l		<1	<1	<1	<1	<1
Methyl Tertiary Butyl Ether	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Boron	ug/l	NRP	**222**	**752**	**680**	**1071**	**121**
PAH MS							
Naphthalene	ug/l	NRP	**0.3**	**0.2**	**0.8**	**0.3**	**2.2**
Acenaphthylene	ug/l	NRP	<0.013	<0.013	**0.02**	**0.036**	**11.916**
Acenaphthene	ug/l	NRP	**0.111**	**0.093**	**0.2**	**0.227**	**1.642**
Fluorene	ug/l	NRP	**0.037**	**0.028**	**0.035**	**0.088**	**9.213**
Phenanthrene	ug/l	NRP	**0.024**	**0.056**	**0.04**	**0.201**	**24.469**
Anthracene	ug/l	NRP	<0.013	<0.013	<0.013	**0.024**	**10.573**
Fluoranthene	ug/l	NRP	<0.012	**0.047**	**0.054**	**0.496**	**20.192**
Pyrene	ug/l	NRP	<0.013	**0.042**	**0.056**	**0.442**	**14.7**
Benzo(a)anthracene	ug/l	NRP	<0.015	<0.015	**0.017**	**0.14**	**4.428**
Chrysene	ug/l	NRP	<0.011	**0.017**	**0.022**	**0.159**	**3.795**
Benzo(bk)fluoranthene	ug/l	NRP	<0.018	<0.018	**0.037**	**0.285**	**4.32**
Benzo(a)pyrene	ug/l	NRP	<0.016	<0.016	**0.017**	**0.166**	**2.701**
Indeno(123cd)pyrene	ug/l	NRP	<0.011	<0.011	<0.011	**0.095**	**1.135**
Dibenzo(ah)anthracene	ug/l	NRP	<0.01	<0.01	<0.01	<0.01	**0.23**
Benzo(ghi)perylene	ug/l	NRP	<0.011	<0.011	**0.013**	**0.092**	**1.131**
PAH 16 Total	ug/l		**0.472**	**0.483**	**1.311**	**2.751**	**112.645**
Benzo(b)fluoranthene	ug/l	NRP	<0.01	<0.01	**0.03**	**0.21**	**3.11**
Benzo(k)fluoranthene	ug/l	NRP	<0.01	<0.01	**0.01**	**0.08**	**1.21**
B(ghi)Perylene + I(123cd)Pyrene	ug/l	NRP	<0.022	<0.022	<0.022	**0.187**	**2.266**
Sum of 4DW PAHs	ug/l	NRP	<0.04	<0.04	**0.05**	**0.47**	**6.59**
Pesticides							
Organochlorine Pesticides							
Aldrin	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Alpha-HCH (BHC)	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Beta-HCH (BHC)	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Delta-HCH (BHC)	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan I	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan II	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan sulphate	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-HCH (BHC)	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
o,p'-Methoxychlor	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDE	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDT	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-Methoxychlor	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-TDE	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Organophosphorus Pesticides							

Table B2: Groundwater Vapour Screening Assessment

	Sample ID		MW0	MW1	MW5	MW7	MW8
	Units	Screening Criteria					
Azinphos methyl	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Disulfoton	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Ethion	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Ethyl Parathion (Parathion)	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Methyl Parathion	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos	ug/l		<0.01	<0.01	<0.01	<0.01	<0.01
Acid Herbicides							
Benazolin	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Bentazone	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Bromoxynil	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Clopyralid	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
4-CPA	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
2,4-D	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
2,4-DB	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Dicamba	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Dichloroprop	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Diclofop	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Fenoprop	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Flamprop	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Flamprop-isopropyl	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Ioxynil	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
MCPA	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
MCPB	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Mecoprop	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Picloram	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-T	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
2,3,6-TBA	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Triclopyr	ug/l		<0.1	<0.1	<0.1	<0.1	<0.1
Ammoniacal Nitrogen as N	ug/l	NRP	**31700**	**31300**	**1650**	**2110**	**90**
Total Dissolved Chromium III	ug/l		<6	<6	<6	<6	<6

-	Not analysed
Bold	Above limit of detection
🟨	Exceeds screening criteria
<	Below limit of detection
NRP	No Risk Predicted

Table B3: Groundwater Screening Assessment

	Sample ID			MW0	MW1	MW5	MW7	MW8	Duplicate	Trip Blank 1
	Units	Screening Criteria	Source							
VOC MS										
BTEX										
Benzene	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	ug/l			<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Xylenes (sum of isomers)	ug/l			<3	<3	<3	<3	<3	<3	<3
m/p-Xylene	ug/l			<2	<2	<2	<2	<2	<2	<2
o-Xylene	ug/l			<1	<1	<1	<1	<1	<1	<1
Chloroethenes										
Tetrachloroethene (PCE)	ug/l			<3	<3	<3	<3	<3	<3	<3
Trichloroethene (TCE)	ug/l			<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethene (1,1 DCE)	ug/l			<3	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	ug/l			<3	<3	<3	<3	<3	<3	<3
trans-1-2-Dichloroethene	ug/l			<3	<3	<3	<3	<3	<3	<3
Vinyl Chloride	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloroethanes										
1,1,1,2-Tetrachloroethane	ug/l			<2	<2	<2	<2	<2	<2	<2
1,1,2,2-Tetrachloroethane	ug/l			<4	<4	<4	<4	<4	<4	<4
1,1,1-Trichloroethane	ug/l			<2	<2	<2	<2	<2	<2	<2
1,1,2-Trichloroethane	ug/l			<2	<2	<2	<2	<2	<2	<2
1,1-Dichloroethane	ug/l			<3	<3	<3	<3	<3	<3	<3
1,2-Dichloroethane	ug/l			<2	<2	<2	<2	<2	<2	<2
Chloroethane	ug/l			<3	<3	<3	<3	<3	<3	<3
Chlorobenzenes										
1,2,3-Trichlorobenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
1,2,4-Trichlorobenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
1,2-Dichlorobenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
1,3-Dichlorobenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
1,4-Dichlorobenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
Chlorobenzene	ug/l			<2	<2	<2	<2	<2	<2	<2
Chloromethanes										
Carbon tetrachloride	ug/l			<2	<2	<2	<2	<2	<2	<2
Chloroform	ug/l			<2	<2	<2	<2	<2	<2	<2
Dichloromethane (DCM)	ug/l			<3	<3	<3	<3	<3	<3	<3
Chloromethane	ug/l			<3	<3	<3	<3	<3	<3	<3
Chloropropanes										
1,2,3-Trichloropropane	ug/l			<3	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	ug/l			<2	<2	<2	<2	<2	<2	<2
2,2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<2	<2	<2	<2	<2	<2	<2
Chloropropenes										
1,1-Dichloropropene	ug/l			<3	<3	<3	<3	<3	<3	<3
cis-1-3-Dichloropropene	ug/l			<2	<2	<2	<2	<2	<2	<2
trans-1-3-Dichloropropene	ug/l			<2	<2	<2	<2	<2	<2	<2
Other VOCs										
Bromobenzene	ug/l			<2	<2	<2	<2	<2	<2	<2
Bromochloromethane	ug/l			<2	<2	<2	<2	<2	<2	<2
Bromodichloromethane	ug/l			<2	<2	<2	<2	<2	<2	<2
Bromoform	ug/l			<2	<2	<2	<2	<2	<2	<2
Bromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
sec-Butylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
2-Chlorotoluene	ug/l			<3	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	ug/l			<3	<3	<3	<3	<3	<3	<3
Isopropylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	ug/l			<2	<2	<2	<2	<2	<2	<2
Dibromochloromethane	ug/l			<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	ug/l			<2	<2	<2	<2	<2	<2	<2
Dibromomethane	ug/l			<3	<3	<3	<3	<3	<3	<3
Dichlorodifluoromethane	ug/l			<2	<2	<2	<2	<2	<2	<2
4-Isopropyltoluene	ug/l			<3	<3	<3	<3	<3	<3	<3
Propylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
Styrene	ug/l			<2	<2	<2	<2	<2	<2	<2
Trichlorofluoromethane	ug/l			<3	<3	<3	<3	<3	<3	<3
1,2,4-Trimethylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	ug/l			<3	<3	<3	<3	<3	<3	<3
Methyl Tertiary Butyl Ether	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	ug/l			<3	<3	<3	<3	<3	<3	<3
Naphthalene	ug/l			<2	<2	<2	<2	<2	<2	<2
SVOC MS										
Phenols										
4-Chloro-3-methylphenol	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
2-Chlorophenol	ug/l			<1	<1	<1	<1	<1	-	-
2-Methylphenol	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
4-Methylphenol	ug/l			<1	<1	<1	<1	<1	-	-
2,4-Dichlorophenol	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
2,4-Dimethylphenol	ug/l	nc		<1	<1	<1	<1	**6**	-	-
2-Nitrophenol	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
4-Nitrophenol	ug/l			<10	<10	<10	<10	<10	-	-
Pentachlorophenol	ug/l			<1	<1	<1	<1	<1	-	-
Phenol	ug/l			<1	<1	<1	<1	<1	-	-
2,4,5-Trichlorophenol	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	-	-
PAHs										
2-Chloronaphthalene	ug/l			<1	<1	<1	<1	<1	-	-
2-Methylnaphthalene	ug/l	4.7	USEPA	<1	<1	<1	<1	**1**	-	-
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l			<5	<5	<5	<5	<5	-	-
Butylbenzyl phthalate	ug/l			<1	<1	<1	<1	<1	-	-
Diethyl phthalate	ug/l			<1	<1	<1	<1	<1	-	-
Dimethyl phthalate	ug/l	800	SEPA	<1	**2**	<1	<1	<1	-	-
Di-n-butyl phthalate	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5	-	-
Di-n-Octyl phthalate	ug/l			<1	<1	<1	<1	<1	-	-
Amines										
N-nitrosodi-n-propylamine	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Anilines										
4-Chloroaniline	ug/l			<1	<1	<1	<1	<1	-	-
2-Nitroaniline	ug/l			<1	<1	<1	<1	<1	-	-
3-Nitroaniline	ug/l			<1	<1	<1	<1	<1	-	-

	Sample ID			MW0	MW1	MW5	MW7	MW8	Duplicate	Trip Blank 1
	Units	Screening Criteria	Source							
4-Nitroaniline	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Other SVOCs										
Azobenzene	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Bis(2-chloroethoxy)methane	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Carbazole	ug/l	nc		<0.5	<0.5	<0.5	<0.5	**11.4**	-	-
Dibenzofuran	ug/l	3.7	USEPA	<0.5	<0.5	<0.5	<0.5	**8**	-	-
2,4-Dinitrotoluene	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	-	-
Hexachlorobutadiene	ug/l			<1	<1	<1	<1	<1	-	-
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1	<1	-	-
Isophorone	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Nitrobenzene	ug/l			<1	<1	<1	<1	<1	-	-
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1	<1	-	-
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1	<1	-	-
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1	<1	-	-
Hexachloroethane	ug/l			<1	<1	<1	<1	<1	-	-
Hexachlorobenzene	ug/l			<1	<1	<1	<1	<1	-	-
1,2,4-Trichlorobenzene	ug/l			<1	<1	<1	<1	<1	-	-
1,2-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	-	-
1,3-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	-	-
1,4-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	-	-
Metals										
Arsenic	ug/l	50	WFD	**10.9**	**6.2**	<2.5	<2.5	<2.5	-	-
Barium	ug/l	114.7	ECHA	**356**	**504**	**324**	**160**	**80**	-	-
Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Cadmium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Total Chromium	ug/l	6.5	ECHA	**5.9**	<1.5	<1.5	**2.8**	<1.5	-	-
Hexavalent Chromium	ug/l			<6	<6	<6	<6	<6	-	-
Copper	ug/l			<7	<7	<7	<7	<7	-	-
Lead	ug/l			<5	<5	<5	<5	<5	-	-
Mercury	ug/l			<1	<1	<1	<1	<1	-	-
Nickel	ug/l	4	WFD	**2**	**3**	**3**	**3**	<2	-	-
Selenium	ug/l			<3	<3	<3	<3	<3	-	-
Vanadium	ug/l	20	EASW	**3.1**	**3.5**	**1.7**	**2.6**	<1.5	-	-
Zinc	ug/l	76.34	WFD^1	<3	**3**	**5**	**13**	**21**	-	-
TPH CWG										
Aliphatics										
>C5-C6	ug/l			<10	<10	<10	<10	<10	-	-
>C6-C8	ug/l			<10	<10	<10	<10	<10	-	-
>C8-C10	ug/l			<10	<10	<10	<10	<10	-	-
>C10-C12	ug/l			<5	<5	<5	<5	<5	-	-
>C12-C16	ug/l			<10	<10	<10	<10	<10	-	-
>C16-C21	ug/l			<10	<10	<10	<10	<10	-	-
>C21-C35	ug/l	6000	UK DWS	<10	<10	<10	<10	**260**	-	-
Aromatics										
>C5-EC7	ug/l			<10	<10	<10	<10	<10	-	-
>EC7-EC8	ug/l			<10	<10	<10	<10	<10	-	-
>EC8-EC10	ug/l			<10	<10	<10	<10	<10	-	-
>EC10-EC12	ug/l			<5	<5	<5	<5	<5	-	-
>EC12-EC16	ug/l	90	UK DWS	<10	<10	<10	<10	**50**	-	-
>EC16-EC21	ug/l	90	UK DWS	<10	<10	<10	<10	**100**	-	-
>EC21-EC35	ug/l			<10	<10	<10	<10	<10	-	-
BTEX / MTBE										
Benzene	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	-	-
Toluene	ug/l			<5	<5	<5	<5	<5	-	-
Ethylbenzene	ug/l			<1	<1	<1	<1	<1	-	-
Xylenes (sum of isomers)	ug/l			<3	<3	<3	<3	<3	-	-
m/p-Xylene	ug/l			<2	<2	<2	<2	<2	-	-
o-Xylene	ug/l			<1	<1	<1	<1	<1	-	-
Methyl Tertiary Butyl Ether	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Dissolved Boron	ug/l	2000	EA/SEPA	**222**	**752**	**680**	**1071**	**121**	-	-
PAH MS										
Naphthalene	ug/l	2	WFD	**0.3**	**0.2**	**0.8**	**0.3**	**2.2**	-	-
Acenaphthylene	ug/l	nc		<0.013	<0.013	**0.02**	**0.036**	**11.916**	-	-
Acenaphthene	ug/l	5.8	USEPA	**0.111**	**0.093**	**0.2**	**0.227**	**1.642**	-	-
Fluorene	ug/l	3	USEPA	**0.037**	**0.028**	**0.035**	**0.088**	**9.213**	-	-
Phenanthrene	ug/l	0.4	USEPA	**0.024**	**0.056**	**0.04**	**0.201**	**24.469**	-	-
Anthracene	ug/l	0.1	WFD	<0.013	<0.013	<0.013	**0.024**	**10.573**	-	-
Fluoranthene	ug/l	0.0063 (MAC 0.12)	WFD	<0.012	**0.047**	**0.054**	**0.496**	**20.192**	-	-
Pyrene	ug/l	0.025	WFD	<0.013	**0.042**	**0.056**	**0.442**	**14.7**	-	-
Benzo(a)anthracene	ug/l	0.018	USEPA	<0.015	<0.015	**0.017**	**0.14**	**4.428**	-	-
Chrysene	ug/l	nc		<0.011	**0.017**	**0.022**	**0.159**	**3.795**	-	-
Benzo(bk)fluoranthene	ug/l	0.00017 (MAC 0.017)	WFD	<0.018	<0.018	**0.037**	**0.285**	**4.32**	-	-
Benzo(a)pyrene	ug/l	0.00017 (MAC0.27)	WFD	<0.016	<0.016	**0.017**	**0.166**	**2.701**	-	-
Indeno(123cd)pyrene	ug/l	0.00017	WFD	<0.011	<0.011	<0.011	**0.095**	**1.135**	-	-
Dibenzo(ah)anthracene	ug/l	nc		<0.01	<0.01	<0.01	<0.01	**0.23**	-	-
Benzo(ghi)perylene	ug/l	0.00017 (MAC 0.0082)	WFD	<0.011	<0.011	**0.013**	**0.092**	**1.131**	-	-
PAH 16 Total	ug/l			**0.472**	**0.483**	**1.311**	**2.751**	**112.645**	-	-
Benzo(b)fluoranthene	ug/l	0.00017 (MAC 0.017)	WFD	<0.01	<0.01	**0.03**	**0.21**	**3.11**	-	-
Benzo(k)fluoranthene	ug/l	0.00017 (MAC 0.017)	WFD	<0.01	<0.01	**0.01**	**0.08**	**1.21**	-	-
B(ghi)Perylene + I(123cd)Pyrene	ug/l			<0.022	<0.022	<0.022	**0.187**	**2.266**	-	-
Sum of 4DW PAHs	ug/l			<0.04	<0.04	**0.05**	**0.47**	**6.59**	-	-
Pesticides										
Organochlorine Pesticides										
Aldrin	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Alpha-HCH (BHC)	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Beta-HCH (BHC)	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Delta-HCH (BHC)	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Dieldrin	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Endosulphan I	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Endosulphan II	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Endosulphan sulphate	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Endrin	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Gamma-HCH (BHC)	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Heptachlor	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Heptachlor Epoxide	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
o,p'-Methoxychlor	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
p,p'-DDE	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
p,p'-DDT	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
p,p'-Methoxychlor	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-

	Sample ID			MW0	MW1	MW5	MW7	MW8	Duplicate	Trip Blank 1
	Units	Screening Criteria	Source							
p,p'-TDE	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Organophosphorus Pesticides										
Azinphos methyl	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Diazinon	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Dichlorvos	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Disulfoton	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Ethion	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Ethyl Parathion (Parathion)	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Fenitrothion	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Malathion	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Methyl Parathion	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Mevinphos	ug/l			<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Acid Herbicides										
Benazolin	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Bentazone	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Bromoxynil	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Clopyralid	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
4-CPA	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
2,4-D	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
2,4-DB	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Dicamba	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Dichloroprop	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Diclofop	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Fenoprop	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Flamprop	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Flamprop-isopropyl	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Ioxynil	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
MCPA	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
MCPB	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Mecoprop	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Picloram	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Pentachlorophenol	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
2,4,5-T	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
2,3,6-TBA	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Triclopyr	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Ammoniacal Nitrogen as N	ug/l	600	WFD	**31700**	**31300**	**1650**	**2110**	**90**	-	-
Total Dissolved Chromium III	ug/l			<6	<6	<6	<6	<6	-	-

-	Not analysed
Bold	Above limit of detection
🟨	Exceeds screening criteria
<	Below limit of detection
nc	No screening criteria
WFD	Water Framework Directive (Standards & Classification) Directions (E&W) 2015
WFD	WFD value Based on the Metal Bioavailability Assessment Tool
USEPA	USEPA Region 3 Freshwater Screening Benchmarks (7/2006)
EASW	EA Environmental Permit Surface Water Pollution Risk Assessment
REACH	ECHA REACH Registration Brief Profile Scientific Properties Ecotoxicological Information PNEC
SEPA	SEPA Supporting Guidance WAT-SG-53 February 2018

TPH Mixtures - TPHCWG Hazard Index Calculation Worksheet
(TPHCWG system after WHO DWS & EA Science Report P5-080/TR3)

Assessment Methodology	
General Rationale	When assessing the significance of petroleum hydrocarbon mixtures the assessment should consider both indicator compounds and petroleum fractions. EA report P5-080/TR3 identifies 16 Petroleum Hydrocarbon fractions for use in UK human health risk assessments based on equivalent carbon numbers corresponding to the13 fractions proposed by the TPHCWG up to EC35 but with the addition of 3 further heavier hydrocarbon fractions (pending further review/evaluation). When assessing petroleum hydrocarbon fractions P5-080/TR3 also identifies the potential for additivity across fractions and that a Hazard Index approach should be adopted for fractions exhibiting similar toxicological properties and that further guidance would be published on tis issue. The TPHCWG identified 6 toxicological fractions between C5 - C35 and pending the release of the further guidance ERM approach to Petroleum Hydrocarbon mixtures will be to treat the 13 TPH fractions as essentially 6 Petroleum Hydrocarbon mixtures. The assessment of each Petroleum Hydrocarbon mixture is undertaken by calculating the Hazard Quotient (HQ) for each individual fraction (ratio of soil concentration and fraction specific GAC) and summing the relevant individual HQ within each mixture to derive a Hazard Index (HI) for each mixture. Where the HI for the mixture is greater than 1 a potentially significant risk may arise and further investigation and or assessment is likely to be required.

Calculation Worksheet	Insert values for the fractions recorded at concentrations greater than the limit of detection. All concentrations recorded less than the detection limit are therefore effectively treated as zero and excluded from the calculation. Since the limit of detection are generally several orders of magnitude below the assessment criteria it is highly unlikely that the inclusion of substance concentrations at 50% of the DL will significantly influence the calculation.

Calculation Sheet TPH Mixtures Soil

Location	Depth (m)	Detection Limits	Aliphatic C5-6 mg/kg	Aliphatic C6-8 mg/kg	Aliphatic C8-10 mg/kg	Aliphatic C10-12 mg/kg	Aliphatic C12-16 mg/kg	Aliphatic C16-21 mg/kg	Aliphatic C21-35 mg/kg	Aromatic C5-7 mg/kg	Aromatic C7-8 mg/kg	Aromatic C8-10 mg/kg	Aromatic C10-12 mg/kg	Aromatic C12-16 mg/kg	Aromatic C16-21 mg/kg	Aromatic C21-35 mg/kg	**HI - Aliphatic C5-8** mg/kg	**HI - Aliphatic C8-16** mg/kg	**HI - Aliphatic C16-35** mg/kg	**HI - Aromatic C5-8** mg/kg	**HI - Aromatic C8-16** mg/kg	**HI - Aromatic C16-35** mg/kg
TP28	**0.4**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**34**	**110**	**0.100**	**0.100**	**0.100**	**0.200**	**5**	**28**	**121**	0.003	0.004	0.001	0.002	0.038	0.197
MW8	**0.8**	**0.100**	**0.100**	**0.100**	**0.100**	**3**	**6**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.005	0.000	0.002	0.031	0.028
MW5	**0.7**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**21**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**62**	0.003	0.004	0.000	0.002	0.031	0.078
MW5	**3.3**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS26	**0.5**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS26	**4.0**	**0.100**	**0.100**	**0.100**	**0.100**	**13**	**26**	**29**	**43**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.011	0.001	0.002	0.031	0.028
WS25	**0.8**	**0.100**	**0.1**	**0.1**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
MW7	**0.8**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**14**	**35**	0.003	0.004	0.000	0.002	0.031	0.075
MW7	**3.7**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**53**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**159**	0.003	0.004	0.000	0.002	0.031	0.165
MW6	**0.5**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS104	**0.4**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS11	**0.5**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS12	**0.4**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS14	**0.4**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS16	**0.9**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS32	**0.4**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS35	**0.7**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
MW1	**0.5**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
MW0	**0.6**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**43**	**0**	**0**	**0**	**0**	**4**	**7**	**83**	0.003	0.004	0.000	0.002	0.031	0.096
WS21	**0.7**	**0.100**	**0.100**	**0.100**	**0.1**	**0.200**	**4.000**	**7.000**	**156**	**0**	**0**	**0**	**0**	**4**	**21**	**770**	0.003	0.004	0.001	0.002	0.031	0.757
WS21	**2.7**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
WS22	**0.7**	**0.100**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	**0.100**	**0.100**	**0.100**	**0.200**	**4.000**	**7.000**	**7.000**	0.003	0.004	0.000	0.002	0.031	0.028
																	0.000	0.000	0.000	0.000	0.000	0.000
																	0.000	0.000	0.000	0.000	0.000	0.000
ERM GAC Residential HGVC			50	128	35	3,491	6,144	127,847		85	164	40	80	152	318	1,115	1	1	1	1	1	1
Number of Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
General Stats	Min		0.1	0.1	0.1	0.2	4.0	7.0	7.0	0.1	0.1	0.1	0.2	4.0	7.0	7.0						
	Geomean		0.1	0.1	0.1	0.3	4.4	8.0	12.4	0.1	0.1	0.1	0.2	4.0	8.1	15.1						
	Mean		0.1	0.1	0.1	0.9	5.1	9.2	24.5	0.1	0.1	0.1	0.2	4.0	8.9	61.0						
	Max		0.1	0.1	0.1	13.3	26.0	34.0	156.0	0.1	0.1	0.1	0.2	5.0	28.0	770.0						

🟦	Less than the laboratory limit of detection
NRP	No Risk Predicted

Ratio of genotoxic PAHs relative to Benzo(a)pyrene in soil to determine suitability of Benzo(a)pyrene as a surrogate marker

(CL:AIRE, September 2014. SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Appendix E Benzo(a)pyrene)

Assessment Methodology

General Rationale	Benzo(a)pyrene (B(a)P) normally exists in the environment as part of a mixture of PAH. In order to evaluate the carcinogenic potential of the PAH mixture DEFRA and CLAIRE recommend the use of the surrogate marker approach. This approach estimates the toxicity of a mixture of PAHs in an environmental matrix by using toxicity data for a PAH mixture for which the composition is known. Exposure to the surrogate marker is assumed to represent exposure to all PAHs in that matrix, therefore the toxicity of the surrogate marker represents the toxicity of the mixture. Recent studies carried out in the UK (HPA, 2010 & Bull et al 2013) concluded that B(a)P was a suitable surrogate marker to represent mixtures of genotoxic PAHs in soil. In order to use the B(a)P C4SL as a surrogate marker for genotoxic PAHs the ratio of the of the seven genotoxic PAHS relative to B(a)P should be calculated to ensure it is similar to the test material used in the pivotal toxicity study on which the B(a)P C4SL is based i.e. the Culp study. To be considered sufficiently similar, DEFRA & CL:AIRE recommend that the ratio relative to B(a)P should fit within the upper and lower limits (representing an order of magnitude above and below the mean ratio to B(a)P of test material used in the Culp study). In such cases B(a)P is considered an adequate surrogate marker for assessing genotoxic PAHs and the C4SL considered appropriate for use. If the soil samples fall outside the order of magnitude limits, use the individual GAC presented in brackets on Soil GAC workbook for the genotoxic PAH to determine their potential risk to human health.
Calculation Worksheet	Insert concentrations for the genotoxic PAHs. Use the detection limit if recorded at concentrations less than the limit of detection. If additional rows are needed, please unhide rows 40 to 112. Should further rows be required please insert rows at the bottom of the lab data and ratio calculations (latter currently hidden) and ensure calculations have been updated to include new data.

Profile of the genotoxic PAHs relative to Benzo(a)pyrene in soil

Location Lab Data	Depth (m)	Benzo(a)Pyrene	Benzo(a)Anthracene	Benzo(b)Fluoranthene	Benzo(g,h,i)Perylene	Benzo(k)Fluoranthene	Chrysene	Dibenzo(a,h)Anthracene	Indeno(1,2,3,c,d)Pyrene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP28	0.4	0.73	0.91	1.14	0.51	0.44	0.88	0.12	0.45
MW8	0.8	0.02	0.05	0.03	0.010	0.01	0.03	0.010	0.010
MW5	0.7	0.20	0.22	0.30	0.16	0.11	0.26	0.04	0.13
MW5	3.3	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
WS26	0.5	0.03	0.07	0.06	0.02	0.02	0.07	0.010	0.01
WS26	4.0	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
WS25	0.8	0.09	0.14	0.16	0.07	0.06	0.13	0.02	0.05
MW7	0.8	0.38	0.45	0.58	0.30	0.22	0.42	0.06	0.26
MW7	3.7	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
MW6	0.5	0.10	0.18	0.19	0.08	0.08	0.19	0.02	0.07
WS104	0.4	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01
WS11	0.5	0.09	0.15	0.14	0.04	0.05	0.16	0.01	0.03
WS12	0.4	0.10	0.14	0.16	0.07	0.06	0.12	0.02	0.06
WS14	0.4	0.03	0.07	0.05	0.01	0.02	0.06	0.01	0.01
WS16	0.9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
WS32	0.4	0.01	0.04	0.01	0.01	0.01	0.02	0.01	0.01
WS35	0.7	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
MW1	0.5	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
MW0	0.6	0.01	0.05	0.01	0.01	0.01	0.02	0.01	0.010
WS21	0.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.010
WS21	2.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.010
WS22	0.7	0.01	0.04	0.01	0.01	0.01	0.02	0.01	0.010
WS22	2.5	-	-	-	-	-	-	-	-
C4SL Residential with HGCV		**5.0**	NA	NA	NA	NA	NA	NA	NA
Number of Exceedances						**0**			
B(a)P Ratio	**Min Ratio**	**1.00**	**1.00**	**1.00**	**0.33**	**0.50**	**1.00**	**0.11**	**0.33**
	Max Ratio	**1.00**	**5.00**	**2.00**	**1.00**	**1.00**	**2.33**	**1.00**	**1.00**
Culp Mean Ratio to B(a)P		NA	**1.24**	**1.08**	**0.82**	**0.37**	**1.16**	**0.14**	**0.73**
Order of Magnitude Lower Limit		NA	**0.12**	**0.11**	**0.08**	**0.04**	**0.12**	**0.01**	**0.07**
Order of Magnitude Upper Limit		NA	**12.43**	**10.85**	**8.22**	**3.72**	**11.61**	**1.38**	**7.27**
B(a)P Ratio within acceptable range to allow the use of B(a)P as a surrogate marker compound for genotoxic PAHs			**TRUE**	**TRUE**	**TRUE**	**TRUE**	**TRUE**	**TRUE**	**TRUE**

🟩	Insert lab data with less than detections at laboratory detection limits
🟨	BaP present at concentrtaiosn greater than Assessment Criteria
🟧	PAH mixture not consistent with methodology adopte alternative method

DEFRA, December 2014. SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document.

CL:AIRE, September 2014. SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (Final Project Report (Revision 2)).

Health Protection Agency, 2010. HPA Contaminated Land Information Sheet. Risk Assessment Approaches for polycyclic Aromatic Hydrocarbons (PAHs) Version 5.

BULL, S., COLLINS, C. 2013. Promoting the use of BaP as a marker for PAH exposure in UK soils. Environmental Geochemistry and Health, 31, 101-109

CULP, S.J., GAYLOR, D.W., SHELDON, W.G. GOLDSTEIN, L.W., BELAND, F.A., 1998. A comparison of the tumors induced by coal tar and benzo(a)pyrene in a 2-year bioassay. Carcinogenesis, 19, 117-124.

APPENDIX C LABORATORY CERTIFICATES

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Salford
Manchester
M5 3EF

4225

Attention :	Sonia Devons
Date :	27th September, 2021
Your reference :	0483019
Our reference :	Test Report 21/14571 Batch 1
Location :	Solar 21
Date samples received :	17th September, 2021
Status :	Final Report
Issue :	1

Nine samples were received for analysis on 17th September, 2021 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Paul Boden BSc
Senior Project Manager

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4225

Attention :	Sonia Devons
Date :	23rd September, 2021
Your reference :	0483091
Our reference :	Test Report 21/14197 Batch 1
Location :	Solar 21
Date samples received :	14th September, 2021
Status :	Final Report
Issue :	1

Thirty three samples were received for analysis on 14th September, 2021 of which twenty seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Simon Gomery BSc
Project Manager

Please include all sections of this report if it is reproduced

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	5-7	8-9	10-11	12-14	15-17	18-20	21-23	24-26			
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW8-SO-2.4-20210901	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903			
Depth	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	01/09/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021			
Sample Type	Clay	Clay	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
Metals													
Arsenic $^{\#M}$	12.9	14.3	-	10.4	8.8	17.2	8.2	21.6	10.4	8.7	<0.5	mg/kg	TM30/PM15
Barium $^{\#M}$	325	84	-	212	114	248	145	301	217	100	<1	mg/kg	TM30/PM15
Beryllium	7.8	0.7	-	4.9	1.8	1.6	1.5	1.7	2.7	1.5	<0.5	mg/kg	TM30/PM15
Cadmium $^{\#M}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	mg/kg	TM30/PM15
Chromium $^{\#M}$	77.5	49.4	-	52.6	64.5	63.5	58.5	73.7	49.7	47.3	<0.5	mg/kg	TM30/PM15
Hexavalent Chromium $^{\#}$	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Copper $^{\#M}$	17	13	-	14	19	27	16	27	12	17	<1	mg/kg	TM30/PM15
Lead $^{\#M}$	37	18	-	13	27	48	21	82	17	19	<5	mg/kg	TM30/PM15
Mercury $^{\#M}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	mg/kg	TM30/PM15
Nickel $^{\#M}$	10.3	16.7	-	17.4	47.5	31.2	33.3	30.8	29.2	35.5	<0.7	mg/kg	TM30/PM15
Selenium $^{\#M}$	4	<1	-	1	1	2	1	1	2	1	<1	mg/kg	TM30/PM15
Vanadium	198	36	-	41	60	55	49	82	61	49	<1	mg/kg	TM30/PM15
Zinc $^{\#M}$	135	44	-	52	112	110	90	121	71	90	<5	mg/kg	TM30/PM15
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) $^{\#M}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) $^{\#M}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) $^{\#M}$	<0.2	2.8	-	<0.2	<0.2	<0.2	13.3	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) $^{\#M}$	<4	6	-	<4	<4	<4	26	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) $^{\#M}$	34	<7	-	<7	<7	<7	29	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) $^{\#M}$	110	<7	-	21	<7	<7	43	<7	<7	53	<7	mg/kg	TM5/PM8/PM16
>C16-C35 (EH_1D_AL) $^{\#M}$	144	<14	-	21	<14	<14	72	<14	<14	53	<14	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	10	<7	-	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	144	<19	-	21	<19	<19	111	<19	<19	53	<19	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics C5-44 (EH+HS_1D_AL)	154	<26	-	<26	<26	<26	111	<26	<26	53	<26	mg/kg	TM5/TM36/PM8/PM12/PM1
Aromatics													
>C5-EC7 (HS_1D_AR) $^{\#}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) $^{\#}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) $^{\#M}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) $^{\#}$	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) $^{\#}$	5	<4	-	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) $^{\#}$	28	<7	-	<7	<7	<7	<7	<7	14	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) $^{\#}$	121	<7	-	62	<7	<7	<7	<7	35	159	<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	18	<7	-	12	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) $^{\#}$	154	<19	-	62	<19	<19	<19	<19	49	159	<19	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	298	<38	-	83	<38	<38	111	<38	49	212	<38	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aromatics C5-44 (EH+HS_1D_AR)	172	<26	-	74	<26	<26	<26	<26	49	159	<26	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics and aromatics(C5-44) (EH+HS_CU_1D_Total)	326	<52	-	74	<52	<52	111	<52	<52	212	<52	mg/kg	TM5/TM36/PM8/PM12/PM1

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	5-7	8-9	10-11	12-14	15-17	18-20	21-23	24-26	LOD/LOR	Units	Method No.
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW8-SO-2.4-20210901	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903			
Depth	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	01/09/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021			
Sample Type	Clay	Clay	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
BTEX / MTBE													
Benzene #	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Toluene #	<0.003	<0.003	-	0.009	<0.003	0.009	<0.003	0.013	0.014	0.028	<0.003	mg/kg	TM15/PM10
Ethylbenzene #	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Xylenes (sum of isomers) #	<0.008	<0.008	-	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	mg/kg	TM15/PM10
m/p-Xylene #	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
o-Xylene #	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Water Soluble Boron #M	7.4	1.7	-	3.7	6.4	6.8	6.3	6.3	3.7	21.4	<0.1	mg/kg	TM74/PM32
Arsenic	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Barium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Beryllium	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Lead	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	-	-	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Water Soluble Boron	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM74/PM61
Zinc	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Surrogate Recovery Toluene D8	97	92	-	91	71	97	68	94	84	57	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	93	90	-	82	69	90	65	90	82	62	<0	%	TM15/PM10
VOC Target List Total	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM15/PM10

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	5-7	8-9	10-11	12-14	15-17	18-20	21-23	24-26			
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW8-SO-2.4-20210901	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903			
Depth	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	01/09/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021			
Sample Type	Clay	Clay	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
Pesticides													
Organochlorine Pesticides													
Aldrin	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Alpha-HCH (BHC)	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Beta-HCH (BHC)	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Delta-HCH (BHC)	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Dieldrin	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endosulphan I	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endosulphan II	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endosulphan sulphate	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endrin	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Gamma-HCH (BHC)	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Heptachlor	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Heptachlor Epoxide	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
p,p'-DDE	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
p,p'-DDT	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
p,p'-TDE	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Total Methoxychlor	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Diazinon	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Dichlorvos	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Disulfoton	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Ethion	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Ethyl Parathion (Parathion)	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Fenitrothion	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Malathion	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Methyl Parathion	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Mevinphos	-	-	-	-	-	-	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	5-7	8-9	10-11	12-14	15-17	18-20	21-23	24-26			
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW8-SO-2.4-20210901	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903			
Depth	0.4	0.8	2.4	0.7	3.3	0.5	4.0	0.8	0.8	3.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	01/09/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021			
Sample Type	Clay	Clay	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
Acid Herbicides													
2,3,6 - TBA	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
2,4 - D	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
2,4 - DB	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
2,4,5 - T	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
4 - CPA	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Benazolin	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Bentazone	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Bromoxynil	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Clopyralid	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Dicamba	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Dichloroprop	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Diclofop	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Fenoprop	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Flamprop	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Flamprop – isopropyl	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Ioxynil	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
MCPA	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
MCPB	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Mecoprop	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Pentachlorophenol	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Picloram	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Triclopyr	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Natural Moisture Content	22.3	13.8	-	18.4	39.4	24.7	37.6	25.6	26.2	152.2	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	-	-	-	-	-	-	-	10.9	-	-	<0.6	mg/kg	TM38/PM20
Chromium III	77.5	49.4	-	52.6	64.5	63.5	58.5	73.7	49.7	47.3	<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	NONE/NONE
Total Organic Carbon $^{\#}$	-	0.67	0.09	0.68	1.74	-	-	-	0.72	-	<0.02	%	TM21/PM24
pH $^{\#M}$	-	8.69	8.90	10.56	7.87	-	-	-	8.40	6.76	<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay	Clayey Sand	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay		None	PM13/PM0
Sample Colour	Medium Brown	Medium Brown	Medium Brown	Dark Brown	Dark Brown	Medium Brown	Dark Brown	Medium Brown	Medium Brown	Dark Grey		None	PM13/PM0
Other Items	stones	stones, sand	stones	stones, glass	none	stones, roots, brick	stones	stones, roots	stones	stones		None	PM13/PM0

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Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	27-29	30-35	36-38	42-44	46-47	48-50	54-56	60-62	66-68	72-74			
Sample ID	MW6-SO-0.5-20210902	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS12-SO-4.2-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908			
Depth	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	02/09/2021	03/09/2021	06/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021			
Sample Type	Clayey Sand	Clay	Clay	Clayey Loam	Soil	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
Metals													
Arsenic$^{\#M}$	-	-	18.7	7.0	-	14.6	2.9	9.6	10.1	13.6	<0.5	mg/kg	TM30/PM15
Barium$^{\#M}$	-	-	370	80	-	342	22	212	192	107	<1	mg/kg	TM30/PM15
Beryllium	-	-	1.2	0.6	-	1.2	<0.5	0.8	0.9	1.7	<0.5	mg/kg	TM30/PM15
Cadmium$^{\#M}$	-	-	0.3	<0.1	-	0.2	<0.1	0.2	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Chromium$^{\#M}$	-	-	78.0	99.0	-	75.5	111.4	62.9	68.8	72.2	<0.5	mg/kg	TM30/PM15
Hexavalent Chromium$^{\#}$	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Copper$^{\#M}$	-	-	31	12	-	24	3	13	13	19	<1	mg/kg	TM30/PM15
Lead$^{\#M}$	-	-	111	31	-	103	11	65	64	24	<5	mg/kg	TM30/PM15
Mercury$^{\#M}$	-	-	0.3	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Nickel$^{\#M}$	-	-	26.2	13.5	-	26.1	6.8	21.9	19.1	46.2	<0.7	mg/kg	TM30/PM15
Selenium$^{\#M}$	-	-	<1	<1	-	1	<1	<1	<1	2	<1	mg/kg	TM30/PM15
Vanadium	-	-	44	24	-	42	11	35	31	64	<1	mg/kg	TM30/PM15
Zinc$^{\#M}$	-	-	148	57	-	130	12	79	74	115	<5	mg/kg	TM30/PM15
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)$^{\#M}$	<0.1	<0.1^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)$^{\#M}$	<0.1	<0.1^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)$^{\#M}$	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)$^{\#M}$	<4	<4	<4	<4	-	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)$^{\#M}$	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)$^{\#M}$	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C16-C35 (EH_1D_AL)$^{\#M}$	<14	<14	<14	<14	-	<14	<14	<14	<14	<14	<14	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	<19	<19	<19	<19	-	<19	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics C5-44 (EH+HS_1D_AL)	<26	<26	<26	<26	-	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM1
Aromatics													
>C5-EC7 (HS_1D_AR)$^{\#}$	<0.1	<0.1^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)$^{\#}$	<0.1	<0.1^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)$^{\#M}$	<0.1	<0.1^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)$^{\#}$	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)$^{\#}$	<4	<4	<4	<4	-	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)$^{\#}$	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)$^{\#}$	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	<7	<7	<7	<7	-	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR)$^{\#}$	<19	<19	<19	<19	-	<19	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	<38	<38	<38	<38	-	<38	<38	<38	<38	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aromatics C5-44 (EH+HS_1D_AR)	<26	<26	<26	<26	-	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics and aromatics(C5-44) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	-	<52	<52	<52	<52	<52	<52	mg/kg	TM5/TM36/PM8/PM12/PM1

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Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	27-29	30-35	36-38	42-44	46-47	48-50	54-56	60-62	66-68	72-74			
Sample ID	MW6-SO-0.5-20210902	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS12-SO-4.2-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908			
Depth	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	02/09/2021	03/09/2021	06/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021			
Sample Type	Clayey Sand	Clay	Clay	Clayey Loam	Soil	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
BTEX / MTBE													
Benzene $^{\#}$	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Toluene $^{\#}$	0.026	0.015	0.005	<0.003	-	0.010	<0.003	0.014	0.011	0.023	<0.003	mg/kg	TM15/PM10
Ethylbenzene $^{\#}$	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Xylenes (sum of isomers) $^{\#}$	<0.008	<0.008	<0.008	<0.008	-	<0.008	<0.008	<0.008	<0.008	0.011	<0.008	mg/kg	TM15/PM10
m/p-Xylene $^{\#}$	0.007	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	mg/kg	TM15/PM10
o-Xylene $^{\#}$	<0.003	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether $^{\#}$	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Water Soluble Boron $^{\#M}$	NDP	NDP	2.2	1.2	-	1.7	0.2	1.8	1.3	4.5	<0.1	mg/kg	TM74/PM32
Arsenic	1.7	9.1	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Barium	148	203	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Beryllium	2.6	0.8	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium	<0.1	0.3	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium	202.4	18.0	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper	11	12	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Lead	9	67	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel	1272.1_{AA}	19.0	-	-	-	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium	<1	<1	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	115	28	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Water Soluble Boron	5.9	1.7	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM74/PM61
Zinc	46	79	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Surrogate Recovery Toluene D8	90	80	83	92	-	80	82	69	68	71	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	89	74	74	82	-	72	82	61	64	65	<0	%	TM15/PM10
VOC Target List Total	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM15/PM10

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Client Name:	ERM	**Report :**	**Solid**
Reference:	0483091		
Location:	Solar 21	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Sonia Devons		
EMT Job No:	21/14197		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	27-29	30-35	36-38	42-44	46-47	48-50	54-56	60-62	66-68	72-74			
Sample ID	MW6-SO-0.5-20210902	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS12-SO-4.2-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908			
Depth	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	02/09/2021	03/09/2021	06/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021			
Sample Type	Clayey Sand	Clay	Clay	Clayey Loam	Soil	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
Pesticides													
Organochlorine Pesticides													
Aldrin	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Alpha-HCH (BHC)	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Beta-HCH (BHC)	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Delta-HCH (BHC)	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Dieldrin	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endosulphan I	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endosulphan II	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endosulphan sulphate	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Endrin	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Gamma-HCH (BHC)	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Heptachlor	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Heptachlor Epoxide	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
p,p'-DDE	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
p,p'-DDT	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
p,p'-TDE	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Total Methoxychlor	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Diazinon	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Dichlorvos	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Disulfoton	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Ethion	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Ethyl Parathion (Parathion)	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Fenitrothion	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Malathion	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Methyl Parathion	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8
Mevinphos	-	-	<0.01	-	-	<0.01	-	<0.01	-	-	<0.01	mg/kg	TM42/PM8

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

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Depth	0.5	0.4	0.5	0.4	4.2	0.4	0.9	0.4	0.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	02/09/2021	03/09/2021	06/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021			
Sample Type	Clayey Sand	Clay	Clay	Clayey Loam	Soil	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
Acid Herbicides													
2,3,6 - TBA	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
2,4 - D	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
2,4 - DB	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
2,4,5 - T	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
4 - CPA	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Benazolin	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Bentazone	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Bromoxynil	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Clopyralid	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Dicamba	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Dichloroprop	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Diclofop	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Fenoprop	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Flamprop	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Flamprop – isopropyl	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Ioxynil	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
MCPA	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
MCPB	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Mecoprop	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Pentachlorophenol	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Picloram	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Triclopyr	-	-	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	mg/kg	TM42/PM8
Natural Moisture Content	11.2	9.3	26.7	11.8	-	24.2	3.9	15.7	31.4	33.5	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	-	-	<0.6	-	-	<0.6	-	<0.6	-	-	<0.6	mg/kg	TM38/PM20
Chromium III	-	-	78.0	99.0	-	75.5	111.4	62.9	68.8	72.2	<0.5	mg/kg	NONE/NONE
Chromium III	202.4	18.0	-	-	-	-	-	-	-	-	<0.5	mg/kg	NONE/NONE
Total Organic Carbon$^{\#}$	NDP	-	-	-	10.40	-	-	-	-	1.07	<0.02	%	TM21/PM24
pH$^{\#M}$	11.83	-	-	-	-	-	-	-	-	8.44	<0.01	pH units	TM73/PM11
Sample Type	Clayey Sand	Clay	Clay	Clayey Loam	-	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay		None	PM13/PM0
Sample Colour	Medium Brown	Medium Brown	Medium Brown	Dark Brown	-	Light Brown	Light Brown	Dark Brown	Medium Brown	Dark Brown		None	PM13/PM0
Other Items	stones	stones, sand	stones, sand	stones, roots	-	roots, stones, sand	none	stones, roots	stones	stones, roots		None	PM13/PM0

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	ERM
Reference:	0483091
Location:	Solar 21
Contact:	Sonia Devons
EMT Job No:	21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	75-77	78-80	81-83	84-86	87-89	90-92	93-95				LOD/LOR	Units	Method No.
Sample ID	MW1-SO-3.7-20210908	MW0-SO-0.6-20210908	MW0-SO-3.5-20210908	WS21-SO-0.7-20210909	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909	WS22-SO-2.5-20210909						
Depth	3.7	0.6	3.5	0.7	2.7	0.7	2.5						
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J						
Sample Date	08/09/2021	08/09/2021	08/09/2021	09/09/2021	09/09/2021	09/09/2021	09/09/2021						
Sample Type	Clay	Clay	Clay	Clay	Clayey Sand	Clay	Clayey Sand						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021						
Metals													
Arsenic $^{\#M}$	-	13.7	-	2.3	1.2	10.6	-				<0.5	mg/kg	TM30/PM15
Barium $^{\#M}$	-	145	-	27	16	188	-				<1	mg/kg	TM30/PM15
Beryllium	-	1.8	-	<0.5	<0.5	1.4	-				<0.5	mg/kg	TM30/PM15
Cadmium $^{\#M}$	-	<0.1	-	0.2	<0.1	<0.1	-				<0.1	mg/kg	TM30/PM15
Chromium $^{\#M}$	-	60.5	-	5.4	110.1	53.1	-				<0.5	mg/kg	TM30/PM15
Hexavalent Chromium $^{\#}$	-	<0.3	-	<15.0$_{AB}$	<0.3	<0.3	-				<0.3	mg/kg	TM38/PM20
Copper $^{\#M}$	-	19	-	3	5	12	-				<1	mg/kg	TM30/PM15
Lead $^{\#M}$	-	39	-	<5	7	28	-				<5	mg/kg	TM30/PM15
Mercury $^{\#M}$	-	<0.1	-	<0.1	<0.1	<0.1	-				<0.1	mg/kg	TM30/PM15
Nickel $^{\#M}$	-	41.1	-	6.2	6.8	28.5	-				<0.7	mg/kg	TM30/PM15
Selenium $^{\#M}$	-	2	-	1	<1	1	-				<1	mg/kg	TM30/PM15
Vanadium	-	73	-	5	12	48	-				<1	mg/kg	TM30/PM15
Zinc $^{\#M}$	-	101	-	<5	11	86	-				<5	mg/kg	TM30/PM15
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) $^{\#M}$	-	<0.1^{SV}	-	<0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) $^{\#M}$	-	<0.1^{SV}	-	<0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	-	<0.1^{SV}	-	0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) $^{\#M}$	-	<0.2	-	<0.2	<0.2	<0.2	-				<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) $^{\#M}$	-	<4	-	<4	<4	<4	-				<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) $^{\#M}$	-	<7	-	<7	<7	<7	-				<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) $^{\#M}$	-	43	-	156	<7	<7	-				<7	mg/kg	TM5/PM8/PM16
>C16-C35 (EH_1D_AL) $^{\#M}$	-	43	-	156	<14	<14	-				<14	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	-	<7	-	<7	<7	<7	-				<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	-	43	-	156	<19	<19	-				<19	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics C5-44 (EH+HS_1D_AL)	-	43	-	156	<26	<26	-				<26	mg/kg	TM5/TM36/PM8/PM12/PM1
Aromatics													
>C5-EC7 (HS_1D_AR) $^{\#}$	-	<0.1^{SV}	-	<0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) $^{\#}$	-	<0.1^{SV}	-	<0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) $^{\#M}$	-	<0.1^{SV}	-	<0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) $^{\#}$	-	<0.2	-	<0.2	<0.2	<0.2	-				<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) $^{\#}$	-	<4	-	<4	<4	<4	-				<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) $^{\#}$	-	<7	-	21	<7	<7	-				<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) $^{\#}$	-	83	-	770	<7	<7	-				<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	-	12	-	102	<7	<7	-				<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) $^{\#}$	-	83	-	791	<19	<19	-				<19	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	-	126	-	947	<38	<38	-				<38	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aromatics C5-44 (EH+HS_1D_AR)	-	95	-	893	<26	<26	-				<26	mg/kg	TM5/TM36/PM8/PM12/PM1
Total aliphatics and aromatics(C5-44) (EH+HS_CU_1D_Total)	-	138	-	1049	<52	<52	-				<52	mg/kg	TM5/TM36/PM8/PM12/PM1

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Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	75-77	78-80	81-83	84-86	87-89	90-92	93-95						
Sample ID	MW1-SO-3.7-20210908	MW0-SO-0.6-20210908	MW0-SO-3.5-20210908	WS21-SO-0.7-20210909	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909	WS22-SO-2.5-20210909						
Depth	3.7	0.6	3.5	0.7	2.7	0.7	2.5						
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J						
Sample Date	08/09/2021	08/09/2021	08/09/2021	09/09/2021	09/09/2021	09/09/2021	09/09/2021						
Sample Type	Clay	Clay	Clay	Clay	Clayey Sand	Clay	Clayey Sand						
Batch Number	1	1	1	1	1	1	1				LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021						
BTEX / MTBE													
Benzene$^{\#}$	-	<0.003	-	<0.003^{SV}	<0.003	<0.003	-				<0.003	mg/kg	TM15/PM10
Toluene$^{\#}$	-	<0.003	-	<0.003^{SV}	<0.003	0.012	-				<0.003	mg/kg	TM15/PM10
Ethylbenzene$^{\#}$	-	<0.003	-	<0.003^{SV}	<0.003	<0.003	-				<0.003	mg/kg	TM15/PM10
Xylenes (sum of isomers)$^{\#}$	-	<0.008	-	<0.008^{SV}	<0.008	<0.008	-				<0.008	mg/kg	TM15/PM10
m/p-Xylene$^{\#}$	-	<0.005	-	<0.005^{SV}	<0.005	<0.005	-				<0.005	mg/kg	TM15/PM10
o-Xylene$^{\#}$	-	<0.003	-	<0.003^{SV}	<0.003	<0.003	-				<0.003	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether$^{\#}$	-	<0.002	-	<0.002^{SV}	<0.002	<0.002	-				<0.002	mg/kg	TM15/PM10
Water Soluble Boron$^{\#M}$	-	6.6	-	3.6	0.2	2.7	-				<0.1	mg/kg	TM74/PM32
Arsenic	-	-	-	-	-	-	-				<0.5	mg/kg	TM30/PM62
Barium	-	-	-	-	-	-	-				<1	mg/kg	TM30/PM62
Beryllium	-	-	-	-	-	-	-				<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	-	-	-	-				<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	-	-	-	-				<0.5	mg/kg	TM30/PM62
Copper	-	-	-	-	-	-	-				<1	mg/kg	TM30/PM62
Lead	-	-	-	-	-	-	-				<5	mg/kg	TM30/PM62
Mercury	-	-	-	-	-	-	-				<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	-	-	-	-				<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	-	-	-	-				<1	mg/kg	TM30/PM62
Vanadium	-	-	-	-	-	-	-				<1	mg/kg	TM30/PM62
Water Soluble Boron	-	-	-	-	-	-	-				<0.1	mg/kg	TM74/PM61
Zinc	-	-	-	-	-	-	-				<5	mg/kg	TM30/PM62
Surrogate Recovery Toluene D8	-	60	-	30^{SV}	91	73	-				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	63	-	45^{SV}	96	68	-				<0	%	TM15/PM10
VOC Target List Total	-	<0.1	-	<0.1^{SV}	<0.1	<0.1	-				<0.1	mg/kg	TM15/PM10

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Client Name:	ERM	**Report :**	**Solid**
Reference:	0483091		
Location:	Solar 21	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Sonia Devons		
EMT Job No:	21/14197		

EMT Sample No.	75-77	78-80	81-83	84-86	87-89	90-92	93-95						
Sample ID	MW1-SO-3.7-20210908	MW0-SO-0.6-20210908	MW0-SO-3.5-20210908	WS21-SO-0.7-20210909	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909	WS22-SO-2.5-20210909						
Depth	3.7	0.6	3.5	0.7	2.7	0.7	2.5				Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J						
Sample Date	08/09/2021	08/09/2021	08/09/2021	09/09/2021	09/09/2021	09/09/2021	09/09/2021						
Sample Type	Clay	Clay	Clay	Clay	Clayey Sand	Clay	Clayey Sand						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021				LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Alpha-HCH (BHC)	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Beta-HCH (BHC)	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Delta-HCH (BHC)	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Dieldrin	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Endosulphan I	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Endosulphan II	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Endosulphan sulphate	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Endrin	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Gamma-HCH (BHC)	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Heptachlor	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Heptachlor Epoxide	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
p,p'-DDE	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
p,p'-DDT	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
p,p'-TDE	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Total Methoxychlor	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Diazinon	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Dichlorvos	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Disulfoton	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Ethion	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Ethyl Parathion (Parathion)	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Fenitrothion	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Malathion	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Methyl Parathion	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8
Mevinphos	-	<0.01	<0.01	<0.01	-	-	-				<0.01	mg/kg	TM42/PM8

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	75-77	78-80	81-83	84-86	87-89	90-92	93-95						
Sample ID	MW1-SO-3.7-20210908	MW0-SO-0.6-20210908	MW0-SO-3.5-20210908	WS21-SO-0.7-20210909	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909	WS22-SO-2.5-20210909						
Depth	3.7	0.6	3.5	0.7	2.7	0.7	2.5						
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J						
Sample Date	08/09/2021	08/09/2021	08/09/2021	09/09/2021	09/09/2021	09/09/2021	09/09/2021						
Sample Type	Clay	Clay	Clay	Clay	Clayey Sand	Clay	Clayey Sand						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021				LOD/LOR	Units	Method No.
Acid Herbicides													
2,3,6 - TBA	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
2,4 - D	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
2,4 - DB	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
2,4,5 - T	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
4 - CPA	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Benazolin	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Bentazone	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Bromoxynil	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Clopyralid	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Dicamba	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Dichloroprop	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Diclofop	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Fenoprop	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Flamprop	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Flamprop – isopropyl	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Ioxynil	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
MCPA	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
MCPB	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Mecoprop	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Pentachlorophenol	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Picloram	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Triclopyr	-	<0.1	<0.1	<0.1	-	-	-				<0.1	mg/kg	TM42/PM8
Natural Moisture Content	-	54.1	253.6	48.4	17.1	21.3	-				<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	-	<0.6	84.5	1.0	-	-	-				<0.6	mg/kg	TM38/PM20
Chromium III	-	60.5	-	5.4	110.1	53.1	-				<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	-	-	-				<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	-	-	12.05	-	0.06	-	-				<0.02	%	TM21/PM24
pH #M	7.83	7.94	7.63	4.12	7.47	8.34	5.66				<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay	Clay	Clay	Clayey Sand	Clay	Clayey Sand					None	PM13/PM0
Sample Colour	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Medium Brown	Medium Brown	Dark Brown					None	PM13/PM0
Other Items	stones, roots	stones	stones	stones	none	roots, stones	none					None	PM13/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

SVOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	8-9	10-11	12-14	15-17	18-20	21-23	24-26	27-29	LOD/LOR	Units	Method No.
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903	MW6-SO-0.5-20210902			
Depth	0.4	0.8	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021	02/09/2021			
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay	Clayey Sand			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
SVOC MS													
Phenols													
4-Chloro-3-methylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Chlorophenol $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Methylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.14	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitrophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitrophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Pentachlorophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phenol $^{\#M}$	<0.01	<0.01	<0.01	<0.01	0.31	<0.01	1.04	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,5-Trichlorophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
PAHs													
Acenaphthene	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Acenaphthylene	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	mg/kg	TM16/PM8
Anthracene	0.22	<0.01	0.03	<0.01	0.03	<0.01	0.04	0.04	<0.01	0.03	<0.01	mg/kg	TM16/PM8
2-Chloronaphthalene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Fluoranthene $^{\#M}$	1.46	0.04	0.31	<0.01	0.11	<0.01	0.26	0.84	<0.01	0.16	<0.01	mg/kg	TM16/PM8
Fluorene	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene $^{\#M}$	0.04	0.14	<0.01	<0.01	0.03	<0.01	0.05	<0.01	<0.01	0.04	<0.01	mg/kg	TM16/PM8
Naphthalene	0.10	0.05	<0.01	<0.01	0.03	<0.01	0.05	<0.01	<0.01	0.03	<0.01	mg/kg	TM16/PM8
Phenanthrene $^{\#M}$	0.67	0.03	0.14	<0.01	0.10	<0.01	0.16	0.12	<0.01	0.07	<0.01	mg/kg	TM16/PM8
Pyrene $^{\#M}$	1.41	0.03	0.28	<0.01	0.10	<0.01	0.24	0.86	<0.01	0.26	<0.01	mg/kg	TM16/PM8
Benzo(a)pyrene	0.73	0.02	0.20	<0.01	0.03	<0.01	0.09	0.38	<0.01	0.10	<0.01	mg/kg	TM16/PM8
Benzo(a)anthracene	0.91	0.05	0.22	<0.01	0.07	<0.01	0.14	0.45	<0.01	0.18	<0.01	mg/kg	TM16/PM8
Benzo(b)fluoranthene	1.14	0.03	0.30	<0.01	0.06	<0.01	0.16	0.58	<0.01	0.19	<0.01	mg/kg	TM16/PM8
Benzo(k)fluoranthene	0.44	0.01	0.11	<0.01	0.02	<0.01	0.06	0.22	<0.01	0.08	<0.01	mg/kg	TM16/PM8
Benzo(ghi)perylene	0.51	<0.01	0.16	<0.01	0.02	<0.01	0.07	0.30	<0.01	0.08	<0.01	mg/kg	TM16/PM8
Chrysene	0.88	0.03	0.26	<0.01	0.07	<0.01	0.13	0.42	<0.01	0.19	<0.01	mg/kg	TM16/PM8
Dibenzo(ah)anthracene	0.12	<0.01	0.04	<0.01	<0.01	<0.01	0.02	0.06	<0.01	0.02	<0.01	mg/kg	TM16/PM8
Indeno(123cd)pyrene	0.45	<0.01	0.13	<0.01	0.01	<0.01	0.05	0.26	<0.01	0.07	<0.01	mg/kg	TM16/PM8
Benzo(bk)fluoranthene	1.58	0.04	0.41	<0.01	0.08	<0.01	0.22	0.80	<0.01	0.27	<0.01	mg/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Diethyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Dimethyl phthalate $^{\#M}$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Amines													
N-nitrosodi-n-propylamine $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Anilines													
4-Chloroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
3-Nitroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8

Client Name:	ERM	**SVOC Report :**	**Solid**
Reference:	0483091		
Location:	Solar 21		
Contact:	Sonia Devons		
EMT Job No:	21/14197		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	8-9	10-11	12-14	15-17	18-20	21-23	24-26	27-29			
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903	MW6-SO-0.5-20210902			
Depth	0.4	0.8	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021	02/09/2021			
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay	Clayey Sand			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
SVOC MS													
Other SVOCs													
Azobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Carbazole	0.06	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Dibenzofuran $^{\#M}$	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Isophorone $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Nitrobenzene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,2-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Other SVOCs													
Surrogate Recovery 2-Fluorobiphenyl	126	124	119	117	116	116	122	123	118	126	<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	137^{SV}	127	124	110	114	114	133^{SV}	129	120	134^{SV}	<0	%	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	ERM	**SVOC Report :**	**Solid**
Reference:	0483091		
Location:	Solar 21		
Contact:	Sonia Devons		
EMT Job No:	21/14197		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	30-35	36-38	42-44	48-50	54-56	60-62	66-68	72-74	78-80	84-86	LOD/LOR	Units	Method No.
Sample ID	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908	MW0-SO-0.6-20210908	WS21-SO-0.7-20210909			
Depth	0.4	0.5	0.4	0.4	0.9	0.4	0.7	0.5	0.6	0.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	03/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021	08/09/2021	09/09/2021			
Sample Type	Clay	Clay	Clayey Loam	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
SVOC MS													
Phenols													
4-Chloro-3-methylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Chlorophenol #M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Methylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol #M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitrophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitrophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Pentachlorophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phenol #M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,5-Trichlorophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
PAHs													
Acenaphthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Anthracene	<0.01	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Chloronaphthalene #M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Fluoranthene #M	<0.01	0.20	0.20	0.07	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	mg/kg	TM16/PM8
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene #M	0.01	0.05	0.02	0.02	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Naphthalene	<0.01	0.03	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phenanthrene #M	0.02	0.16	0.09	0.06	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Pyrene #M	<0.01	0.18	0.19	0.07	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(a)pyrene	<0.01	0.09	0.10	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(a)anthracene	0.03	0.15	0.14	0.07	<0.01	0.04	<0.01	<0.01	0.05	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(b)fluoranthene	<0.01	0.14	0.16	0.05	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(k)fluoranthene	<0.01	0.05	0.06	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(ghi)perylene	<0.01	0.04	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Chrysene	0.01	0.16	0.12	0.06	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	mg/kg	TM16/PM8
Dibenzo(ah)anthracene	<0.01	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Indeno(123cd)pyrene	<0.01	0.03	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(bk)fluoranthene	0.01	0.19	0.22	0.07	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Diethyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Dimethyl phthalate #M	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Amines													
N-nitrosodi-n-propylamine #M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Anilines													
4-Chloroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
3-Nitroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitroaniline	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

SVOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	30-35	36-38	42-44	48-50	54-56	60-62	66-68	72-74	78-80	84-86			
Sample ID	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908	MW0-SO-0.6-20210908	WS21-SO-0.7-20210909			
Depth	0.4	0.5	0.4	0.4	0.9	0.4	0.7	0.5	0.6	0.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	03/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021	08/09/2021	09/09/2021			
Sample Type	Clay	Clay	Clayey Loam	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
SVOC MS													
Other SVOCs													
Azobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Carbazole	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Dibenzofuran $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Isophorone $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Nitrobenzene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene $^{\#M}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,2-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Other SVOCs													
Surrogate Recovery 2-Fluorobiphenyl	113	121	118	118	121	114	118	115	122	128	<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	112	127	122	118	116	106	120	113	126	140^{SV}	<0	%	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

SVOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	87-89	90-92	LOD/LOR	Units	Method No.
Sample ID	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909			
Depth	2.7	0.7			
COC No / misc					
Containers	V J	V J			
Sample Date	09/09/2021	09/09/2021			
Sample Type	Clayey Sand	Clay			
Batch Number	1	1			
Date of Receipt	14/09/2021	14/09/2021			
SVOC MS					
Phenols					
4-Chloro-3-methylphenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Chlorophenol #M	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylphenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Methylphenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol #M	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitrophenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitrophenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Pentachlorophenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phenol #M	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,5-Trichlorophenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
PAHs					
Acenaphthene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Acenaphthylene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Anthracene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Chloronaphthalene #M	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Fluoranthene #M	<0.01	0.02	<0.01	mg/kg	TM16/PM8
Fluorene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene #M	<0.01	0.02	<0.01	mg/kg	TM16/PM8
Naphthalene	<0.01	0.01	<0.01	mg/kg	TM16/PM8
Phenanthrene #M	<0.01	0.03	<0.01	mg/kg	TM16/PM8
Pyrene #M	<0.01	0.02	<0.01	mg/kg	TM16/PM8
Benzo(a)pyrene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(a)anthracene	<0.01	0.04	<0.01	mg/kg	TM16/PM8
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(ghi)perylene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Chrysene	<0.01	0.02	<0.01	mg/kg	TM16/PM8
Dibenzo(ah)anthracene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Indeno(123cd)pyrene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(bk)fluoranthene	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phthalates					
Bis(2-ethylhexyl) phthalate	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Diethyl phthalate	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Dimethyl phthalate #M	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Amines					
N-nitrosodi-n-propylamine #M	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Anilines					
4-Chloroaniline	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitroaniline	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
3-Nitroaniline	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitroaniline	<0.01	<0.01	<0.01	mg/kg	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

SVOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	87-89	90-92											
Sample ID	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909											
Depth	2.7	0.7											
COC No / misc													
Containers	V J	V J											
Sample Date	09/09/2021	09/09/2021											
Sample Type	Clayey Sand	Clay											
Batch Number	1	1											
Date of Receipt	14/09/2021	14/09/2021									LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
Azobenzene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Carbazole	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Dibenzofuran $^{\#M}$	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene $^{\#M}$	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Isophorone $^{\#M}$	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Nitrobenzene $^{\#M}$	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether $^{\#M}$	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Hexachloroethane	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene $^{\#M}$	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
1,2-Dichlorobenzene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	<0.01	<0.01									<0.01	mg/kg	TM16/PM8
Other SVOCs													
Surrogate Recovery 2-Fluorobiphenyl	123	118									<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	116	119									<0	%	TM16/PM8

Client Name:	ERM
Reference:	0483091
Location:	Solar 21
Contact:	Sonia Devons
EMT Job No:	21/14197

VOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	8-9	10-11	12-14	15-17	18-20	21-23	24-26	27-29	LOD/LOR	Units	Method No.
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903	MW6-SO-0.5-20210902			
Depth	0.4	0.8	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021	02/09/2021			
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay	Clayey Sand			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
VOC MS													
BTEX													
Benzene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Toluene#	<0.003	<0.003	0.009	<0.003	0.009	<0.003	0.013	0.014	0.028	0.026	<0.003	mg/kg	TM15/PM10
Ethylbenzene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Xylenes (sum of isomers)#	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	mg/kg	TM15/PM10
m/p-Xylene#	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	mg/kg	TM15/PM10
o-Xylene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Chloroethenes													
Tetrachloroethene (PCE)#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Trichloroethene (TCE)#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE)#	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
cis-1-2-Dichloroethene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
trans-1-2-Dichloroethene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Vinyl Chloride	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15_A/PM10
Chloroethanes													
1,1,1,2-Tetrachloroethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1,1-Trichloroethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,2-Dichloroethane#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Chloroethane#	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Chlorobenzenes													
1,2,3-Trichlorobenzene	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10
1,2-Dichlorobenzene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Chlorobenzene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Chloromethanes													
Carbon tetrachloride#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Chloroform#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Dichloromethane (DCM)#	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10
Chloromethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.023	<0.003	<0.003	mg/kg	TM15/PM10
Chloropropanes													
1,2,3-Trichloropropane#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,2-Dichloropropane#	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
2,2-Dichloropropane	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,3-Dichloropropane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Chloropropenes													
1,1-Dichloropropene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
cis-1-3-Dichloropropene	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
trans-1-3-Dichloropropene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

VOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	8-9	10-11	12-14	15-17	18-20	21-23	24-26	27-29			
Sample ID	TP28-SO-0.4-20210825	MW8-SO-0.8-20210831	MW5-SO-0.7-20210831	MW5-SO-3.3-20210831	WS26-SO-0.5-20210901	WS26-SO-4.0-20210901	WS25-SO-0.8-20210902	MW7-SO-0.8-20210902	MW7-SO-3.7-20210903	MW6-SO-0.5-20210902			
Depth	0.4	0.8	0.7	3.3	0.5	4.0	0.8	0.8	3.7	0.5			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	25/08/2021	31/08/2021	31/08/2021	31/08/2021	01/09/2021	01/09/2021	02/09/2021	02/09/2021	03/09/2021	02/09/2021			
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Loam	Clay	Clay	Clayey Sand			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
VOC MS													
Other VOCs													
Bromobenzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Bromochloromethane #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromodichloromethane #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromoform	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromomethane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/kg	TM15/PM10
n-Butylbenzene #	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
sec-Butylbenzene #	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
tert-Butylbenzene #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
2-Chlorotoluene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
4-Chlorotoluene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Isopropylbenzene #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Dibromochloromethane #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,2-Dibromoethane #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Dibromomethane #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Dichlorodifluoromethane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
4-Isopropyltoluene #	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Propylbenzene #	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Styrene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15_A/PM10
Trichlorofluoromethane #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Hexachlorobutadiene	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Naphthalene	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8	97	92	91	71	97	68	94	84	57	90	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	93	90	82	69	90	65	90	82	62	89	<0	%	TM15/PM10

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

VOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	30-35	36-38	42-44	48-50	54-56	60-62	66-68	72-74	78-80	84-86			
Sample ID	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908	MW0-SO-0.6-20210908	WS21-SO-0.7-20210909			
Depth	0.4	0.5	0.4	0.4	0.9	0.4	0.7	0.5	0.6	0.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	03/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021	08/09/2021	09/09/2021			
Sample Type	Clay	Clay	Clayey Loam	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
VOC MS													
BTEX													
Benzene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Toluene$^{\#}$	0.015	0.005	<0.003	0.010	<0.003	0.014	0.011	0.023	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Ethylbenzene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Xylenes (sum of isomers)$^{\#}$	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.011	<0.008	<0.008^{SV}	<0.008	mg/kg	TM15/PM10
m/p-Xylene$^{\#}$	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005^{SV}	<0.005	mg/kg	TM15/PM10
o-Xylene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Chloroethenes													
Tetrachloroethene (PCE)$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Trichloroethene (TCE)$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE)$^{\#}$	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006^{SV}	<0.006	mg/kg	TM15/PM10
cis-1-2-Dichloroethene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
trans-1-2-Dichloroethene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Vinyl Chloride	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002^{SV}	<0.002	mg/kg	TM15_A/PM10
Chloroethanes													
1,1,1,2-Tetrachloroethane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,1,1-Trichloroethane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,2-Dichloroethane$^{\#}$	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Chloroethane$^{\#}$	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002^{SV}	<0.002	mg/kg	TM15/PM10
Chlorobenzenes													
1,2,3-Trichlorobenzene	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007^{SV}	<0.007	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007^{SV}	<0.007	mg/kg	TM15/PM10
1,2-Dichlorobenzene$^{\#}$	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene$^{\#}$	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene$^{\#}$	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Chlorobenzene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Chloromethanes													
Carbon tetrachloride$^{\#}$	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Chloroform$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Dichloromethane (DCM)$^{\#}$	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007^{SV}	<0.007	mg/kg	TM15/PM10
Chloromethane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.025^{SV}	<0.003	mg/kg	TM15/PM10
Chloropropanes													
1,2,3-Trichloropropane$^{\#}$	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
1,2-Dichloropropane$^{\#}$	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006^{SV}	<0.006	mg/kg	TM15/PM10
2,2-Dichloropropane	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
1,3-Dichloropropane$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Chloropropenes													
1,1-Dichloropropene$^{\#}$	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
cis-1-3-Dichloropropene	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
trans-1-3-Dichloropropene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

VOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	30-35	36-38	42-44	48-50	54-56	60-62	66-68	72-74	78-80	84-86			
Sample ID	WS104-SO-0.4-20210903	WS11-SO-0.5-20210906	WS12-SO-0.4-20210906	WS14-SO-0.4-20210907	WS16-SO-0.9-20210907	WS32-SO-0.4-20210907	WS35-SO-0.7-20210908	MW1-SO-0.5-20210908	MW0-SO-0.6-20210908	WS21-SO-0.7-20210909			
Depth	0.4	0.5	0.4	0.4	0.9	0.4	0.7	0.5	0.6	0.7			
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J			
Sample Date	03/09/2021	06/09/2021	06/09/2021	07/09/2021	07/09/2021	07/09/2021	08/09/2021	08/09/2021	08/09/2021	09/09/2021			
Sample Type	Clay	Clay	Clayey Loam	Clay	Clayey Sand	Clayey Loam	Clayey Sand	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021			
VOC MS													
Other VOCs													
Bromobenzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002^{SV}	<0.002	mg/kg	TM15/PM10
Bromochloromethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Bromodichloromethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Bromoform	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Bromomethane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001^{SV}	<0.001	mg/kg	TM15/PM10
n-Butylbenzene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
sec-Butylbenzene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
tert-Butylbenzene#	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005^{SV}	<0.005	mg/kg	TM15/PM10
2-Chlorotoluene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
4-Chlorotoluene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Isopropylbenzene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Dibromochloromethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
1,2-Dibromoethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Dibromomethane#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Dichlorodifluoromethane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002^{SV}	<0.002	mg/kg	TM15/PM10
4-Isopropyltoluene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Propylbenzene#	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Styrene	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15_A/PM10
Trichlorofluoromethane#	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002^{SV}	<0.002	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene#	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006^{SV}	<0.006	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene#	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003^{SV}	<0.003	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether#	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002^{SV}	<0.002	mg/kg	TM15/PM10
Hexachlorobutadiene	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004^{SV}	<0.004	mg/kg	TM15/PM10
Naphthalene	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027^{SV}	<0.027	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8	80	83	92	80	82	69	68	71	60	30^{SV}	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	74	74	82	72	82	61	64	65	63	45^{SV}	<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14197

VOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	87-89	90-92											
Sample ID	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909											
Depth	2.7	0.7											
COC No / misc													
Containers	V J	V J											
Sample Date	09/09/2021	09/09/2021											
Sample Type	Clayey Sand	Clay											
Batch Number	1	1											
Date of Receipt	14/09/2021	14/09/2021										LOD/LOR	Units	Method No.
VOC MS													
BTEX													
Benzene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Toluene#	<0.003	0.012									<0.003	mg/kg	TM15/PM10
Ethylbenzene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Xylenes (sum of isomers)#	<0.008	<0.008									<0.008	mg/kg	TM15/PM10
m/p-Xylene#	<0.005	<0.005									<0.005	mg/kg	TM15/PM10
o-Xylene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Chloroethenes													
Tetrachloroethene (PCE)#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Trichloroethene (TCE)#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE)#	<0.006	<0.006									<0.006	mg/kg	TM15/PM10
cis-1-2-Dichloroethene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
trans-1-2-Dichloroethene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Vinyl Chloride	<0.002	<0.002									<0.002	mg/kg	TM15_A/PM10
Chloroethanes													
1,1,1,2-Tetrachloroethane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
1,1,1-Trichloroethane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
1,2-Dichloroethane#	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
Chloroethane#	<0.002	<0.002									<0.002	mg/kg	TM15/PM10
Chlorobenzenes													
1,2,3-Trichlorobenzene	<0.007	<0.007									<0.007	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene	<0.007	<0.007									<0.007	mg/kg	TM15/PM10
1,2-Dichlorobenzene#	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene#	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene#	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
Chlorobenzene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Chloromethanes													
Carbon tetrachloride#	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
Chloroform#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Dichloromethane (DCM)#	<0.007	<0.007									<0.007	mg/kg	TM15/PM10
Chloromethane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Chloropropanes													
1,2,3-Trichloropropane#	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
1,2-Dichloropropane#	<0.006	<0.006									<0.006	mg/kg	TM15/PM10
2,2-Dichloropropane	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
1,3-Dichloropropane#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
Chloropropenes													
1,1-Dichloropropene#	<0.003	<0.003									<0.003	mg/kg	TM15/PM10
cis-1-3-Dichloropropene	<0.004	<0.004									<0.004	mg/kg	TM15/PM10
trans-1-3-Dichloropropene	<0.003	<0.003									<0.003	mg/kg	TM15/PM10

Client Name:	ERM	**VOC Report :**	**Solid**
Reference:	0483091		
Location:	Solar 21		
Contact:	Sonia Devons		
EMT Job No:	21/14197		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	87-89	90-92			
Sample ID	WS21-SO-2.7-20210909	WS22-SO-0.7-20210909			
Depth	2.7	0.7			
COC No / misc					
Containers	V J	V J			
Sample Date	09/09/2021	09/09/2021			
Sample Type	Clayey Sand	Clay			
Batch Number	1	1			
Date of Receipt	14/09/2021	14/09/2021	LOD/LOR	Units	Method No.
VOC MS					
Other VOCs					
Bromobenzene	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Bromochloromethane #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromodichloromethane #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromoform	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromomethane	<0.001	<0.001	<0.001	mg/kg	TM15/PM10
n-Butylbenzene #	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
sec-Butylbenzene #	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
tert-Butylbenzene #	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
2-Chlorotoluene	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
4-Chlorotoluene	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Isopropylbenzene #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Dibromochloromethane #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,2-Dibromoethane #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Dibromomethane #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Dichlorodifluoromethane	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
4-Isopropyltoluene #	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Propylbenzene #	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Styrene	<0.003	<0.003	<0.003	mg/kg	TM15_A/PM10
Trichlorofluoromethane #	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Hexachlorobutadiene	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Naphthalene	<0.027	<0.027	<0.027	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8	91	73	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	68	<0	%	TM15/PM10

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	ERM
Reference:	483091
Location:	Solar 21
Contact:	Sonia Devons

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/14197	1	TP28-SO-0.4-20210825	0.4	2	17/09/2021	**General Description (Bulk Analysis)**	soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	MW8-SO-0.8-20210831	0.8	4	17/09/2021	**General Description (Bulk Analysis)**	soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	MW5-SO-0.7-20210831	0.7	9	17/09/2021	**General Description (Bulk Analysis)**	soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	WS25-SO-0.8-20210902	0.8	20	17/09/2021	**General Description (Bulk Analysis)**	Soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	MW7-SO-0.8-20210902	0.8	23	17/09/2021	**General Description (Bulk Analysis)**	Soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	MW6-SO-0.5-20210902	0.5	29	17/09/2021	**General Description (Bulk Analysis)**	Soil
					17/09/2021	**Asbestos Fibres**	Fibre Bundles
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	Anthophyllite
					17/09/2021	**Asbestos Level Screen**	less than 0.1%
21/14197	1	WS104-SO-0.4-20210903	0.4	35	17/09/2021	**General Description (Bulk Analysis)**	Soil/Stones
					17/09/2021	**Asbestos Fibres**	Fibre Bundles
					17/09/2021	**Asbestos ACM**	NAD

Client Name:	ERM
Reference:	483091
Location:	Solar 21
Contact:	Sonia Devons

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/14197	1	WS104-SO-0.4-20210903	0.4	35	17/09/2021	**Asbestos Type**	Chrysotile
					17/09/2021	**Asbestos Level Screen**	less than 0.1%
21/14197	1	WS32-SO-0.4-20210907	0.4	62	17/09/2021	**General Description (Bulk Analysis)**	Soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	MW1-SO-0.5-20210908	0.5	74	17/09/2021	**General Description (Bulk Analysis)**	Soil
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	MW0-SO-0.6-20210908	0.6	80	17/09/2021	**General Description (Bulk Analysis)**	Soil/Stones
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD
21/14197	1	WS21-SO-0.7-20210909	0.7	86	17/09/2021	**General Description (Bulk Analysis)**	Soil/Stones
					17/09/2021	**Asbestos Fibres**	NAD
					17/09/2021	**Asbestos ACM**	NAD
					17/09/2021	**Asbestos Type**	NAD
					17/09/2021	**Asbestos Level Screen**	NAD

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
21/14197	1	MW6-SO-0.5-20210902	0.5	27-29	TM21/PM24	Asbestos detected in sample
21/14197	1	MW6-SO-0.5-20210902	0.5	27-29	TM74/PM32	Asbestos detected in sample
21/14197	1	WS104-SO-0.4-20210903	0.4	30-35	TM74/PM32	Asbestos detected in sample

Notification of Deviating Samples

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
21/14197	1	TP28-SO-0.4-20210825	0.4	1-2	EPH, GRO, SVOC, VOC	Sample holding time exceeded prior to receipt
21/14197	1	MW8-SO-0.8-20210831	0.8	3-4	EPH, SVOC	Sample holding time exceeded
21/14197	1	MW5-SO-0.7-20210831	0.7	8-9	EPH, SVOC	Sample holding time exceeded
21/14197	1	MW5-SO-3.3-20210831	3.3	10-11	EPH, SVOC	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

AB	x50 Dilution

HWOL ACRONYMS AND OPERATORS USED

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

EMT Job No: 21/14197

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes

EMT Job No: 21/14197

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

EMT Job No: 21/14197

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM42	Modified US EPA method 8270D v5:2014. Pesticides and herbicides by GC-MS	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14571

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32	33-40	41-48	49	50					
Sample ID	MW5_WG_20 210914	MW7_WG_20 210914	MW8_WG_20 210914	MW0_WG_20 210914	MW1_WG_20 210914	LR001_WG_2 0210914	TB001_20210 914	TB002_20210 914					
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G	V H HN G	V	V					
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Trip Blank (water)	Trip Blank (water)					
Batch Number	1	1	1	1	1	1	1	1			LOD/LOR	Units	Method No.
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021					
Metals													
Dissolved Arsenic$^{\#}$	<2.5	<2.5	<2.5	10.9	6.2	-	-	-			<2.5	ug/l	TM30/PM14
Dissolved Barium$^{\#}$	324	160	80	356	504	-	-	-			<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-			<0.5	ug/l	TM30/PM14
Dissolved Cadmium$^{\#}$	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-			<0.5	ug/l	TM30/PM14
Total Dissolved Chromium$^{\#}$	<1.5	2.8	<1.5	5.9	<1.5	-	-	-			<1.5	ug/l	TM30/PM14
Hexavalent Chromium	<6	<6	<6	<6	<6	-	-	-			<6	ug/l	TM38/PM0
Dissolved Copper$^{\#}$	<7	<7	<7	<7	<7	-	-	-			<7	ug/l	TM30/PM14
Dissolved Lead$^{\#}$	<5	<5	<5	<5	<5	-	-	-			<5	ug/l	TM30/PM14
Dissolved Mercury$^{\#}$	<1	<1	<1	<1	<1	-	-	-			<1	ug/l	TM30/PM14
Dissolved Nickel$^{\#}$	3	3	<2	2	3	-	-	-			<2	ug/l	TM30/PM14
Dissolved Selenium$^{\#}$	<3	<3	<3	<3	<3	-	-	-			<3	ug/l	TM30/PM14
Dissolved Vanadium$^{\#}$	1.7	2.6	<1.5	3.1	3.5	-	-	-			<1.5	ug/l	TM30/PM14
Dissolved Zinc$^{\#}$	5	13	21	<3	3	-	-	-			<3	ug/l	TM30/PM14
TPH CWG													
Aliphatics													
>C5-C6$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>C6-C8$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>C8-C10$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>C10-C12$^{\#}$	<5	<5^{SV}	<5	<5^{SV}	<5	-	-	-			<5	ug/l	TM5/PM16/PM30
>C12-C16$^{\#}$	<10	<10^{SV}	<10	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
>C16-C21$^{\#}$	<10	<10^{SV}	<10	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
>C21-C35$^{\#}$	<10	<10^{SV}	260	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35$^{\#}$	<10	<10	260	<10	<10	-	-	-			<10	ug/l	TM5/TM36/PM12/PM16/PM30
>C5-C8$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>C8-C16$^{\#}$	<10	<10^{SV}	<10	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/TM36/PM12/PM16/PM30
>C16-C35$^{\#}$	<10	<10^{SV}	260	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
Aromatics													
>C5-EC7$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>EC7-EC8$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>EC8-EC10$^{\#}$	<10	<10	<10	<10	<10	-	-	-			<10	ug/l	TM36/PM12
>EC10-EC12$^{\#}$	<5	<5^{SV}	<5	<5^{SV}	<5	-	-	-			<5	ug/l	TM5/PM16/PM30
>EC12-EC16$^{\#}$	<10	<10^{SV}	50	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
>EC16-EC21$^{\#}$	<10	<10^{SV}	100	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
>EC21-EC35$^{\#}$	<10	<10^{SV}	<10	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35$^{\#}$	<10	<10	150	<10	<10	-	-	-			<10	ug/l	TM5/TM36/PM12/PM16/PM30
>EC10-EC16$^{\#}$	<10	<10^{SV}	50	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
>EC16-EC35$^{\#}$	<10	<10^{SV}	100	<10^{SV}	<10	-	-	-			<10	ug/l	TM5/PM16/PM30
Total aliphatics and aromatics(C5-35)$^{\#}$	<10	<10	410	<10	<10	-	-	-			<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14571

Report : **Liquid**

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32	33-40	41-48	49	50			LOD/LOR	Units	Method No.
Sample ID	MW5_WG_20210914	MW7_WG_20210914	MW8_WG_20210914	MW0_WG_20210914	MW1_WG_20210914	LR001_WG_20210914	TB001_20210914	TB002_20210914					
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G	V H HN G	V	V					
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Trip Blank (water)	Trip Blank (water)					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021					
BTEX / MTBE													
Benzene$^{\#}$	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-			<0.5	ug/l	TM15/PM10
Toluene$^{\#}$	<5	<5	<5	<5	<5	-	-	-			<5	ug/l	TM15/PM10
Ethylbenzene$^{\#}$	<1	<1	<1	<1	<1	-	-	-			<1	ug/l	TM15/PM10
Xylenes (sum of isomers)$^{\#}$	<3	<3	<3	<3	<3	-	-	-			<3	ug/l	TM15/PM10
m/p-Xylene$^{\#}$	<2	<2	<2	<2	<2	-	-	-			<2	ug/l	TM15/PM10
o-Xylene$^{\#}$	<1	<1	<1	<1	<1	-	-	-			<1	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether$^{\#}$	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM15/PM10
Dissolved Boron	680	1071	121	222	752	-	-	-			<12	ug/l	TM30/PM14
PAH MS													
Naphthalene$^{\#}$	0.8	0.3	2.2	0.3	0.2	-	-	-			<0.1	ug/l	TM4/PM30
Acenaphthylene$^{\#}$	0.020	0.036	11.916$_{AA}$	<0.013	<0.013	-	-	-			<0.013	ug/l	TM4/PM30
Acenaphthene$^{\#}$	0.200	0.227	1.642	0.111	0.093	-	-	-			<0.013	ug/l	TM4/PM30
Fluorene$^{\#}$	0.035	0.088	9.213$_{AA}$	0.037	0.028	-	-	-			<0.014	ug/l	TM4/PM30
Phenanthrene$^{\#}$	0.040	0.201	24.469$_{AA}$	0.024	0.056	-	-	-			<0.011	ug/l	TM4/PM30
Anthracene$^{\#}$	<0.013	0.024	10.573$_{AA}$	<0.013	<0.013	-	-	-			<0.013	ug/l	TM4/PM30
Fluoranthene$^{\#}$	0.054	0.496	20.192$_{AA}$	<0.012	0.047	-	-	-			<0.012	ug/l	TM4/PM30
Pyrene$^{\#}$	0.056	0.442	14.700$_{AA}$	<0.013	0.042	-	-	-			<0.013	ug/l	TM4/PM30
Benzo(a)anthracene$^{\#}$	0.017	0.140	4.428	<0.015	<0.015	-	-	-			<0.015	ug/l	TM4/PM30
Chrysene$^{\#}$	0.022	0.159	3.795	<0.011	0.017	-	-	-			<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene$^{\#}$	0.037	0.285	4.320	<0.018	<0.018	-	-	-			<0.018	ug/l	TM4/PM30
Benzo(a)pyrene$^{\#}$	0.017	0.166	2.701	<0.016	<0.016	-	-	-			<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene$^{\#}$	<0.011	0.095	1.135	<0.011	<0.011	-	-	-			<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene$^{\#}$	<0.01	<0.01	0.23	<0.01	<0.01	-	-	-			<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene$^{\#}$	0.013	0.092	1.131	<0.011	<0.011	-	-	-			<0.011	ug/l	TM4/PM30
PAH 16 Total$^{\#}$	1.311	2.751	112.645	0.472	0.483	-	-	-			<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	0.03	0.21	3.11	<0.01	<0.01	-	-	-			<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	0.01	0.08	1.21	<0.01	<0.01	-	-	-			<0.01	ug/l	TM4/PM30
B(ghi)Perylene + I(123cd)Pyrene	<0.022	0.187	2.266	<0.022	<0.022	-	-	-			<0.022	ug/l	TM4/PM30
Sum of 4DW PAHs	0.05	0.47	6.59	<0.04	<0.04	-	-	-			<0.04	ug/l	TM4/PM30
PAH Surrogate % Recovery	83	89	80	87	83	-	-	-			<0	%	TM4/PM30
Surrogate Recovery Toluene D8	107	106	108	107	110	-	-	-			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	105	103	104	102	106	-	-	-			<0	%	TM15/PM10
VOC Target List Total	<100	<100	<100	<100	<100	<100	<100	<100			<100	ug/l	TM15/PM10

Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14571

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32	33-40	41-48	49	50					
Sample ID	MW5_WG_20210914	MW7_WG_20210914	MW8_WG_20210914	MW0_WG_20210914	MW1_WG_20210914	LR001_WG_20210914	TB001_20210914	TB002_20210914					
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G	V H HN G	V	V					
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Trip Blank (water)	Trip Blank (water)					
Batch Number	1	1	1	1	1	1	1	1			LOD/LOR	Units	Method No.
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021					
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-			<0.01	ug/l	TM149/PM30

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14571

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32	33-40	41-48	49	50			LOD/LOR	Units	Method No.
Sample ID	MW5_WG_20210914	MW7_WG_20210914	MW8_WG_20210914	MW0_WG_20210914	MW1_WG_20210914	LR001_WG_20210914	TB001_20210914	TB002_20210914					
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G	V H HN G	V	V					
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Trip Blank (water)	Trip Blank (water)					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021					
Acid Herbicides													
Benazolin	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Bentazone	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Bromoxynil	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Clopyralid	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
4-CPA	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
2,4-D	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
2,4-DB	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Dicamba	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Dichloroprop	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Diclofop	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Fenoprop	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Flamprop	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Flamprop-isopropyl	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Ioxynil	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
MCPA	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
MCPB	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Mecoprop	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Picloram	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Pentachlorophenol	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
2,4,5-T	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
2,3,6-TBA	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Triclopyr	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-			<0.1	ug/l	TM42/PM30
Ammoniacal Nitrogen as N$^{\#}$	1650	2110	90	31700	31300	-	-	-			<30	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6	-	-	-			<6	ug/l	TM0/PM0

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Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14571

SVOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32	33-40								
Sample ID	MW5_WG_20 210914	MW7_WG_20 210914	MW8_WG_20 210914	MW0_WG_20 210914	MW1_WG_20 210914								
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G								
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1						LOD/LOR	Units	Method No.
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021								
SVOC MS													
Phenols													
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
2-Chlorophenol #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	6	<1	<1						<1	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	1	<1	<1						<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5						<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	2						<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5	<1.5						<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Amines													
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
Anilines													
4-Chloroaniline	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
Other SVOCs													
Azobenzene #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	11.4	<0.5	<0.5						<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	8.0	<0.5	<0.5						<0.5	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
1,2-Dichlorobenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM16/PM30
Other SVOCs													
Surrogate Recovery 2-Fluorobiphenyl	126	118	100	112	104						<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	135^{SV}	130	128	118	128						<0	%	TM16/PM30

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	ERM	**VOC Report :**	**Liquid**
Reference:	0483019		
Location:	Solar 21		
Contact:	Sonia Devons		
EMT Job No:	21/14571		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32	33-40	41-48	49	50			LOD/LOR	Units	Method No.
Sample ID	MW5_WG_20 210914	MW7_WG_20 210914	MW8_WG_20 210914	MW0_WG_20 210914	MW1_WG_20 210914	LR001_WG_2 0210914	TB001_20210 914	TB002_20210 914					
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G	V H HN G	V	V					
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Trip Blank (water)	Trip Blank (water)					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021					
VOC MS													
BTEX													
Benzene#	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM15/PM10
Toluene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/l	TM15/PM10
Ethylbenzene#	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM15/PM10
Xylenes (sum of isomers)#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
m/p-Xylene#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
o-Xylene#	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM15/PM10
Chloroethenes													
Tetrachloroethene (PCE)#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Trichloroethene (TCE)#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Vinyl Chloride#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM15/PM10
Chloroethanes													
1,1,1,2-Tetrachloroethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/l	TM15/PM10
1,1,1-Trichloroethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1,2-Trichloroethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1-Dichloroethane#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dichloroethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Chloroethane#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Chlorobenzenes													
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dichlorobenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,3-Dichlorobenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,4-Dichlorobenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Chlorobenzene#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Chloromethanes													
Carbon tetrachloride#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Chloroform#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Dichloromethane (DCM)#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Chloromethane#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Chloropropanes													
1,2,3-Trichloropropane#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dichloropropane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM15/PM10
1,3-Dichloropropane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Chloropropenes													
1,1-Dichloropropene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons
EMT Job No: 21/14571

VOC Report : **Liquid**

EMT Sample No.	1-8	9-16	17-24	25-32	33-40	41-48	49	50			LOD/LOR	Units	Method No.
Sample ID	MW5_WG_20210914	MW7_WG_20210914	MW8_WG_20210914	MW0_WG_20210914	MW1_WG_20210914	LR001_WG_20210914	TB001_20210914	TB002_20210914					
Depth													
COC No / misc													
Containers	V H HN G	V H HN G	V H HNUF G	V H HN G	V H HN G	V H HN G	V	V					
Sample Date	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Trip Blank (water)	Trip Blank (water)					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021					
VOC MS													
Other VOCs													
Bromobenzene#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Bromochloromethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Bromodichloromethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Bromoform#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM15/PM10
n-Butylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
sec-Butylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
tert-Butylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
2-Chlorotoluene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
4-Chlorotoluene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Isopropylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Dibromochloromethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2-Dibromoethane#	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Dibromomethane#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
4-Isopropyltoluene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Propylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Trichlorofluoromethane#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	106	108	107	110	106	106	109			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	105	103	104	102	106	103	104	105			<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: ERM
Reference: 0483019
Location: Solar 21
Contact: Sonia Devons

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/14571						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
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EMT Job No.: 21/14571

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

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

EMT Job No: 21/14571

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes			
TM42	Modified US EPA method 8270D v5:2014. Pesticides and herbicides by GC-MS	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270D v5:2014	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

Element Materials Technology
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Zone 3
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[redacted]

ERM
11th Floor
5 Exchange Quay
Salford
Manchester
M5 3EF

4225

Attention :	Sonia Devons
Date :	11th October, 2021
Your reference :	0483091
Our reference :	Test Report 21/14197 Batch 1 Schedule D
Location :	Solar 21
Date samples received :	14th September, 2021
Status :	Final report
Issue :	1

Thirty three samples were received for analysis on 14th September, 2021 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Simon Gomery BSc
Project Manager

Please include all sections of this report if it is reproduced

Client Name: ERM
Reference: 483091
Location: Solar 21
Contact: Sonia Devons

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/14197	1	MW6-SO-0.5-20210902	0.5	29	04/10/2021	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/10/2021	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/10/2021	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					08/10/2021	**Asbestos PCOM Quantification (Fibres)**	0.001 (mass %)
					08/10/2021	**Asbestos Gravimetric & PCOM Total**	0.001 (mass %)
21/14197	1	WS104-SO-0.4-20210903	0.4	35	04/10/2021	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/10/2021	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/10/2021	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					11/10/2021	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					11/10/2021	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)

Client Name: ERM
Reference: 0483091
Location: Solar 21
Contact: Sonia Devons

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/14197						

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NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/14197

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Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

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Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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

EMT Job No: 21/14197

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM131	Quantification of Asbestos Fibres and ACM based on HSG248 First edition:2006, HSG 264 Second edition:2012, HSE Contract Research Report No.83/1996, MDHS 87:1998, WM3 1st Edition v1.1:2018	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes

APPENDIX D DERIVATION OF HUMAN HEALTH GA

1.1 GENERAL RATIONALE

ERM GAC have been developed in general accordance with the guidance published by the Environment Agency for undertaking the assessment of chronic risks to human health from land contamination collectively commonly referred to as the 'CLEA framework' and the revised exposure assumptions more recently published by DEFRA as contained in the following documents:

- Updated technical background to the CLEA model (SR3), Environment Agency, January 2009;
- Human health toxicological assessment of contaminants in soil (SR2), Environment Agency, January 2009;
- Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values (SR7), November 2008;
- CLEA software (version 1.071) and handbook (SR4 version 1.05), Environment Agency, September 2009; and
- DEFRA, December 2014. SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document; and
- CL:AIRE, September, 2014. SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Final Project Report (Revision 2), Final.

In 2014 DEFRA published a limited number of Category 4 Screening Levels (C4SLs)(1) which followed the publication of a number of Soil Guideline Values (SGVs) published by the Environment Agency in 2009. Both C4SLs and SGVs have broadly been developed in accordance with the 'CLEA Framework', but the more recent C4SL's have adopted a limited number of revised exposure parameters and an alternative 'low' risk rather than 'minimal' risk approach to toxicological inputs. The C4SLs and SGVs are examples of authoritative generic assessment criteria used in the preliminary evaluation of the risk to human health from long term exposure to chemicals in soil. However, only a limited number of C4SLs and SGVs have been published to date, (As, Cd, CrVI, Hg, Lead, Se, benzo(a)pyrene, benzene, toluene, ethylbenzene, phenol, Dioxins/Furans & Dioxin like PCB's).

Environment Agency document "*Using Soil Guideline Values*" published in March 2009 states that in the absence of an SGV the simplest option might be to derive a generic assessment criterion using (where appropriate) the generic models used to define SGVs, and based on appropriately sourced physical-chemical and toxicity data.

Due to the limited number of published C4SLs and or SGVs, ERM has developed an expanded set of Generic Assessment Criteria (GACs) in accordance with the techniques and protocols set out in the CLEA Framework of publications detailed above and updated exposure assumptions presented by DEFRA. The intention is that these GACs are used in an equivalent way to published authoritative generic assessment criteria in terms of being applicable to the majority of sites and a means of undertaking a generic assessment of chronic risks to human health and help refine any requirement for further Detailed Quantitative Risk Assessment (DQRA).

The C4SLs , SGVs and ERMs GACs are considered to represent "cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal/low risk to health" (2). C4SLs, SGVs and GACs are not levels which indicate a significant possibility of significant harm or levels which describe the boundary between categories 3 and 4, as detailed within the statutory Guidance (1), neither are they indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2a. C4SLs, SGV's and GAC do however describe levels of contamination which are comfortably within category 4 of the statutory guidance.

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(1) DEFRA, December 2014. SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document.

(2) Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance, DEFRA, April 2012.

The CLEA framework or C4SL guidance does not currently include specific guidance for assessing the potential risks to human health via the inhalation of groundwater-derived vapours. In the absence of UK specific authoritative guidance, ERM has followed the spirit of the methodology to derive a set of GAC_{GW} for groundwater, adopting, where applicable, the same standard land use assumptions detailed within SR3 and updated by DEFRA, and the fate and transport model adopted within the software RISC V5.

The C4SLs, SGVs and GACs rely on predicting the concentration of vapours within the unsaturated zone using partitioning equations. However, due to the inherent uncertainty with estimating vapour partitioning there is growing international consensus that when assessing vapour inhalation risks from land contamination less reliance is placed on predicting contaminant partitioning and greater emphasis on directly measured soil vapour concentrations. Therefore, ERM has also produced Soil Vapour GACs (GAC_{SV}) with respect to assessing the vapour inhalation pathway. The GAC_{SV} have been based on the standard land use assumptions detailed within SR3 and modelling the migration of vapours through the unsaturated zone and subsequent flow inside buildings and into ambient air. The GAC_{SV} enable a tiered approach to assessing vapour inhalation to be adopted involving an initial assessment based on calculating partitioning from soil and groundwater phases, supplemented where appropriate by the assessment of directly measured soil vapour concentrations. This tiered approach to the assessment of vapour inhalation is consistent with the approach suggested within DEFRA way forward publication CLAN 6/06 and CIRIA C682 (The VOC Handbook).

1.2 CONCEPTUAL EXPOSURE MODEL

Harmful effects from exposure to hazardous substances may occur as a result of either short-term exposure (acute effects) or long-term exposure (chronic effects). Generally for the vast majority of contaminants the long-term exposure to relatively low levels of the substance is of greatest concern since short-term effects generally occur at much higher concentrations. Any assessment based on the effects of long-term exposure is also likely to be overly protective with respect to the effects from short-term exposure. The assessment of risks to human health for the vast majority of the contaminants of concern is, therefore, based on the assessment of chronic exposure. However, free cyanide may elicit harmful effects from short-term exposure at relatively low concentrations. Therefore, GAC for free cyanide have been derived for both chronic and acute exposure.

The land use behaviour will significantly influence the exposure of end users to soil contaminants and should be reflected in any site specific assessment of those contaminants which represent a hazard as a result of chronic exposure. Influencing factors include: the age and gender of site users; the number of visits to the site; the duration of each visit; and the likely activities that could bring about contact with soil contamination. In the derivation of ERM's GACs three types of 'generic' land use have been included:

- Residential including Consumption of Home-grown Vegetables;
- Residential excluding the Consumption of Home-grown Vegetables; and
- Commercial/Industrial.

The generic land use conceptual exposure models presented within SR3 have been adopted in the derivation of the GAC. *Table 1* presents the exposure pathways included in the derivation of ERMs GAC for each land use.

Table 1 Exposure Pathways Included For Land Use

	Residential Land Use with Gardens	Residential Land Use without Gardens	Commercial Land Use
GAC_{Soil} - Exposure from Substances Present in Soils			
Ingestion of Soil and Dust	✓	✓	✓
Ingestion of Home grown Vegetables	✓	-	-
Ingestion of Soil Attached to Vegetables	✓	-	-
Inhalation of Fugitive Dust – Indoors	✓	✓	✓
Inhalation of Fugitive Dust – Outdoors	✓	✓	✓
Inhalation of Vapours – Indoors	✓	✓	✓
Inhalation of Vapours – Outdoors	✓	✓	✓
Dermal contact – Indoors	✓	✓	✓
Dermal contact – Outdoors	✓	✓	✓
GAC_{GW} - Exposure from Substances Present in Groundwaters			
Inhalation of Vapours – Indoors	✓	✓	✓
Inhalation of Vapours – Outdoors	✓	✓	✓
GAC_{SV} - Exposure from Substances Present in Soil Vapours			
Inhalation of Vapours – Indoors	✓	✓	✓
Inhalation of Vapours – Outdoors	✓	✓	✓

The generic human exposure assumptions and building parameters detailed within SR3, and more recently updated by DEFRA, for each standard land use have been adopted in the derivation of the GAC.

1.3 CONTAMINANT SPECIFIC PROPERTIES

Toxicological Parameters

Health criteria values (HCV) used to benchmark exposure have been compiled from a review of the scientific and technical literature. Where several health criteria values have been identified, preference has been given to authoritative UK sources. Where available, "Low Levels of Toxicological Concern" (LLTC) reported by DEFRA have been adopted as HCV.

In the absence of a published LLTC, HCV have been adopted based on guidance presented within SR2, and are considered to represent a "tolerable" or "minimal" level of risk. LQM/CIEH also adopted the "tolerable" or "minimal" level of risk presented within SR2 as the basis of their S4ULs(1). The final selection of the most appropriate value has been made with consideration of the following hierarchy:

1. Authoritative UK Sources (e.g. DEFRA C4SL LLTCs, Environment Agency TOX reports, UK Drinking Water Inspectorate, UK Air Quality Strategy);
2. European/International Authoritative Sources (e.g. WHO Drinking Water Guidelines (underlying toxicological data), WHO Air Quality Guidelines for Europe, International Programme on Chemical Safety (IPCS) Environmental Health Criteria Monographs (EHC), IPCS Concise International Chemical Assessment Documents (CICADs));
3. Other National Organisations (e.g. USEPA, RIVM)

In deriving HCVs for non threshold substances, preference was given to the use of an Index Dose (ID) where these were available. Where ID were not available slope factors have been used and amended by multiplying by an appropriate level of excess lifetime cancer risk. SR2 states that, when using human data, the ID is based on estimates of the daily dose corresponding to an excess lifetime cancer risk of 1 in 100,000. This has been used, where required for slope factors in the absence of an ID.

(1) Land Quality Management, 2015. The LQM/CIH S4ULs for Human Health Risk Assessment.

In the absence of appropriate dermal or inhalation HCVs, extrapolated oral values have been adopted as described within SR2. Where available, the dermal absorption fractions presented within SR3 have been adopted. In their absence the default approach adopted within the CLEA model, as outlined within SR3, has been adopted (0.1 for all organic chemicals and zero for inorganic chemicals).

Where required, inhalation HCVs have been converted from reference concentrations quoted in mg/m^{-3} unit risk factors by assuming a 70kg adult typically inhales $20m^3$ of air per day.

Where available, the mean daily intakes (MDI) have been sourced from UK diet studies and the Food Standard Agency. In the absence of any UK sources, the IPCS EHC and CICADs have been reviewed to help determine potential background exposure. In accordance with SR2, if no data or information on background information are available, background exposure is considered to be negligible and MDI set to zero for all age groups. If qualitative information is available suggesting background exposure may significantly contribute to overall exposure the pragmatic default outlined within SR2, that land should be allowed to contribute at least half the tolerable daily intake (TDI), has been applied.

Toxicological Equivalents

Polychlorinated Biphenyls (PCBs) have been assessed according to the Toxicity Equivalency Factor (TEF) approach(1) for dioxin-like PCBs (the PCBs considered to represent the greatest health risk). Each of the PCBs toxicity is related to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), which is considered to be the most carcinogenic dioxin, using a multiplication factor (the TEF). The concentration of each PCB is multiplied by its respective TEF giving a 2,3,7,8-TCDD toxic equivalent (TEQ). The total TEQ for the mixture is compared with the GAC for 2,3,7,8-TCDD.

The toxicity assumptions presented within the TPH Criteria Working Group have been adopted in the derivation of the GAC for aliphatic and aromatic TPH fractions. The TPH fractions are therefore protective of threshold human health effects and indicator compounds are used to assess non-threshold health effects (in line with Environment Agency publication on assessing petroleum hydrocarbons).

Genotoxic PAH –Surrogate Marker

Genotoxic PAHs are assessed in accordance within the guidance presented within Appendix E of the CL:AIRE SP1010 Category 4 Screening Levels (C4SL)(2) guidance which, recommends using benzo(a)pyrene as surrogate marker for genotoxic PAHs where the recorded soil ratios are within the range identified.

Alternative GAC have also been derived for genotoxic PAHs for those occasions where the PAH concentrations fall outside the soil ratio range identified. These have been based on index doses calculated from published(3) estimated relative potencies to benzo(a)pyrene, and calculated from the LLTC for benzo(a)pyrene detailed within Appendix E of the CL:AIRE C4SL report. The benzo(a)pyrene LLTC is based on a coal tar mixture study looking at the carcinogenic potential of a mixture of PAHs rather than exposure to benzo(a)pyrene alone. However, the adoption of the LLTC to represent benzo(a)pyrene in the derivation of index doses for other genotoxic PAHs, using relative potency factors, is considered to be conservative.

Physico-chemical Parameters

Physico-chemical properties have been compiled from a review of the scientific and technical literature. Where available, the physico-chemical properties have been adopted from the

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(1) Environment Agency 'Contaminants In Soil: Updated collation of toxicological data and intake values for humans. Dioxins, furans and dioxin-like PCBs'. SC050021/TOX 12. September 2009.

(2) CL:AIRE, December 2013. SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination.

(3) USEPA, 2010. External Review Draft. Development of Relative Potency Factor (RPF) approach for Polycyclic Aromatic Hydrocarbon (PAH) mixtures. In Support of Summary Information on the Integrated Risk Information

Environment Agency Report SR7 (1). In their absence, parameters have been sourced from the references detailed within SR7, where available.

Many of the references present a range of values from numerous scientific studies, with the same studies being presented within each reference. Based upon the values presented within the studies and their own professional expertise, Mackay et al (2) provide recommended values for many parameters and have been adopted where available.

Where a range of values have been sourced, consideration has been given to the selection hierarchy detailed within SR7:

1. If all values the same, select this value;
2. Select Value from consistent range;
3. Central value from consistent range;
4. Newest value (if there is no consistent range or no single central value)

Where available, parameters have been sourced at 10ºC, which is the assumed annual average temperature of UK soils (SR3) and required for the CLEA model.

Where chemical data was unavailable in the literature, or adjustments needed for temperature (i.e. literature source not at 10ºC), property estimation methods and adjustment calculations detailed within SR7 have been used.

Petroleum Hydrocarbon Indoor Air Attenuation Factor
An indoor air attenuation factor of 10 has been adopted for petroleum hydrocarbons in soils and groundwater in accordance with the recommendations contained within SR3.

"Top Two Approach" for Homegrown Produce Types
The C4SLs developed by DEFRA adopted the 90th percentile consumption rates for the two homegrown produce groups expected to give the highest exposure and the mean consumption rates used for the remaining groups. This approach has also been adopted in the derivation of the ERM GAC. The mean consumption rate was multiplied by the homegrown fraction and then multiplied by the modelled soil to plant concentration factor for each substance. The two produce groups giving the greatest exposure to the critical receptor are considered the "*top two*".

1.4 SOIL PROPERTIES

ERM GAC have been developed using a generic set of soil properties which are considered to represent a reasonable conservative scenario. SR3 states that although the sand soil type represents the most conservative choice for modelling diffusion and advection transport processes, it is not geographically widespread. Most common UK sandy soils are closer to a sandy loam and it is this default soil type that is used in the derivation of C4SLs and SGVs by the DEFRA and the Environment Agency and has been adopted in the derivation of ERM GAC.

In deriving C4SLS and SGVs, DEFRA and the Environment Agency have adopted a soil organic matter content of 6%. ERM do not consider this value to be sufficiently conservative for the production of GAC. Therefore, a SOM of 1% (or TOC 0.58%) has been adopted in the derivation of ERM GAC.

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(1) Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values (SR7). Environment Agency, November 2008.

(2) Handbook of Physical-Chemical Properties and Environmental fate for Organic Chemicals. 2nd edition. Mackay et al, 2006.

1.5 MODELLING APPROACH

In deriving human health GAC for soils, ERM has adopted the CLEA software version 1.071, which incorporates the modelling approach detailed within SR3 and used by the Environment Agency to derive Soil Guideline Values, together with the more recent approach adopted by DEFRA in the derivation of the DEFRA C4SLs.

The ERM soil vapour GAC (GAC_{SV}) have been back calculated from the indoor and outdoor vapour inhalation soil criteria derived using the CLEA software using the soil to soil vapour partioning approach detailed within Section 5 of SR3. The results have been directly compared to the soil gas media concentration provided within the CLEA outputs when running the model for vapour inhalation pathways only, to ensure parity.

The ERM GAC for groundwater derived vapours (GAC_{GW}) have been calculated using the Johnson and Ettinger vapour transport algorithms / models used within the modelling software RISC V5 specifically for groundwater, assuming both the diffusive and advective transport of vapours. In contrast to the SOBRA Groundwater Vapour GACs (1) , the ERM GACs include the effects of the capillary fringe. Where applicable, the standard CLEA/C4SL receptor, soil and building properties have been utilised. In the absence of capillary fringe assumptions within SR3, these have been calculated using equations recommended by the USEPA(2) and the soil properties presented within SR3, assuming a sandy loam soil. Inhalation health criteria values have been inputted into the model as a dose (i.e. mg/kg/bw/day) and substance specific assessment criteria based on a hazard quotient of 1 (as adopted by CLEA methodology). The RISC model does not allow the incorporation of an indoor air attenuation factor, therefore, the RISC outputs for petroleum hydrocarbons from indoor vapour inhalation pathway have been manually adjusted by the indoor air attenuation factor of 10, in accordance with the recommendations contained within SR3.

For acute exposure to free cyanide the conceptual exposure model assumes a one off ingestion of 2000mg of soil by a 1 to 2 year old female child using the algorithms presented by Beck et al 2006(3) and SNIFFER 2000(4) .

1.6 ESTIMATING COMBINED EXPOSURE FROM ALL RELEVANT PATHWAYS

For some chemicals, intake and/or uptake via different routes (via the nose, mouth, or through the skin) may lead to different local effects or may affect different organs. People using a contaminated site may be exposed to the same chemical via all three routes of exposure. If the contaminant exhibits systemic toxicity (i.e. reaches the main blood circulation system unchanged following absorption), each route of exposure may contribute to an aggregate total systemic load that results in adverse systemic effects. The ERM GAC takes this possible effect into account by automatically adopting the methodology used by the CLEA software and the Environment Agency, and combining the reciprocal from each relevant exposure pathway. This helps ensure that the assessment criteria is set at a concentration where the total risk via all relevant routes of entry into the body is mathematically no greater than the risk due to exposure by any single route of entry. The only exception is where a DEFRA C4SL or Environment Agency Soil Guideline Value (SGV) report identifies that a single exposure route is more appropriate for an individual contaminant, in such cases the same exposure routes used by DEFRA or the Environment Agency in deriving the C4SL or SGV have been adopted by ERM in deriving the GAC for the same contaminant.

(1) SOBRA, February 2017. Development of Generic Assessment CRiteria for Assessing Vapour Risk to Human Health from Volatile Contaminants in Groundwater. Version 1.

(2) USEPA, 2004. Users Guide for Evaluating Vapour Intrusion into Buildings

(3) Human Health Risk Assessment of Cyanide in Water and Soil. Beck et al. *Published in Cyanide in water and Soil, Chemistry Risk and Management, Dzombak et al 2006.*

(4) Framework for Deriving Numeric Targets to Minimise the Adverse Human Health Effects of Long-term Exposure to Contaminants in Soil. SR99(02)F. SNIFFER April 2000.

Environment Agency report SR4, states that an important assumption used in the CLEA model is that of simple linear partitioning of a chemical in the soil between the sorbed, dissolved, and vapour phases. The theoretical upper boundaries to this behaviour are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. Environment Agency report SR3 presents equations for using these chemical properties to estimate the saturated soil concentrations where these limits are reached. These boundaries are important when considering vapour phase transport of chemicals into ambient and indoor air.

The CLEA software uses a traffic-light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous or vapour based saturation limit.

In instances where the combined assessment criteria of all relevant pathways outputted from the CLEA software is highlighted green or amber and the vapour pathway is not an important contributor, these have been adopted as ERM GAC.

Where the combined assessment criteria exceeds the theoretical saturation limits (aqueous or vapour based) and the vapour pathway is an important contributor to exposure, the methodology detailed within the CLEA Software Handbook (SR4) for such circumstances has been adopted:

1. Determining the relevant inhalation ADE/HCV ratio at the lower saturation limit;
2. Estimate relevant contribution required from other pathways by subtracting this value by 1 (since the contribution from the vapour pathway is capped at the saturation limit);
3. Determine the soil concentration at which the relevant combined HCV/ADE ratio is equal to the value calculated in (2) without the vapour inhalation pathways.

1.7 *ASSESSING MIXTURES*

Knowledge about the toxicology of a chemical comes, in the main, from studies involving the exposure of relatively large doses to a single substance. In contrast, an individual may be exposed to many different chemicals every day, including priority soil contaminants. The possibility exists, therefore, that the mixture of chemicals to which any one individual may be exposed may have a greater cumulative effect on health than that predicted by toxicological risk assessment of individual chemicals. Environment Agency report SR2 states that 'where there is evidence for chemical interaction, this should be taken into account: when such evidence is not available, each chemical should be assumed to be acting independently. SR2 goes on to identify that interactions between chemicals are however unlikely at exposures below the HCVs.

Environment Agency Guidance does however identify two groups of similar substances where additive affects should be considered:

1.7.1 *Dioxins Furans & Dioxin Like PCBs*

The assessment of Dioxin like PCB's assumes the effect from exposure to any individual dioxin like PCB will potentially be additive to exposure to other dioxin like PCB's (as well as similarly acting dioxins/furans) and therefore when assessing risks to human health the 12 congeners should be considered as a mixture rather than isolated substances (1) . The assessment of the PCB mixture is undertaken by calculating the Hazard Quotient (HQ) for each individual congener (ratio of soil concentration and congener specific GAC) and summing the individual HQ to derive a Hazard Index (HI) for the mixture. Where the HI for the mixture is greater than 1 a potentially significant risk may arise and further investigation and or assessment is likely to be required.

(1) Environment Agency, October 2009. Soil Guideline values for dioxins, furans and dioxin like PCBs in soil. Science Report SC050021/Dioxins SGV.

1.7.2 *Petroleum Hydrocarbons*

When assessing the significance of petroleum hydrocarbon mixtures the assessment should consider both indicator compounds and petroleum fractions. Environment Agency report P5-080/TR3(1) identifies 16 Petroleum Hydrocarbon fractions for use in UK human health risk assessments based on equivalent carbon numbers corresponding to the 13 fractions proposed by the TPHCWG(2) up to EC35 but with the addition of 3 further heavier hydrocarbon fractions (pending further review/evaluation). When assessing petroleum hydrocarbon fractions P5-080/TR3 also identifies the potential for additivity across fractions and that a Hazard Index approach should be adopted for fractions exhibiting similar toxicological properties and that further guidance would be published on this issue. The TPHCWG identified 6 toxicological fractions between C5 - C35 and pending the release of the further guidance ERM approach to Petroleum Hydrocarbon mixtures will be to treat the 13 TPH fractions as essentially 6 Petroleum Hydrocarbon mixtures based on the 6 toxicological fractions.

The assessment of each Petroleum Hydrocarbon mixture is undertaken by calculating the Hazard Quotient (HQ) for each individual fraction (ratio of soil concentration and fraction specific GAC) and summing the relevant individual HQ within each mixture to derive a Hazard Index (HI) for each mixture. Where the HI for the mixture is greater than 1 a potentially significant risk may arise and further investigation and or assessment is likely to be required.

1.8 UNCERTAINTY

As with any form of modelling of the interaction between humans and the wider environment, there is a substantial amount of uncertainty involved. This relates both to the way in which the interaction is modelled (the pathway algorithms) and the input parameters defining the substances, the pathways and the receptors. The CLEA model is deterministic, meaning that in any calculation a single value is assigned to each variable. Many of these values are assigned on the basis of average or conservative (the most health protective) measurements and by expert judgement.

Historically, in dealing with parameter uncertainty and variability in a deterministic model, it has been good practice to select values representative of a worst case exposure scenario. This has the assumed comfort of being more protective against an unforeseen situation or risks to sensitive individuals. However, the problem with this approach can be that such choices, however defensible individually, tend to be implausible collectively.

Over the recent years there has been an increasing desire on the part of authoritative bodies to move away from modelling a worst case individual to more realistic or reasonable exposure scenarios. This is the approach adopted by the CLEA model and takes into account not only the degree of conservatism from individual choices, but also the collective effect of these choices.

It should be noted that ERM's GACs are not a static set of values, but are reviewed on a regular basis and reissued as more guidance is made available by DEFRA or the Environment Agency, or when improved knowledge of toxicity is published.

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(1) Environment Agency, February 2005. The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils. Science Report P5-080/TR3.

(2) Total Petroleum Hydrocarbon Criteria Working Group Series Volumes 1 to 5.

APPENDIX E GEOTECHNICAL RESULTS

ENGINEERS LOG

SHEET 1 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*MW0*	**HOLE TYPE:**	*WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.40*	*MADE GROUND: Grass over firm brown slightly gravelly sandy silty CLAY with frequent roots and rootlets. Gravel is subangular fine and medium brick and slag. Sand is medium.*			
0.40	*0.80*	*Stiff greyish brown with frequent orangish brown staining slightly sandy CLAY with occasional roots.*			
0.80	*2.60*	*Spongy dark brownish black slightly sandy clayey fibrous PEAT with a strong sulphurous odour. Sand is medium.*	*2.90*	*5.00*	*Frequent wood fragments (50x15mm).*
2.60	*5.40*	*Spongy dark brownish black slightly sandy clayey fibrous PEAT intermixed with soft dark grey CLAY with a strong sulphurous odour. Sand is medium.*			
5.40	*5.50*	*Grey medium SAND.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*09/09/2021 11:43*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW0* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.40*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.45*			
1.50	*3.00*	*4*	*B*	
2.00	*2.45*			
3.00	*3.45*			
3.00	*4.00*	*5*	*B*	
4.00	*4.45*			
4.00	*5.00*	*6*	*B*	
5.00	*5.50*	*7*	*B*	

INSTALLATION & BACKFILL

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW0* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment
Raised	*1*	*Standpipe*	*0.00*	*0.50*	*50*	*Plain*	
	1	*Standpipe*	*0.50*	*1.00*	*50*	*Slotted*	
	2	*Standpipe*	*0.00*	*2.00*	*50*	*Plain*	
	2	*Standpipe*	*2.00*	*5.00*	*50*	*Slotted*	

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.50*	*bentonite*	
0.50	*1.00*	*gravel*	
1.00	*2.00*	*bentonite*	
2.00	*5.00*	*gravel*	

ENGINEERS LOG

SHEET 1 OF 4

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*08 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW1* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.20*	*Grass over firm brown sandy silty CLAY with frequent roots and rootlets. Sand is medium.*			
0.20	*1.50*	*Stiff grey with frequent orangish brown staining slightly sandy CLAY with occasional roots.*	*1.50*		*Soft.*
2.20	*5.00*	*Spongy dark brownish black slightly sandy clayey fibrous PEAT with a strong sulphurous odour. Sand is medium.*	*2.00*		*With frequent decomposed plant remains and a slight sulphurous odour.*

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*08/09/2021 16:37*

SAMPLES & PID

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*08 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW1* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.45*			
1.50	*2.20*	*4*	*B*	
2.20	*3.50*	*5*	*B*	
2.50	*2.95*			
3.50	*3.95*			
3.50	*4.50*	*6*	*B*	
4.50	*4.95*			
4.50	*5.00*	*7*	*B*	

HAND SHEAR VANE RESULTS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*08 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW1* **HOLE TYPE:** *WS*

HAND VANE RESULTS

Depth (m)	Test Number	Vane Shear Strength					Remoulded Vane Shear Strength			
		19mm Ø		33mm Ø			19mm Ø		33mm Ø	
		Reading	Shear Strength	Reading	Shear Strength		Reading	Shear Strength	Reading	Shear Strength
0.50	*1*	*72.00*	*108.22*				*36*	*54.974*		
	2	*94.00*	*140.76*				*42*	*63.848*		
	3	*90.00*	*134.84*				*40*	*60.89*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		
	1		*1.73*					*1.73*		
	2		*1.73*					*1.73*		
	3		*1.73*					*1.73*		

19mm Ø Vane Blade	*Shear Strength = A x Reading + B*	*A (kPa/div)*	*1.479*	*B (kPa)*	*1.73*	*Area Ratio*	*24.30%*
33mm Ø Vane Blade	*Shear Strength = A x Reading + B*	*A (kPa/div)*	*0.279*	*B (kPa)*	*0.33*	*Area Ratio*	*12.80%*

Testing Completed with AM GEO Hand Shear Vane
Certificate Number: 716271.01

INSTALLATION & BACKFILL

SHEET 4 OF 4

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*08 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW1* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment
Raised	*1*	*Standpipe*	*0.00*	*0.50*	*50*	*Plain*	
	1	*Standpipe*	*0.50*	*1.00*	*50*	*Slotted*	
	2	*Standpipe*	*0.00*	*2.00*	*50*	*Plain*	
	2	*Standpipe*	*2.00*	*5.00*	*50*	*Slotted*	

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.50*	*bentonite*	
0.50	*1.00*	*gravel*	
1.00	*2.00*	*bentonite*	
2.00	*5.00*	*gravel*	

ENGINEERS LOG

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*31 August 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*MW5*	**HOLE TYPE:**	*WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.40*	*MADE GROUND: Light vegetation over firm brown sandy, locally very sandy, gravelly friable CLAY. Gravel is angular to subrounded fine to coarse concrete, brick, slag, sandstone and quartz. Sand is medium.*	*0.00*	*0.10*	*Rootlets.*
0.40	*0.85*	*MADE GROUND: Brown slightly clayey gravelly medium SAND with high cobble content. Gravel is angular to subrounded fine to coarse concrete, brick, slag and sandstone. Cobbles are angular concrete.*	*0.55*	*0.60*	*Rounded quartzitic gravels.*
0.85	*1.20*	*MADE GROUND: Firm brown sandy gravelly CLAY with medium cobble content. Gravel is angular to subrounded fine to coarse concrete, brick, slag, sandstone and quartz. Sand is medium. Cobbles are angular concrete.*			
1.20	*1.30*	*MADE GROUND: Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine and medium slag, sandstone and quartzite. Sand is fine.*			
1.30	*1.50*	*Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded sandstone, limestone and quartzite.*	*1.30*	*1.50*	*Occasional roots and rootlets.*
1.50	*2.30*	*Firm greyish brown with frequent light orangish mottling slightly sandy CLAY. Sand is medium.*	*1.50*	*3.00*	*Rare rootlets.*
2.30	*3.60*	*Firm grey with occasional black mottling slightly sandy CLAY. Sand is medium.*	*2.50*	*3.00*	*Light brown staining and a slight organic odour.*
3.60	*5.45*	*Soft grey with rare black mottling slightly sandy silty CLAY. Sand is medium.*	*4.50*	*5.00*	*Frequent decomposed organic material with a mild organic odour.*

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*31/08/2021 15:59*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*31 August 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW5* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.20	*0.40*	*1*	*B*	
0.40	*0.70*	*2*	*B*	
0.90	*1.20*	*3*	*B*	
1.20	*1.50*	*4*	*B*	
1.50	*1.95*	*5*	*D*	
1.50	*2.00*	*6*	*B*	
2.00	*2.45*	*7*	*D*	
2.00	*3.00*	*8*	*B*	
3.00	*3.45*	*9*	*D*	
3.00	*4.00*	*10*	*B*	
4.00	*4.50*	*11*	*D*	
4.00	*5.00*	*12*	*B*	
5.00	*5.45*	*13*	*D*	

INSTALLATION & BACKFILL

SHEET 3 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*31 August 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW5* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment
Flush	*1*	*Standpipe*	*0.00*	*0.50*	*50*	*Plain*	
	1	*Standpipe*	*0.50*	*1.00*	*50*	*Slotted*	
	2	*Standpipe*	*0.00*	*2.00*	*50*	*Plain*	
	2	*Standpipe*	*2.00*	*5.00*	*50*	*Slotted*	

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.50*	*bentonite*	
0.50	*1.00*	*gravel*	
1.00	*2.00*	*bentonite*	
2.00	*5.00*	*gravel*	

ENGINEERS LOG

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*02 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW6* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.06*	*MADE GROUND comprising Tarmacadam.*			
0.06	*0.20*	*MADE GROUND: Grey sandy angular to subrounded medium concrete and limestone. Sand is coarse.*			
0.20	*0.40*	*MADE GROUND: Light greyish brown gravelly medium SAND with medium cobble content. Gravel is angular to subrounded fine and medium concrete, slag and limestone. Cobbles are angular concrete and slag.*	*0.30*	*0.50*	*Slag boulder obstruction (300x200mm).*
0.40	*0.65*	*MADE GROUND: Grey sandy angular and subangular COBBLES of concrete and slag. Sand is medium.*			
		Borehole terminated due to obstructions, slow progress and collapse.			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*02/09/2021 14:29*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*02 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW6* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.40	*0.60*	*1*	*B*	

INSTALLATION & BACKFILL

SHEET 3 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*02 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW6* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.60*	*arisings*	

ENGINEERS LOG

SHEET 1 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*03 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW07* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.09*	*MADE GROUND comprising Tarmacadam .*			
0.09	*0.40*	*MADE GROUND: Greyish brown gravelly medium SAND with medium cobble content. Gravel is angular to subrounded fine to coarse concrete, slag, sandstone and limestone. Cobbles are angular concrete.*			
0.40	*0.70*	*MADE GROUND: Greyish brown sandy angular and subangular medium and coarse GRAVEL AND COBBLES of concrete, brick and slag. Sand is medium.*			
0.70	*0.90*	*Firm grey with frequent light brown staining and occasional black mottling slightly sandy silty CLAY.*			
0.90	*1.50*	*Firm brown with occasional light orange staining sandy clayey SILT. Sand is fine .*			
1.50	*2.50*	*Firm greyish brown with frequent light orangish mottling slightly sandy CLAY. Sand is medium.*			
2.50	*3.50*	*Firm grey with occasional black mottling slightly sandy CLAY. Sand is medium.*			
3.50	*4.20*	*Spongy dark brownish grey slightly sandy clayey fibrous PEAT with a mild organic odour. Sand is medium.*			
4.20	*5.00*	*Soft brownish grey slightly sandy CLAY with frequent lenses of peat and decomposed vegetation matter, with a mild hydrocarbon odour.*	*4.80*		*Band of wood fragments (10x5mm)*

END OF BOREHOLE? ***YES*** **LOGGING ENGINEERS SIGNATURE** [redacted] *03/09/2021 09:13*

SAMPLES & PID

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*03 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*MW07*	**HOLE TYPE:**	*WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.20	*0.40*	*1*	*B*	
0.70	*0.90*	*2*	*B*	
1.00	*1.20*	*3*	*B*	
1.50	*1.95*			
1.50	*2.00*	*4*	*B*	
2.00	*2.45*			
2.00	*3.00*	*5*	*B*	
3.00	*3.45*			
3.00	*4.00*	*6*	*B*	
4.00	*4.45*			
4.00	*5.00*	*7*	*B*	
5.00	*5.45*			

INSTALLATION & BACKFILL

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*03 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW07* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment
Flush	*1*	*Standpipe*	*0.00*	*0.50*	*50*	*Slotted*	
	1	*Standpipe*	*0.50*	*1.00*	*50*	*Slotted*	
	2	*Standpipe*	*0.00*	*2.00*	*50*	*Slotted*	
	2	*Standpipe*	*2.00*	*5.00*	*50*	*Slotted*	

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.50*	*bentonite*	
0.50	*1.00*	*gravel*	
1.00	*2.00*	*bentonite*	
2.00	*5.00*	*gravel*	

ENGINEERS LOG

AM GEO

SHEET 1 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*01 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW8* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.60*	*MADE GROUND: Vegetation over firm brown slightly sandy slightly gravelly friable CLAY with occasional roots and rootlets. Gravel is subangular and rounded fine and medium sandstone, limestone and flint. Sand is medium.*			
0.60	*1.20*	*Light orangish brown slightly clayey slightly gravelly medium SAND. Gravel is subangular and subrounded fine to coarse limestone and flint.*	*1.00*		*becoming gravelly .*
1.20	*1.50*	*Medium dense orangish brown clayey gravelly medium SAND. Gravel is subangular and subrounded fine to coarse limestone and flint.*			
1.50	*2.50*	*Firm brown sandy SILT with occasional thin laminations of fine black sand. Sand is fine and medium.*			
2.50	*5.00*	*Medium dense light brown silty medium SAND.*	*4.00*	*5.00*	*Thinly interlaminated with medium black sand.*

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*01/09/2021 12:32*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*01 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW8* **HOLE TYPE:** *WS*

SAMPLES				
Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.10	*0.30*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
0.80	*1.20*	*3*	*B*	
1.20	*1.65*			
1.20	*2.00*	*5*	*B*	
2.00	*2.45*	*6*	*D*	
2.00	*3.00*	*7*	*B*	
3.00	*3.45*	*8*	*D*	
3.00	*4.00*	*9*	*B*	
4.00	*4.45*	*10*	*D*	
4.00	*5.00*	*11*	*B*	

INSTALLATION & BACKFILL

SHEET 3 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*01 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *MW8* **HOLE TYPE:** *WS*

INSTALLATION							
Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment
Raised	*1*	*Standpipe*	*0.00*	*0.50*	*50*	*Plain*	
	1	*Standpipe*	*0.50*	*1.00*	*50*	*Slotted*	
	2	*Standpipe*	*0.00*	*2.00*	*50*	*Plain*	
	2	*Standpipe*	*2.00*	*5.00*	*50*	*Slotted*	

BACKFILL			
Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.50*	*bentonite*	
0.50	*1.00*	*gravel*	
1.00	*2.00*	*bentonite*	
2.00	*5.00*	*gravel*	

ENGINEERS LOG

SHEET 1 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*06 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS11* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.30*	*Brownish grey slightly sandy CLAY with frequent roots and rootlets.*			
0.30	*1.10*	*Firm brown sandy SILT. Sand is medium.*	*0.80*	*1.10*	*Very sandy.*
1.20	*1.40*	*Firm grey sandy clayey SILT. Sand is medium.*			
1.60	*1.85*	*Firm black slightly sandy silty CLAY with coarse gravel sized pockets of peat and a mild organic odour.*			
1.85	*4.50*	*Medium dense grey with occasional black laminations medium SAND.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*06/09/2021 13:56*

SAMPLES & PID

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*06 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS11* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
0.90	*1.10*	*3*	*B*	
1.50	*1.95*			
1.50	*2.50*	*4*	*B*	
2.50	*2.95*			
2.50	*3.50*	*5*	*B*	
3.50	*3.95*			
3.50	*4.50*	*6*	*B*	

HAND SHEAR VANE RESULTS

CONTRACT: *North Lincs Geeen Energy Park, Flixboro*
PROJECT NO. : *J2457*
ON BEHALF OF: *GEOTRON*
DATE: *06 September 2021*
ENGINEER INITIALS: *AMcQ*
LOCATION ID: *WS11*
HOLE TYPE: *WS*

HAND VANE RESULTS

Depth (m)	Test Number	Vane Shear Strength					Remoulded Vane Shear Strength			
		19mm Ø		33mm Ø			19mm Ø		33mm Ø	
		Reading	Shear Strength	Reading	Shear Strength		Reading	Shear Strength	Reading	Shear Strength
0.50	*1*	*42.00*	*63.85*		*0.33*		*22*	*34.268*		*0.33*
	2	*74.00*	*111.18*		*0.33*		*26*	*40.184*		*0.33*
	3	*56.00*	*84.55*		*0.33*		*22*	*34.268*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*
	1		*1.73*		*0.33*			*1.73*		*0.33*
	2		*1.73*		*0.33*			*1.73*		*0.33*
	3		*1.73*		*0.33*			*1.73*		*0.33*

19mm Ø Vane Blade	*Shear Strength = A x Reading + B*	*A (kPa/div)*	*1.479*	*B (kPa)*	*1.73*	*Area Ratio*	*24.30%*
33mm Ø Vane Blade	*Shear Strength = A x Reading + B*	*A (kPa/div)*	*0.279*	*B (kPa)*	*0.33*	*Area Ratio*	*12.80%*

Testing Completed with AM GEO Hand Shear Vane
Certificate Number: 716271.01

INSTALLATION & BACKFILL

SHEET 4 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*06 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS11* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*4.50*	*arisings*	

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*06 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS11* **HOLE TYPE:** *WS*

1.50 to 2.50 metres

2.50 to 3.50 metres

3.50 to 4.50 metres

ENGINEERS LOG

SHEET 1 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*06 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS12* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.50*	*MADE GROUND: Greyish brown medium SAND with frequent roots and rootlets.*			
0.50	*1.00*	*MADE GROUND: Brown slightly gravelly medium SAND. Gravel is subangular fine and medium brick, sandstone and limestone.*			
1.00	*3.00*	*Dark orangish brown medium SAND.*	*1.80*		*becoming brown.*
3.00	*4.10*	*Greyish brown medium SAND, locally silty.*	*3.40*		*with dark grey laminations.*
4.10	*4.30*	*Firm dark brown slightly sandy silty CLAY with coarse gravel sized pockets of peat and a mild organic odour.*			
4.30	*4.50*	*Grey silty medium SAND.*			
4.50	*5.50*	*No recovery.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*07/09/2021 08:33*

SAMPLES & PID

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS12* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.95*			
1.50	*2.50*	*4*	*B*	
2.50	*2.95*			
2.50	*3.50*	*5*	*B*	
3.50	*3.95*			
3.50	*4.50*	*6*	*B*	
4.50	*4.95*			
4.50	*5.50*	*7*	*B*	

INSTALLATION & BACKFILL

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS12* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*5.50*	*arisings*	

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.50 metres

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

2.50 to 3.50 metres

3.50 to 4.50 metres

ENGINEERS LOG

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS14* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.30*	*MADE GROUND: Firm dark brown sandy CLAY with frequent roots and rootlets. Sand is medium.*			
0.30	*1.30*	*Brown with occasional orange staining silty medium SAND.*			
1.30	*1.80*	*Grey silty medium SAND.*			
1.80	*2.80*	*Firm black very organic sandy silty CLAY with medium and coarse gravel sized pockets of peat and a slight organic odour. Sand is medium.*	*2.30*	*2.80*	*Dark brown slightly sandy.*
2.80	*4.45*	*Light grey medium SAND.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*07/09/2021 09:55*

SAMPLES & PID

SHEET 2 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS14* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.00	*1.20*	*3*	*B*	
1.50	*1.95*			
1.50	*2.00*	*4*	*B*	
2.50	*2.45*			
2.00	*3.00*	*5*	*B*	
3.50	*3.45*			
3.00	*4.00*	*6*	*B*	
4.00	*4.45*	*6*	*B*	

INSTALLATION & BACKFILL

SHEET 3 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS14* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*4.00*	*arisings*	

PHOTOGRAPHS

SHEET 4 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.00 metres

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

2.00 to 3.00 metres

3.00 to 4.50 metres

ENGINEERS LOG

SHEET 1 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.50*	*MADE GROUND: Firm dark brown sandy CLAY with frequent roots and rootlets. Sand is medium.*			
0.50	*0.60*	*MADE GROUND: Grey silty medium SAND.*			
0.60	*1.20*	*Orangish brown medium SAND with rare fine gravel sized pockets of black ash.*			
1.20	*3.00*	*Light brown medium SAND.*			
3.00	*4.00*	*No recovery.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*07/09/2021 13:52*

SAMPLES & PID

SHEET 2 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS12* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.95*			
1.50	*2.00*	*4*	*B*	
2.00	*2.46*			
2.00	*3.00*	*5*	*B*	
3.00	*3.45*			
3.00	*4.00*	*6*	*B*	

INSTALLATION & BACKFILL

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* | **LOCATION ID:** *WS12* | **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*4.00*	*arisings*	

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS16*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.00 metres

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS16*	**HOLE TYPE:**	*WS*

2.00 to 3.00 metres

ENGINEERS LOG

SHEET 1 OF 4

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS21*	**HOLE TYPE:**	*WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.60*	*Grass over firm brown sandy silty CLAY with frequent roots and rootlets. Sand is medium.*			
0.60	*1.20*	*Spongy dark brownish black slightly sandy clayey fibrous PEAT with a slight sulphurous odour. Sand is medium.*			
1.20	*1.60*	*Grey and dark orange brown medium SAND.*			
1.60	*2.60*	*Grey medium SAND.*			
2.60	*3.00*	*Brown medium SAND.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*09/09/2021 14:51*

SAMPLES & PID

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS21* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.60*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.45*			
1.50	*2.00*	*4*	*B*	
2.00	*2.45*			
2.00	*3.00*	*5*	*B*	
3.00	*3.45*			

PHOTOGRAPHS

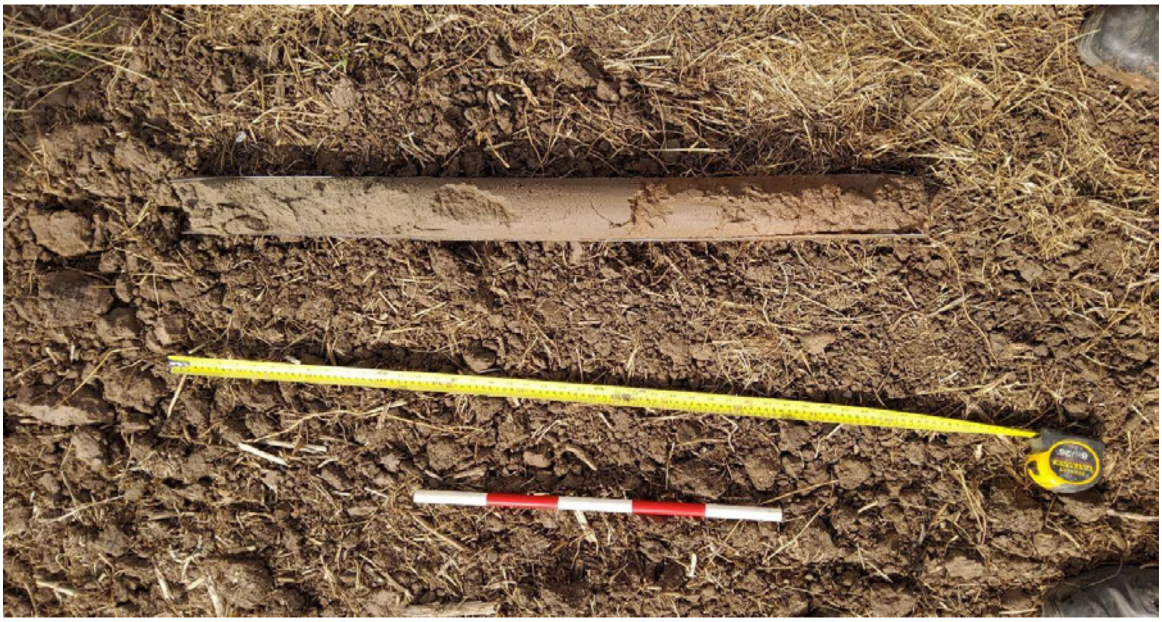
CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.00 metres

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*		**PROJECT NO. :**	*J2457*	
ON BEHALF OF:	*GEOTRON*		**DATE:**	*09 September 2021*	
ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*



2.00 to 3.00 metres

ENGINEERS LOG

SHEET 1 OF 4

CONTRACT: *North Lincs Geeen Energy Park, Flixboro*
PROJECT NO. : *J2457*
ON BEHALF OF: *GEOTRON*
DATE: *09 September 2021*
ENGINEER INITIALS: *AMcQ*
LOCATION ID: *WS21*
HOLE TYPE: *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.60*	*Grass over firm brown sandy silty CLAY with frequent roots and rootlets. Sand is medium.*			
0.60	*1.00*	*Firm light orangish brown sandy SILT. Sand is medium.*			
1.00	*1.60*	*Spongy dark brownish black slightly sandy clayey fibrous PEAT with a slight sulphurous odour. Sand is medium.*			
1.60	*1.80*	*Dark brown medium SAND.*			
1.80	*2.60*	*Light orangish brown medium SAND.*			
2.60	*3.00*	*Dark brownish grey medium SAND.*			

END OF BOREHOLE? ***YES*** **LOGGING ENGINEERS SIGNATURE** [redacted] *09/09/2021 15:08*

SAMPLES & PID

SHEET 2 OF 4

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS: *AMcQ* | **LOCATION ID:** *WS21* | **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.60*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.45*			
1.50	*2.00*	*4*	*B*	
2.00	*2.45*			
2.00	*3.00*	*5*	*B*	
3.00	*3.45*			

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*		**PROJECT NO. :**	*J2457*	
ON BEHALF OF:	*GEOTRON*		**DATE:**	*09 September 2021*	
ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.00 metres

PHOTOGRAPHS

SHEET 4 OF 4

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

2.00 to 3.00 metres

ENGINEERS LOG

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*02 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS25*	**HOLE TYPE:**	*WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.30*	*MADE GROUND comprising of CONCRETE.*			
0.30	*1.00*	*MADE GROUND: Grey compacted slightly clayey slightly gravelly silty medium SAND with a mild chemical\hydrocardbon odour and rare decomposed rootlets. Gravel is subangular and subrounded fine and medium concrete, brick and flint.*	*0.90*		*Angular concrete cobble.*
		Borehole terminated due to concrete cobble.			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*02/09/2021 13:33*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*02 September 2021*

ENGINEER INITIALS: *AMcQ*	**LOCATION ID:** *WS25*	**HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.70	*1.00*	*2*	*B*	

INSTALLATION & BACKFILL

SHEET 3 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*02 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS25* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*1.00*	*arisings*	

ENGINEERS LOG

SHEET 1 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*01 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS26* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.36*	*MADE GROUND comprising of CONCRETE.*			
0.36	*2.80*	*MADE GROUND: Grey compacted slightly clayey slightly gravelly silty medium SAND with a mild chemical\hydrocardbon odour and rare decomposed rootlets. Gravel is subangular and subrounded fine and medium concrete, brick and flint.*	*0.70*		*White mesh\membrane.*
2.80	*3.20*	*Firm brown with occasional orange mottling sandy SILT. Sand is medium.*			
3.20	*4.90*	*Soft grey with occasional thin black laminations slightly sandy silty CLAY with a mild organic odour.*	*3.80*	*4.90*	*Occasional decomposed vegetation matter.*
4.90	*5.45*	*Soft pseudo-fibrous silty PEAT with a mild organic odour.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*01/09/2021 16:39*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*01 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS26* **HOLE TYPE:** *WS*

SAMPLES				
Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.40	*0.60*	*1*	*B*	
0.70	*1.00*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*1.65*			
1.50	*2.50*	*4*	*B*	
2.50	*2.95*			
2.50	*3.50*	*5*	*B*	
3.50	*3.95*			
3.50	*4.50*	*6*	*B*	
4.50	*4.95*			
4.50	*5.00*	*7*	*B*	
5.00	*5.45*			

INSTALLATION & BACKFILL

SHEET 3 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*01 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS26* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.40*	*concrete*	
0.40	*1.00*	*arisings*	
1.00	*5.00*	*bentonite*	

ENGINEERS LOG

SHEET 1 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS32* **HOLE TYPE:** *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.50*	*MADE GROUND: Dark brown clayey medium SAND with frequent roots and rootlets.*	*0.50*		*Field drain.*
0.60	*2.50*	*Light brown medium SAND.*	*2.50*	*2.60*	*Laminatsions of orangish brown sand and dark brown organic clayey sand.*
2.50	*3.00*	*Light grey medium SAND.*	*2.90*		*Grey.*
3.00	*3.50*	*No recovery.*			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*07/09/2021 16:14*

SAMPLES & PID

SHEET 2 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS: *AMcQ* | **LOCATION ID:** *WS32* | **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	0.50	1	B	
0.60	0.80	2	B	
1.20	1.50	3	B	
1.50	1.95			
1.50	2.00	4	B	
2.00	2.45			
2.00	3.00	5	B	
3.00	3.45			
3.00	3.50			

INSTALLATION & BACKFILL

SHEET 3 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS32*	**HOLE TYPE:**	*WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*3.50*	*arisings*	

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*07 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.00 metres

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*		**PROJECT NO. :**	*J2457*	
ON BEHALF OF:	*GEOTRON*		**DATE:**	*07 September 2021*	
ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

2.00 to 3.00 metres

ENGINEERS LOG

SHEET 1 OF 5

CONTRACT: *North Lincs Geeen Energy Park, Flixboro*
PROJECT NO. : *J2457*
ON BEHALF OF: *GEOTRON*
DATE: *09 September 2021*
ENGINEER INITIALS: *AMcQ*
LOCATION ID: *WS35*
HOLE TYPE: *WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
0.00	*0.30*	*MADE GROUND: Dark brown sandy silty CLAY with frequent roots and rootlets. Sand is medium.*			
0.30	*1.20*	*MADE GROUND: Brown with frrequent light orange staining silty medium SAND.*	*0.80*	*1.20*	*With occasional black organic silt pockets.*
1.20	*2.00*	*Brown medium SAND.*			
2.00	*3.00*	*Grey silty medium SAND.*			

END OF BOREHOLE? ***YES*** **LOGGING ENGINEERS SIGNATURE** [redacted] *09/09/2021 09:19*

SAMPLES & PID

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *WS35* **HOLE TYPE:** *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.30	*0.50*	*1*	*B*	
0.60	*0.80*	*2*	*B*	
1.20	*1.50*	*3*	*B*	
1.50	*2.00*	*4*	*B*	
2.00	*2.45*			
2.00	*3.00*	*5*	*B*	
3.00	*3.45*			

INSTALLATION & BACKFILL

SHEET 3 OF 5

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS: *AMcQ*
LOCATION ID: *WS35*
HOLE TYPE: *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*3.00*	*arisings*	

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*			**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*			**DATE:**	*09 September 2021*
ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

0.00 to 1.50 metres

1.50 to 2.00 metres

PHOTOGRAPHS

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*09 September 2021*

ENGINEER INITIALS:	*AMcQ*	**LOCATION ID:**	*WS12*	**HOLE TYPE:**	*WS*

2.00 to 3.00 metres

ENGINEERS LOG

SHEET 1 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*03 September 2021*
ENGINEER INITIALS: *AMcQ*	**LOCATION ID:**	**HOLE TYPE:**	*WS*

STRATA DESCRIPTION

Top (m)	Bottom (m)	Main Description	Top (m)	Bottom (m)	Detail Desciption
	0.06	*MADE GROUND comprising Tarmacadam.*			
0.06	*0.15*	*MADE GROUND: Grey slightly sandy subangular COBBLES of concrete and slag.*			
0.15	*0.20*	*MADE GROUND: Light brownish grey fine SAND.*			
0.20	*0.45*	*MADE GROUND: Dark greyish brown gravelly medium SAND with medium cobble content and fragments of cloth, plastic and metal. Gravel is angular and subangular medium and coarse concrete and slag. Cobbles are angular concrete and slag.*	*0.45*		*Coroded cable..*
		Borehole terminated due to obstructions, slow progress.			

END OF BOREHOLE?	***YES***	**LOGGING ENGINEERS SIGNATURE**	[redacted]	*03/09/2021 10:54*

SAMPLES & PID

SHEET 2 OF 3

CONTRACT: *North Lincs Geeen Energy Park, Flixboro*

PROJECT NO. : *J2457*

ON BEHALF OF: *GEOTRON*

DATE: *03 September 2021*

ENGINEER INITIALS: *AMcQ*

LOCATION ID: *0*

HOLE TYPE: *WS*

SAMPLES

Top Depth (m)	Bottom Depth (m)	Sample Number	Sample Type	PID (ppm)
0.20	*0.45*	*1*	*B*	

INSTALLATION & BACKFILL

SHEET 3 OF 3

CONTRACT:	*North Lincs Geeen Energy Park, Flixboro*	**PROJECT NO. :**	*J2457*
ON BEHALF OF:	*GEOTRON*	**DATE:**	*03 September 2021*

ENGINEER INITIALS: *AMcQ* **LOCATION ID:** *0* **HOLE TYPE:** *WS*

INSTALLATION

Cover Type	Pipe Number	Type	Depth from (m)	Depth to (m)	Diameter (mm)	Plain/Slotted	Comment

BACKFILL

Depth from (m)	Depth to (m)	Backfill Material	Comment
0.00	*0.45*	*arisings*	

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/10767
Issue Number: 1 **Date:** 15 October, 2021

Client:
Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Luke Fisher
Project Name: Flixborough
Project Ref: 785042
Order No: N/A
Date Samples Received: 01/10/21
Date Instructions Received: 04/10/21
Date Analysis Completed: 14/10/21

Prepared by:	**Approved by:**
[redacted]	[redacted]
Melanie Marshall Laboratory Coordinator	Richard Wong Client Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING 1247

Lab Sample ID	21/10767/1	21/10767/2	21/10767/3	21/10767/4	21/10767/5	21/10767/6	21/10767/7	Units	Limit of Detection	Method ref
Client Sample No	1	6	1	5	7	7	6			
Client Sample ID	MW0	MW0	MW01	MW01	MW01	MW05	MW07			
Depth to Top	1.50	4.00	0.30	2.20	4.50	2.00	3.00			
Depth To Bottom	3.00	5.00	0.50	3.50	5.50	2.45	4.00			
Date Sampled										
Sample Type	Soil - B	Soil - B	Soil - B	Soil - B	Soil - B	Soil - B	Soil - B			
Sample Matrix Code	6A	6A	6AE	6AE	6A	3A	6A			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	4.78	6.44	8.53	6.59	6.59	6.73	5.32	pH	0.01	A-T-031s
Chloride BRE, SO4 equiv. (water sol 2:1)$_D$	989	-	-	-	-	-	503	mg/l	7	A-T-026s
Nitrate BRE, SO4 equiv. (water sol 2:1)$_D$	<0.4	-	-	-	-	-	<0.4	mg/l	0.4	A-T-026s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	3110	2950	41	1330	3790	103	3620	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.98	0.79	0.06	1.29	0.89	0.10	1.54	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	2.50	3.95	0.06	2.58	3.45	0.10	2.29	% w/w	0.01	A-T-024s
Magnesium BRE (water sol 2:1)$_D$	274	-	-	-	596	-	306	mg/l	1	A-T-SOLMETS

Envirolab Job Number: **21/10767** **Client Project Name:** **Flixborough**

Client Project Ref: **785042**

Lab Sample ID	21/10767/8	21/10767/9	21/10767/10	21/10767/11	21/10767/12	21/10767/13	21/10767/14	Units	Limit of Detection	Method ref
Client Sample No	6	1	4	1	4	4	1			
Client Sample ID	MW08	WS11	WS11	WS16	WS16	WS21	WS25			
Depth to Top	2.00	0.30	1.50	0.30	1.50	1.20	0.30			
Depth To Bottom	2.45	0.50	2.50	0.50	2.00	1.50	0.50			
Date Sampled										
Sample Type	Soil - B	Soil - B	Soil - B	Soil - B	Soil - B	Soil - B	Soil - B			
Sample Matrix Code	4A	6A	5A	6AE	4A	4A	6A			
% Stones >10mm$_{A}$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	20.1	% w/w	0.1	A-T-044
pH BRE$_{D}^{M\#}$	7.93	7.97	7.03	7.94	8.01	4.85	9.27	pH	0.01	A-T-031s
Chloride BRE, SO4 equiv. (water sol 2:1)$_{D}$	-	-	-	-	-	<7	-	mg/l	7	A-T-026s
Nitrate BRE, SO4 equiv. (water sol 2:1)$_{D}$	-	-	-	-	-	0.5	-	mg/l	0.4	A-T-026s
Sulphate BRE (water sol 2:1)$_{D}^{M\#}$	19	17	218	<10	<10	70	307	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_{D}^{M\#}$	<0.02	0.06	0.08	0.05	<0.02	0.03	0.42	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_{D}$	0.01	0.07	0.08	0.06	<0.01	0.08	0.24	% w/w	0.01	A-T-024s

Envirolab Job Number: **21/10767** **Client Project Name:** **Flixborough**

Client Project Ref: **785042**

Lab Sample ID	21/10767/15	21/10767/16						**Units**	**Limit of Detection**	**Method ref**
Client Sample No	5	2								
Client Sample ID	WS26	WS32								
Depth to Top	2.50	0.60								
Depth To Bottom	3.50	0.80								
Date Sampled										
Sample Type	Soil - B	Soil - B								
Sample Matrix Code	6A	4A								
% Stones >10mm$_A$	<0.1	<0.1						% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	8.03	7.89						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	291	<10						mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.17	<0.02						% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	0.45	<0.01						% w/w	0.01	A-T-024s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

v1

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Structural Soils Limited (Castleford Lab), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ	**Project No:**	21/10767
		Date Received:	04/10/2021 (am)
Project:	Flixborough	**Cool Box Temperatures (°C):**	16.5,16.0
Clients Project No:	785042		

Lab Sample ID	21/10767/1	21/10767/2	21/10767/3	21/10767/4	21/10767/5	21/10767/6	21/10767/7	21/10767/8	21/10767/9	21/10767/10	21/10767/11	21/10767/12
Client Sample No	1	6	1	5	7	7	6	6	1	4	1	4
Client Sample ID/Depth	MW0 1.50-3.00m	MW0 4.00-5.00m	MW01 0.30-0.50m	MW01 2.20-3.50m	MW01 4.50-5.50m	MW05 2.00-2.45m	MW07 3.00-4.00m	MW08 2.00-2.45m	WS11 0.30-0.50m	WS11 1.50-2.50m	WS16 0.30-0.50m	WS16 1.50-2.00m
Date Sampled												
Deviation Code												
E (no date)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Lab Sample ID	21/10767/13	21/10767/14	21/10767/15	21/10767/16
Client Sample No	4	1	5	2
Client Sample ID/Depth	WS21 1.20-1.50m	WS25 0.30-0.50m	WS26 2.50-3.50m	WS32 0.60-0.80m
Date Sampled				
Deviation Code				
E (no date)	✓	✓	✓	✓

Key

E (no date)	*No sampling date provided (all results affected if not provided)*

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/10767/1	21/10767/2	21/10767/3	21/10767/4	21/10767/5	21/10767/6	21/10767/7	21/10767/8	21/10767/9	21/10767/10	21/10767/11	21/10767/12
Client Sample No	1	6	1	5	7	7	6	6	1	4	1	4
Client Sample ID/Depth	MW0 1.50-3.00m	MW0 4.00-5.00m	MW01 0.30-0.50m	MW01 2.20-3.50m	MW01 4.50-5.50m	MW05 2.00-2.45m	MW07 3.00-4.00m	MW08 2.00-2.45m	WS11 0.30-0.50m	WS11 1.50-2.50m	WS16 0.30-0.50m	WS16 1.50-2.00m
Date Sampled												
A-T-024s	12/10/2021	12/10/2021	11/10/2021	12/10/2021	12/10/2021	11/10/2021	12/10/2021	13/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021
A-T-026s	14/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	14/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021
A-T-028s	12/10/2021	12/10/2021	12/10/2021	12/10/2021	12/10/2021	12/10/2021	12/10/2021	13/10/2021	12/10/2021	12/10/2021	12/10/2021	12/10/2021
A-T-031s	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021	11/10/2021
A-T-044	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
A-T-SOLMETS	14/10/2021				14/10/2021		14/10/2021					

Lab Sample ID	21/10767/13	21/10767/14	21/10767/15	21/10767/16
Client Sample No	4	1	5	2
Client Sample ID/Depth	WS21 1.20-1.50m	WS25 0.30-0.50m	WS26 2.50-3.50m	WS32 0.60-0.80m
Date Sampled				
A-T-024s	11/10/2021	11/10/2021	11/10/2021	11/10/2021
A-T-026s	14/10/2021	11/10/2021	11/10/2021	11/10/2021
A-T-028s	12/10/2021	12/10/2021	12/10/2021	12/10/2021
A-T-031s	11/10/2021	11/10/2021	11/10/2021	11/10/2021
A-T-044	07/10/2021	07/10/2021	07/10/2021	07/10/2021
A-T-SOLMETS				

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number:	21/12064	
Issue Number:	1	**Date:** 11 November, 2021

Client:

Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager:	Castleford Lab/Luke Fisher
Project Name:	Flixborough
Project Ref:	785042
Order No:	N/A
Date Samples Received:	05/11/21
Date Instructions Received:	08/11/21
Date Analysis Completed:	11/11/21

Approved by:

[redacted]

Richard Wong
Client Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
1247

Envirolab Job Number: 21/12064 **Client Project Name: Flixborough**

Client Project Ref: 785042

Lab Sample ID	21/12064/1	21/12064/2						**Units**	**Limit of Detection**	**Method ref**
Client Sample No	12	5								
Client Sample ID	MW05	WS14								
Depth to Top	4.00	2.00								
Depth To Bottom	5.00	3.00								
Date Sampled										
Sample Type	Soil - B	Soil - B								
Sample Matrix Code	3A	6AE								
% Stones >10mm$_A$	<0.1	<0.1						% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	7.71	6.90						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	710	61						mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.24	0.03						% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	0.80	0.04						% w/w	0.01	A-T-024s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.
Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

v1

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Structural Soils Limited (Castleford Lab), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ

Project: Flixborough

Clients Project No: 785042

Project No: 21/12064

Date Received: 08/11/2021 (am)

Cool Box Temperatures (°C): 6.6

Lab Sample ID	21/12064/1	21/12064/2
Client Sample No	12	5
Client Sample ID/Depth	MW05 4.00-5.00m	WS14 2.00-3.00m
Date Sampled		
Deviation Code		
E (no date)	✓	✓

Key

E (no date) *No sampling date provided (all results affected if not provided)*

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/12064/1	21/12064/2
Client Sample No	12	5
Client Sample ID/Depth	MW05 4.00-5.00m	WS14 2.00-3.00m
Date Sampled		
A-T-024s	10/11/2021	10/11/2021
A-T-026s	10/11/2021	10/11/2021
A-T-028s	11/11/2021	11/11/2021
A-T-031s	10/11/2021	10/11/2021
A-T-044	10/11/2021	10/11/2021

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

STRUCTURAL SOILS LTD

TEST REPORT

1774

Report No. 785042 r1

Date 13-October-2021
Contract Flixborough

Client Geotron UK Ltd
Address Unit E201B
Warmco Industry Park
Manchester Road
Mossley
OL5 9AY
For the Attention of Ms. Prado Fernandez

Order received 28-September-2021
Testing Started 29-September-2021
Testing Completed 13-October-2021

Client Reference
Client Order No. 785042
Instruction Type Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory

UKAS Accredited Tests

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded) **
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Particle Size Distribution sedimentation by pipette BS1377:Part 2:1990,clause 9.4
Dry density/moisture content relationship 4.5kg rammer method BS1377:Part 4: 1990, clause 3.5/3.6

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ [redacted]

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
MW0	2	B	0.60	67.4	78	43	35	99	Dark brown silty organic CLAY
MW1	2	B	0.60	36.4	67	31	36	100	Dark brown slightly silty CLAY
MW1	3	B	1.20	48.0	60	27	33	100	Dark brown slightly silty sandy slightly organic CLAY
MW05	8	B	2.00	30.3	68	20	48	100	Dark brown CLAY
MW05	10	B	3.00	50.6	49	31	18	100	Dark brown CLAY
MW07	4	B	1.50	36.3	57	22	35	100	Dark brown silty CLAY
MW07	7	B	4.00	126	77	43	34	94	Black silty slightly sandy very silty gravelly CLAY
WS11	3	B	0.90	37.8	NP	NP	NP	99	Brown slightly silty CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD	Contract: **Flixborough**	Contract Ref: **785042**

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
WS11	4	B	1.50	34.9	NP	NP	NP	91	Brown silty slightly sandy CLAY
WS21	1	B	0.30	22.2	44	26	18	96	Dark brown slightly sandy CLAY
WS22	1	B	0.30	19.3	43	25	18	99	Brown slightly silty CLAY
WS26	6	B	3.50	48.8	51	26	25	100	Dark brown CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD

Contract:

Flixborough

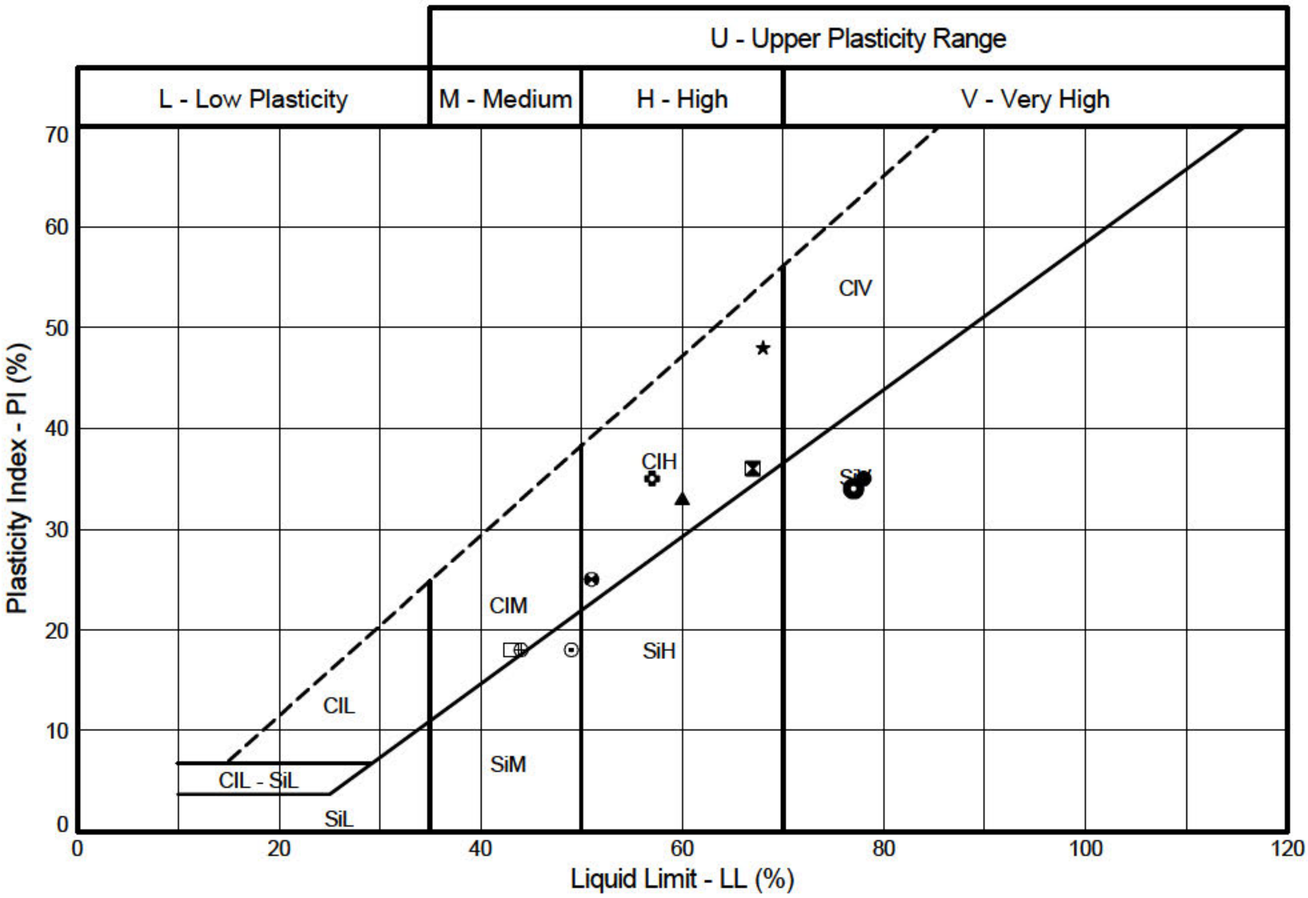
Contract Ref:

785042

AGS

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018



Sample Identification				Test Method #	Preparation Method +	WC %	LL %	PL %	PI %	<425μm %	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)									
●	MW0	2B	0.60	5.3/5.5/6.5	5.2.7	67.4	78	43	35	99	C	
⧗	MW1	2B	0.60	5.3/5.5/6.5	5.2.7	36.4	67	31	36	100	C	
▲	MW1	3B	1.20	5.3/5.5/6.5	5.2.7	48.0	60	27	33	100	C	
★	MW05	8B	2.00	5.3/5.5/6.5	5.2.7	30.3	68	20	48	100	C	
⊙	MW05	10B	3.00	5.3/5.5/6.5	5.2.7	50.6	49	31	18	100	C	
✿	MW07	4B	1.50	5.3/5.5/6.5	5.2.7	36.3	57	22	35	100	C	
◉	MW07	7B	4.00	5.3/5.5/6.5	5.2.7	126	77	43	34	94	C	
	WS11	3B	0.90	5.3/5.5/6.5	5.2.7	37.8	NP	NP	NP	99	C	
	WS11	4B	1.50	5.3/5.5/6.5	5.2.7	34.9	NP	NP	NP	91	C	
⊕	WS21	1B	0.30	5.3/5.5/6.5	5.2.7	22.2	44	26	18	96	C	
□	WS22	1B	0.30	5.3/5.5/6.5	5.2.7	19.3	43	25	18	99	C	
⊗	WS26	6B	3.50	5.3/5.5/6.5	5.2.7	48.8	51	26	25	100	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018

5.3 - Cone Penetrometer Method
5.3.14 - One-Point Cone Penetrometer Method
5.4 - Casagrande Method
5.5 - Plastic Limit Method
6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018.

5.2.1 - Natural State
5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic,
I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**14/10/21**

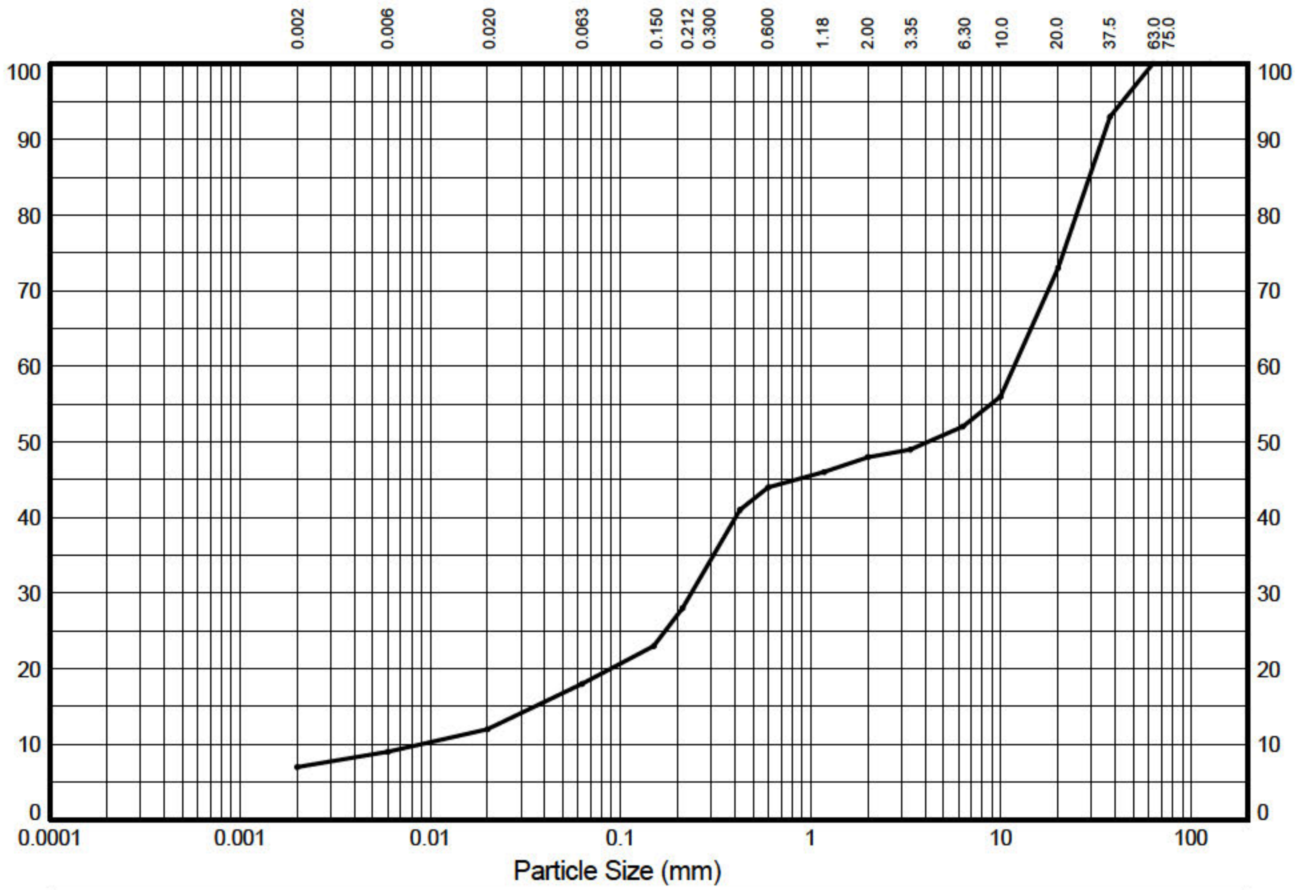
Contract: **Flixborough**

Contract Ref: **785042**

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **MW08** Sample Ref: **3** Sample Type: **B** Depth (m): **0.80**



CLAY	SILT			SAND			GRAVEL			COBBLES
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
	2%	3%	6%	9%	17%	4%	4%	21%	27%	
7%	11%			30%			52%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**93**
20.0	**73**
10.0	**56**
6.30	**52**
3.35	**49**
2.00	**48**
1.18	**46**
0.630	
0.425	**41**
0.200	
0.150	**23**
0.063	**18**

Particle Diameter (mm)	Percent Passing (%)
0.02	**12**
0.006	**9**
0.002	**7**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.009**
D_{15} (mm)	**0.035**
D_{30} (mm)	**0.236**
D_{50} (mm)	**4.135**
D_{60} (mm)	**11.771**
D_{85} (mm)	**29.163**
D_{90} (mm)	**34.126**
C_U	**1313**
C_C	**0.53**

Soil Description:

Brown clayey silty very sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

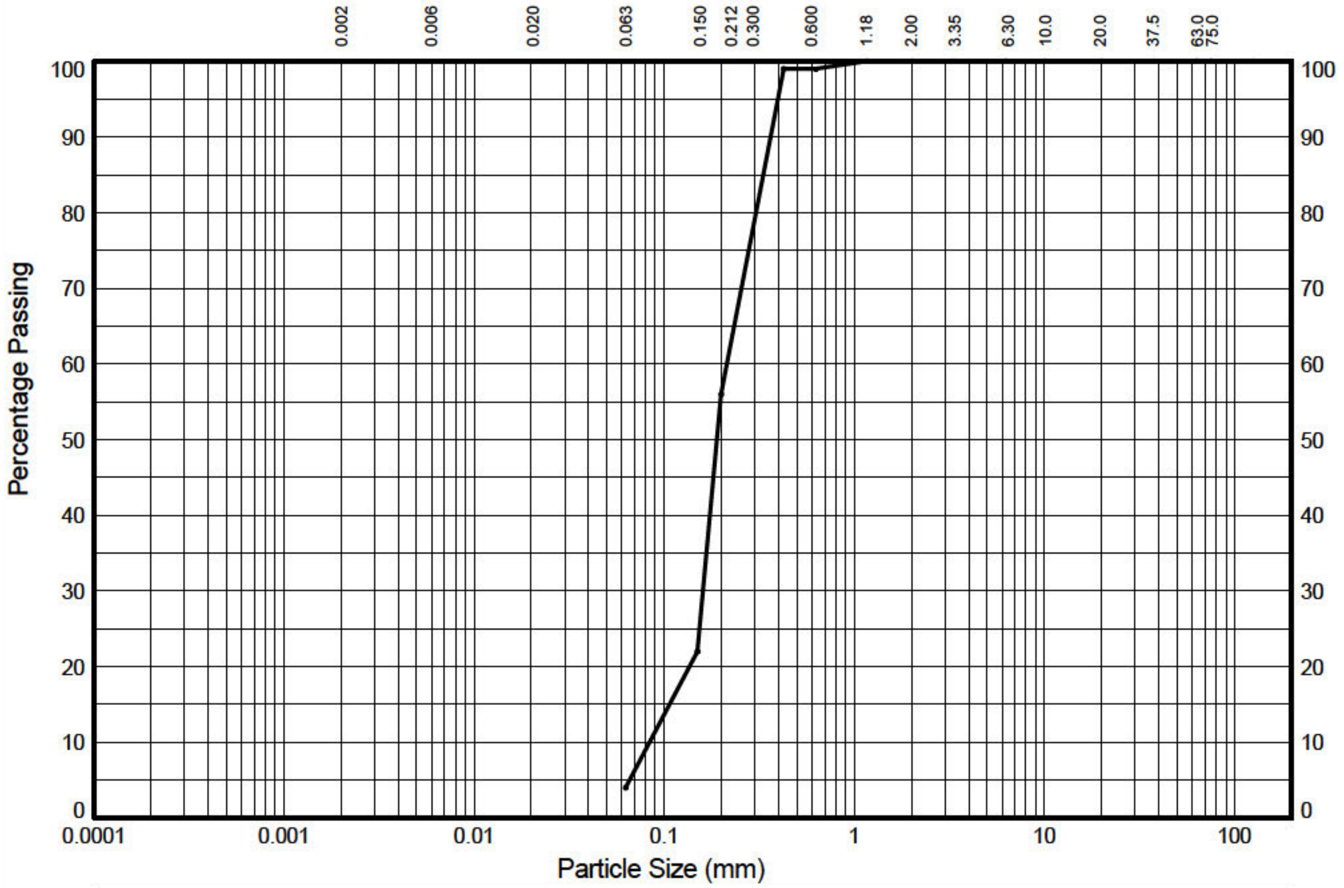
Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**14/10/21**

Contract	Contract Ref:
Flixborough	**785042**

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **MW08** Sample Ref: **9** Sample Type: **B** Depth (m): **3.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	52%	43%	1%	0%	0%	0%	
	SILT			SAND			GRAVEL			
4%				96%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**100**
0.630	**99**
0.425	**99**
0.200	**56**
0.150	**22**
0.063	**4**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.084**
D_{15} (mm)	**0.107**
D_{30} (mm)	**0.161**
D_{50} (mm)	**0.190**
D_{60} (mm)	**0.215**
D_{85} (mm)	**0.333**
D_{90} (mm)	**0.363**
C_U	**2.6**
C_C	**1.4**

Soil Description:

Brown slightly clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**14/10/21**

Cont

Flixborough

Contract Ref:

785042

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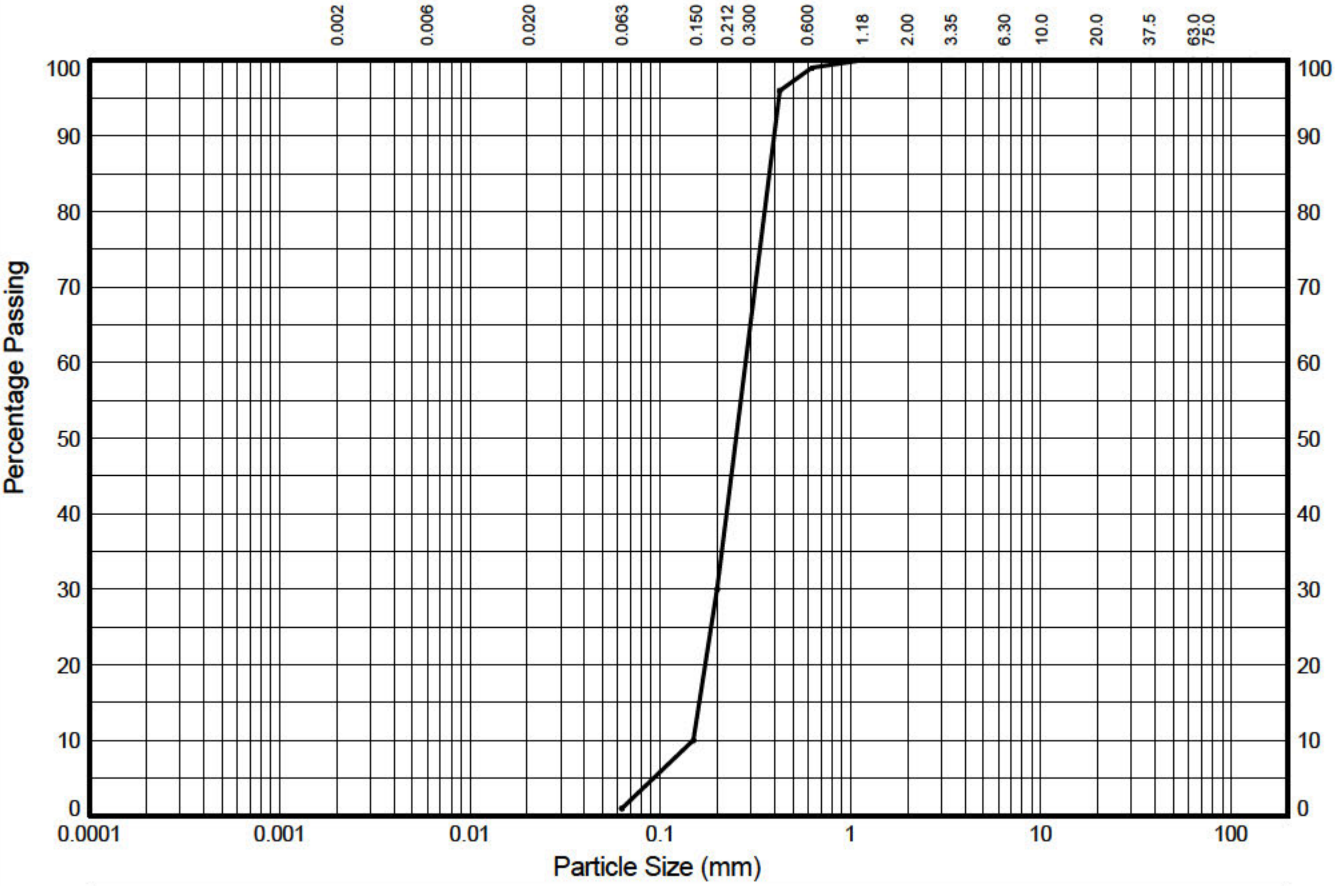
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS21** Sample Ref: **5** Sample Type: **B** Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	29%	69%	1%	0%	0%	0%	
	SILT			SAND			GRAVEL			
1%				99%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**100**
0.630	**99**
0.425	**96**
0.200	**30**
0.150	**10**
0.063	**1**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.150**
D_{15} (mm)	**0.161**
D_{30} (mm)	**0.200**
D_{50} (mm)	**0.251**
D_{60} (mm)	**0.282**
D_{85} (mm)	**0.375**
D_{90} (mm)	**0.397**
C_U	**1.9**
C_C	**0.95**

Soil Description:

Brown slightly clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**14/10/21**

Contract	Contract Ref:
Flixborough	**785042**

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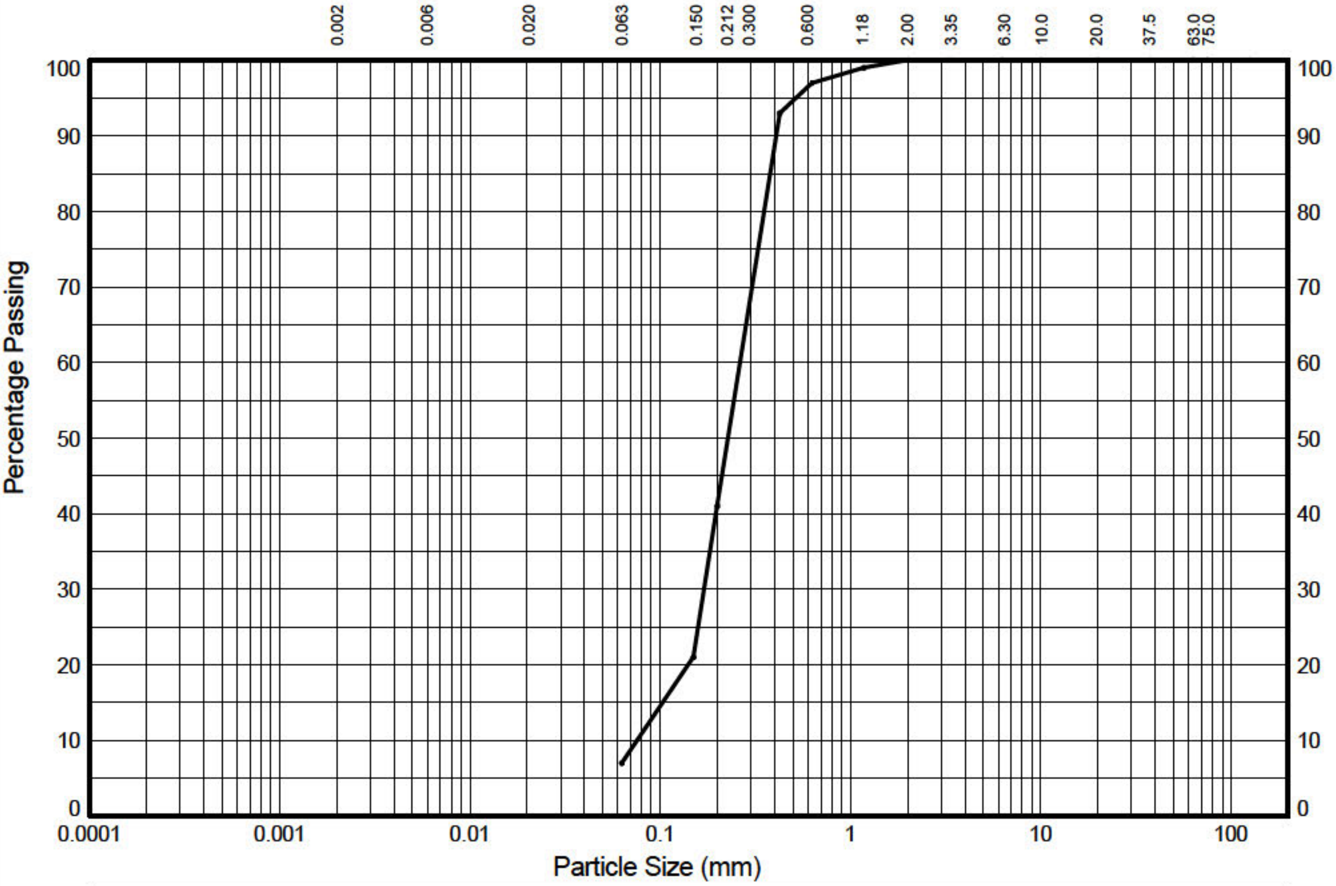
GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 785042-FLIXBOROUGH.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 14/10/21 - 09:36 | LW5 |

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS32** Sample Ref: **5** Sample Type: **B** Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	34%	56%	3%	0%	0%	0%	
	SILT			SAND			GRAVEL			
7%				93%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**99**
0.630	**97**
0.425	**93**
0.200	**41**
0.150	**21**
0.063	**7**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.076**
D_{15} (mm)	**0.103**
D_{30} (mm)	**0.171**
D_{50} (mm)	**0.228**
D_{60} (mm)	**0.263**
D_{85} (mm)	**0.378**
D_{90} (mm)	**0.407**
C_U	**3.5**
C_C	**1.5**

Soil Description:

Brown clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**14/10/21**

Contract	Contract Ref:
Flixborough	**785042**

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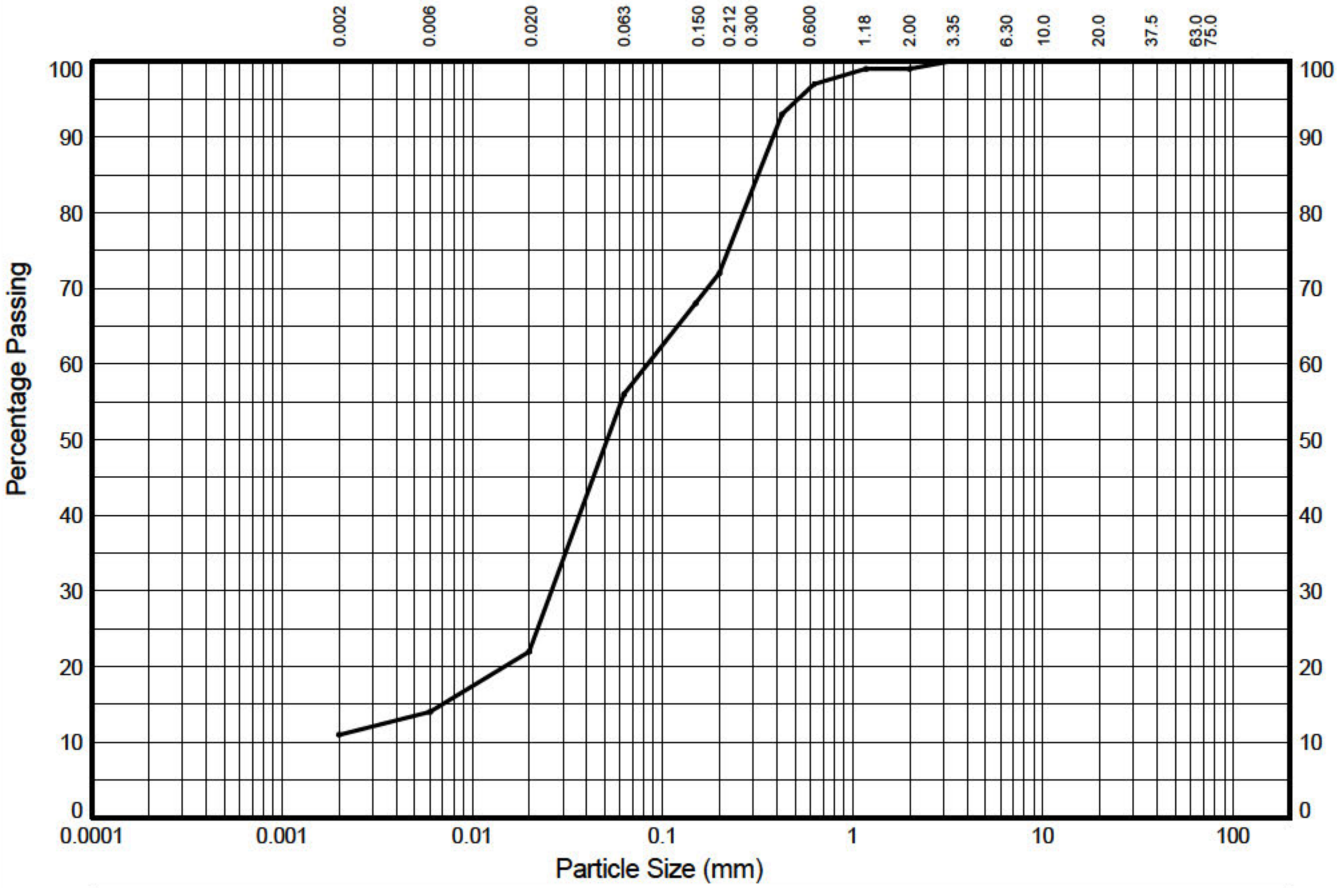
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS35** Sample Ref: **4** Sample Type: **B** Depth (m): **1.50**



CLAY	SILT			SAND			GRAVEL			COBBLES
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
	3%	8%	34%	16%	25%	2%	1%	0%	0%	
11%	45%			43%			1%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**99**
1.18	**99**
0.630	**97**
0.425	**93**
0.200	**72**
0.150	**68**
0.063	**56**

Particle Diameter (mm)	Percent Passing (%)
0.02	**22**
0.006	**14**
0.002	**11**
Sedimentation sample was not pre-treated	

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.007**
D_{30} (mm)	**0.026**
D_{50} (mm)	**0.051**
D_{60} (mm)	**0.084**
D_{85} (mm)	**0.319**
D_{90} (mm)	**0.382**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly clayey very sandy SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**14/10/21**

Contract	Contract Ref:
Flixborough	**785042**

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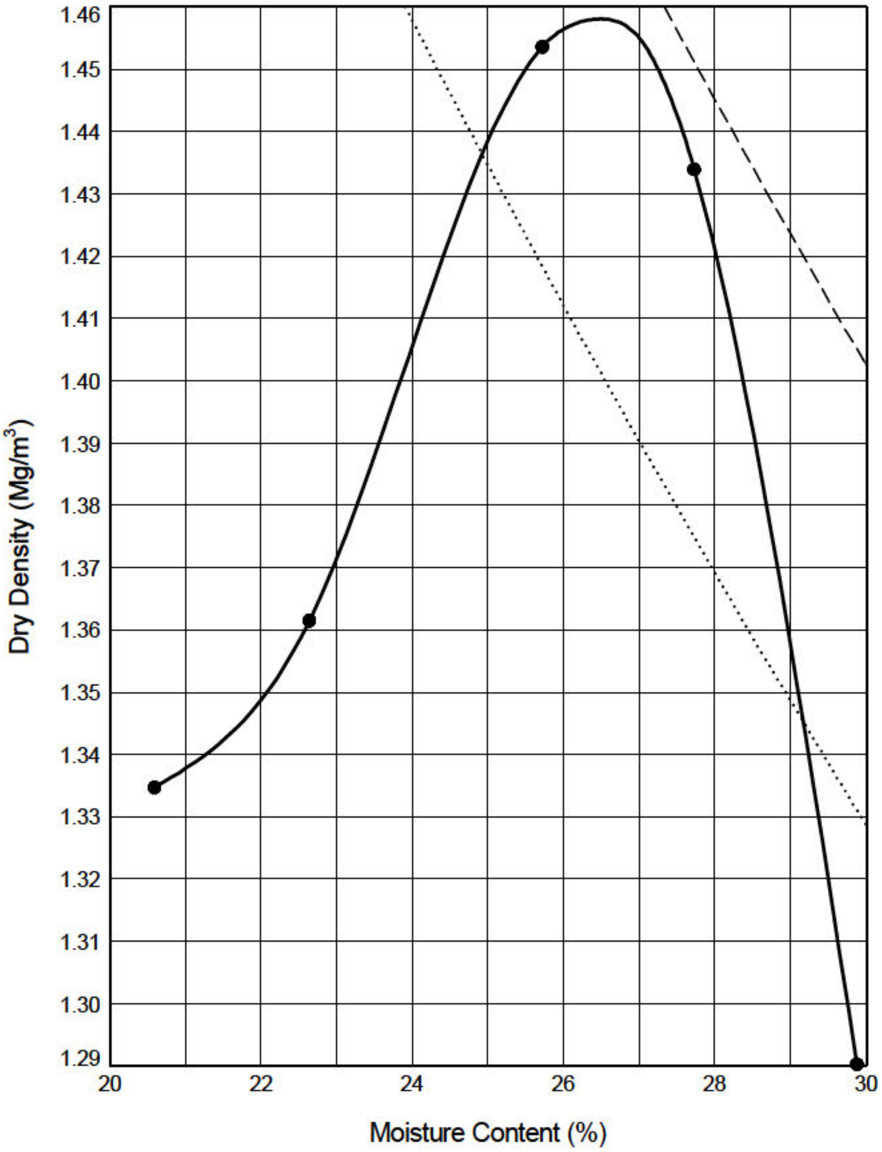
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Window Sample: **WS14** Sample Ref: **2** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details		Test Results	
Initial Moisture Content (%)	:	**28**	Compaction Type :	**Heavy**	Maximum Dry Density (Mg/m^3) :	**1.45**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%) :	**26**
% Retained on 20.0mm BS Sieve	:	**0**	Type of Mould :	**1 LITRE**	Method Used:	**Clause 3.5**
Particle Density - assumed (Mg/m^3)	:	**2.65**			Remarks:	
Size of Soil Pieces	:	**<20mm**	Single sample was used.			

Sample Description	Key to Air Voids Lines		
Brown	——— 0%	– – – – 5%	·········· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LUKE FISHER**	**14/10/21**

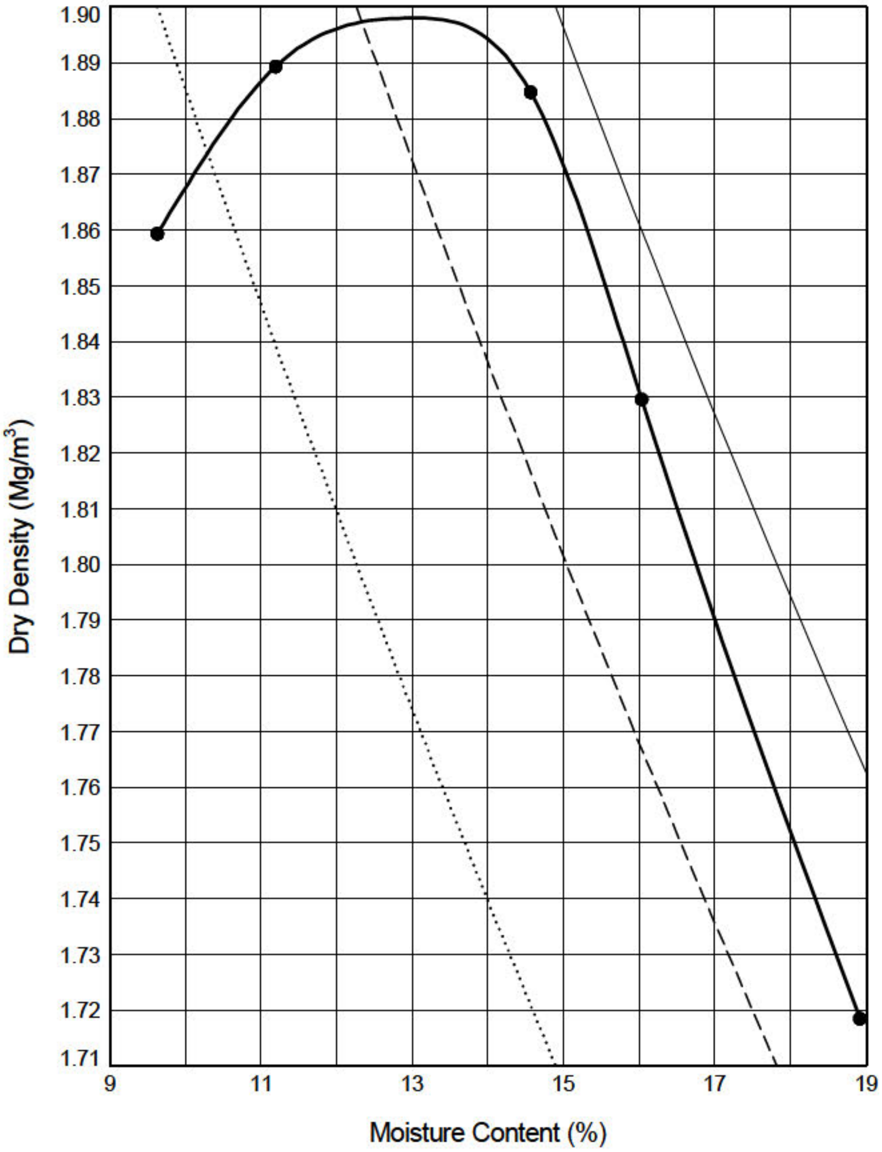
Contract	Contract Ref:
Flixborough	**785042**

AGS

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Position ID: **MW08**   Sample Ref: **2**   Sample Type: **B**   Depth (m): **0.60**



Initial Sample Conditions			Test Details	Test Results	
Initial Moisture Content (%)	:	16	Compaction Type : **Heavy**	Maximum Dry Density (Mg/m^3)	: **1.89**
% Retained on 37.5mm BS Sieve	:	0	Mass of Rammer (kg): **4.5**	Optimum Moisture Content (%)	: **11**
% Retained on 20.0mm BS Sieve	:	2	Type of Mould : **1 LITRE**	Method Used: **Clause 3.5**	
Particle Density - assumed (Mg/m^3)	:	2.65		Remarks:	
Size of Soil Pieces	:	<20MM	Single sample was used.		

Sample Description	Key to Air Voids Lines		
Brown slightly gravelly SAND	——— 0%	– – – – 5%	·········· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LUKE FISHER**	**14/10/21**

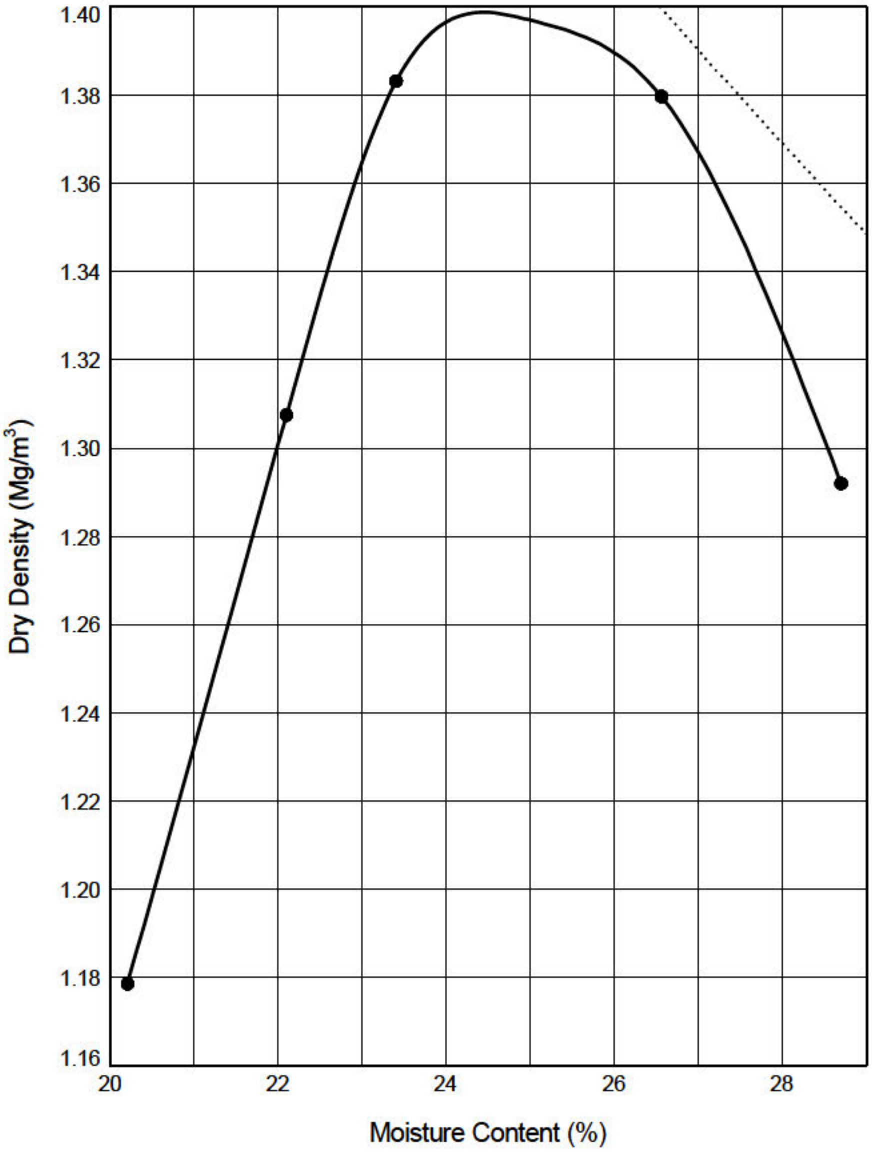
Contract
Flixborough

Contract Ref:
785042

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Window Sample: **WS35** Sample Ref: **2** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**27**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.38**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**23**
% Retained on 20.0mm BS Sieve	:	**0**	Type of Mould	:	**1 LITRE**	Method Used:		**Clause 3.5**
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Single sample was used.					

Sample Description	Key to Air Voids Lines		
Brown slightly clayey SAND	——— 0%	– – – – 5%	·········· 10%

	Compiled By		Date
STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	[redacted]	**LUKE FISHER**	**14/10/21**
	Contract **Flixborough**	Contract Ref: **785042**	AGS

STRUCTURAL SOILS LTD

TEST REPORT

1774

Report No. 785042 r1

Date 09-November-2021 Contract Flixborough

Client Geotron UK Ltd
Address Unit E201B
Warmco Industry Park
Manchester Road
Mossley
OL5 9AY
For the Attention of Ms. Prado Fernandez

Order received 28-September-2021
Testing Started 29-September-2021
Testing Completed 09-November-2021

Client Reference
Client Order No. 785042
Instruction Type Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory

UKAS Accredited Tests

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded) **
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Particle Size Distribution sedimentation by pipette BS1377:Part 2:1990,clause 9.4
Dry density/moisture content relationship 4.5kg rammer method BS1377:Part 4: 1990, clause 3.5/3.6

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ [redacted]

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
MW0	2	B	0.60	67.4	78	43	35	99	Dark brown silty organic CLAY
MW1	2	B	0.60	36.4	67	31	36	100	Dark brown slightly silty CLAY
MW1	3	B	1.20	48.0	60	27	33	100	Dark brown slightly silty sandy slightly organic CLAY
MW05	4	B	1.20	22.1	71	30	41	100	Brown slightly sandy slightly gravelly CLAY
MW05	8	B	2.00	30.3	68	20	48	100	Dark brown CLAY
MW05	10	B	3.00	50.6	49	31	18	100	Dark brown CLAY
MW05	11	D	4.00	43.6	54	25	29	100	Dark brown grey slightly gravelly slightly organic CLAY
MW07	4	B	1.50	36.3	57	22	35	100	Dark brown silty CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD

Contract:

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SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

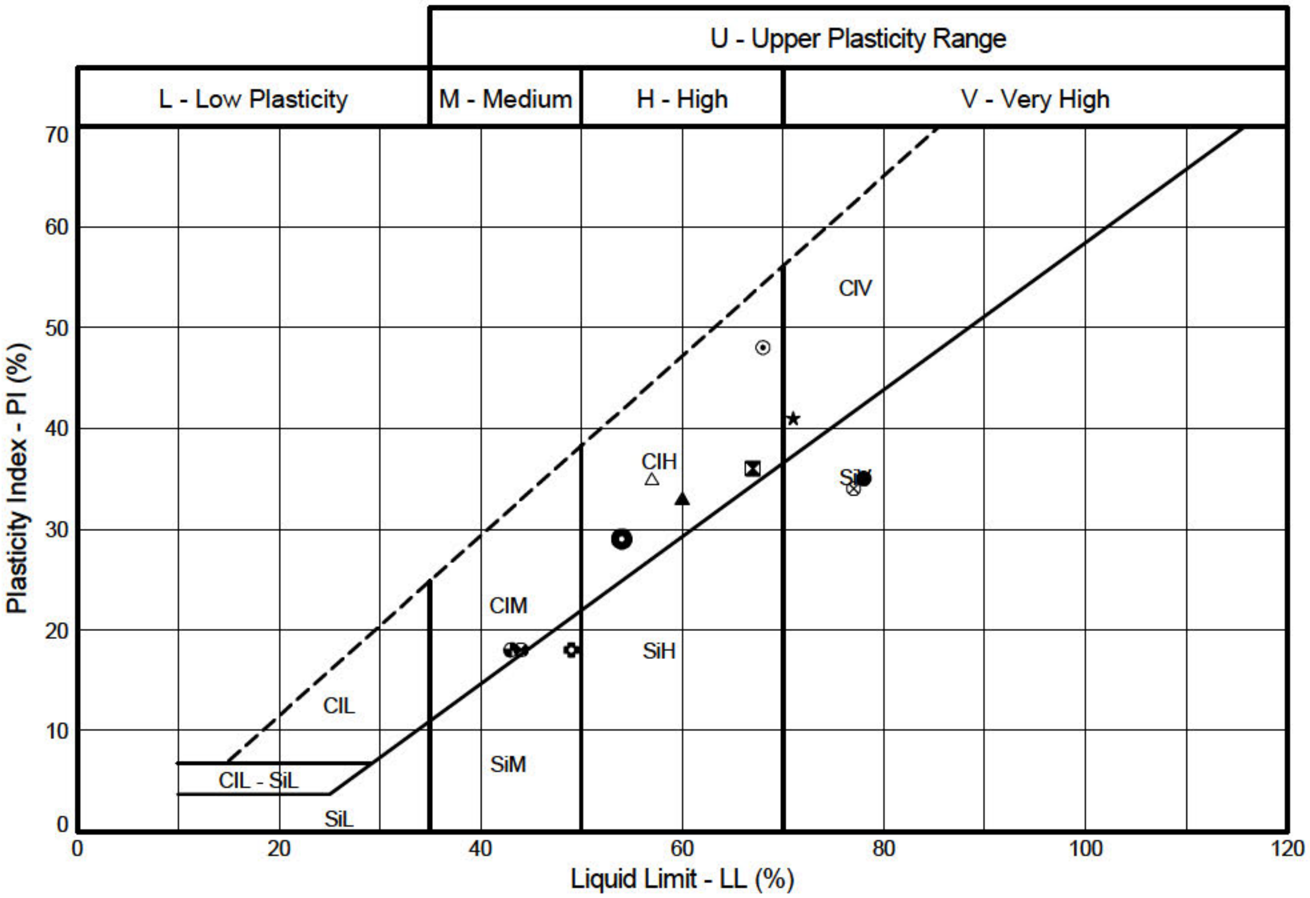
Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
MW07	7	B	4.00	126	77	43	34	94	Black silty slightly sandy very silty gravelly CLAY
WS11	3	B	0.90	37.8	NP	NP	NP	99	Brown slightly silty CLAY
WS11	4	B	1.50	34.9	NP	NP	NP	91	Brown silty slightly sandy CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD	Contract: Flixborough	Contract Ref: 785042

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018



	Sample Identification			Test Method #	Preparation Method +	WC	LL	PL	PI	<425µm	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
●	MW0	2B	0.60	5.3/5.5/6.5	5.2.7	67.4	78	43	35	99	C	
⧗	MW1	2B	0.60	5.3/5.5/6.5	5.2.7	36.4	67	31	36	100	C	
▲	MW1	3B	1.20	5.3/5.5/6.5	5.2.7	48.0	60	27	33	100	C	
★	MW05	4B	1.20	5.3/5.5/6.5	5.2.7	22.1	71	30	41	100	C	
⊙	MW05	8B	2.00	5.3/5.5/6.5	5.2.7	30.3	68	20	48	100	C	
✿	MW05	10B	3.00	5.3/5.5/6.5	5.2.7	50.6	49	31	18	100	C	
◉	MW05	11D	4.00	5.3/5.5/6.5	5.2.7	43.6	54	25	29	100	C	
△	MW07	4B	1.50	5.3/5.5/6.5	5.2.7	36.3	57	22	35	100	C	
⊗	MW07	7B	4.00	5.3/5.5/6.5	5.2.7	126	77	43	34	94	C	
	WS11	3B	0.90	5.3/5.5/6.5	5.2.7	37.8	NP	NP	NP	99	C	
	WS11	4B	1.50	5.3/5.5/6.5	5.2.7	34.9	NP	NP	NP	91	C	
⊛	WS21	1B	0.30	5.3/5.5/6.5	5.2.7	22.2	44	26	18	96	C	
◕	WS22	1B	0.30	5.3/5.5/6.5	5.2.7	19.3	43	25	18	99	C	

\# Tested in accordance with the following clauses of BS EN ISO 17892-12:2018

5.3 - Cone Penetrometer Method
5.3.14 - One-Point Cone Penetrometer Method
5.4 - Casagrande Method
5.5 - Plastic Limit Method
6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

\+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018.

5.2.1 - Natural State
5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic,
I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

[redacted]ompiled By		Date
	LORNA WHITWORTH	**09/11/21**

Contract
Flixborough

Contract Ref:
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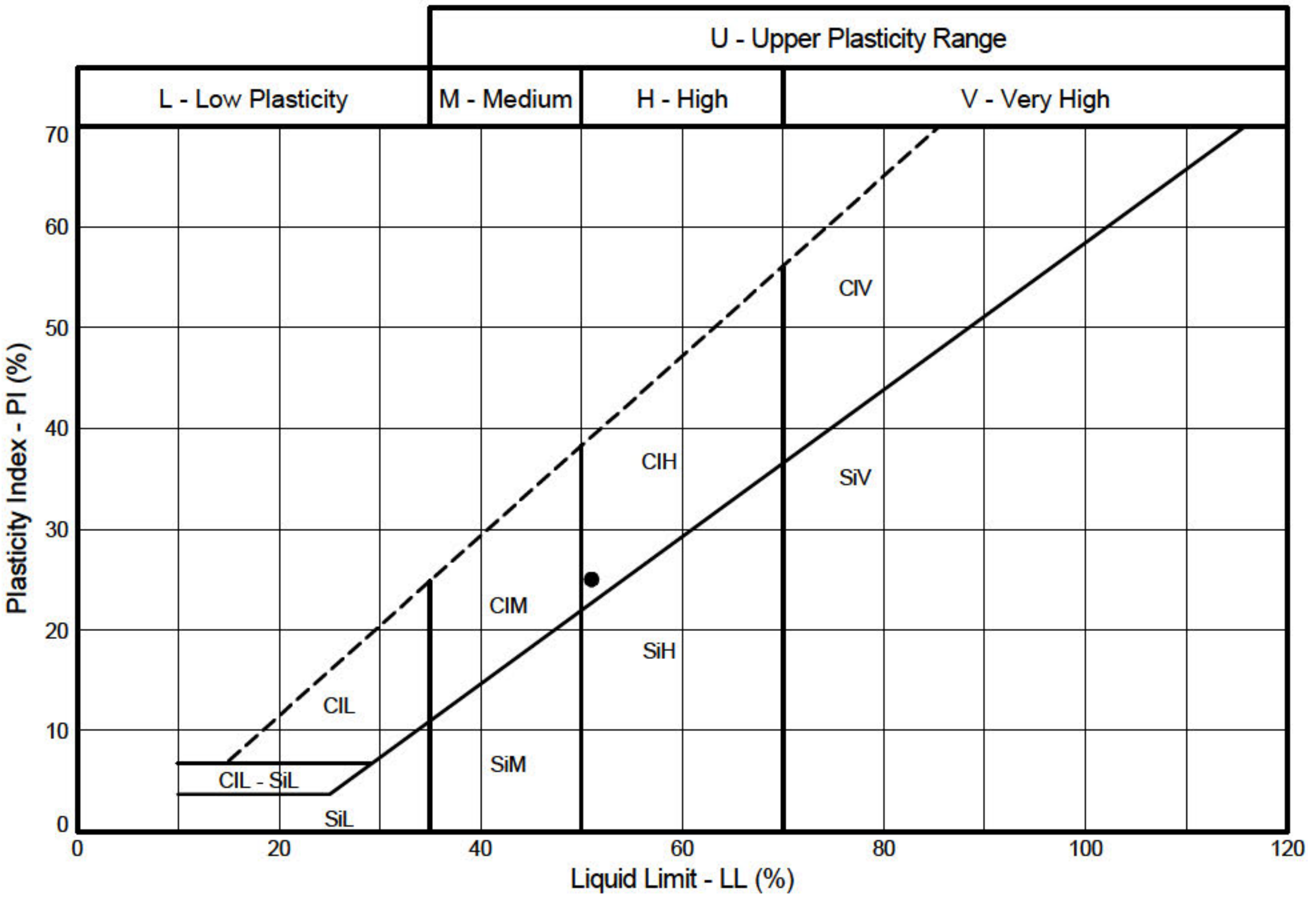
PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018



Sample Identification				Test Method #	Preparation Method +	WC %	LL %	PL %	PI %	<425µm %	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)									
●	WS26	6B	3.50	5.3/5.5/6.5	5.2.7	48.8	51	26	25	100	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018

5.3 - Cone Penetrometer Method
5.3.14 - One-Point Cone Penetrometer Method
5.4 - Casagrande Method
5.5 - Plastic Limit Method
6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018.

5.2.1 - Natural State
5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic,
I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By
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LORNA WHITWORTH

Date
09/11/21

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Flixborough

Contract Ref:
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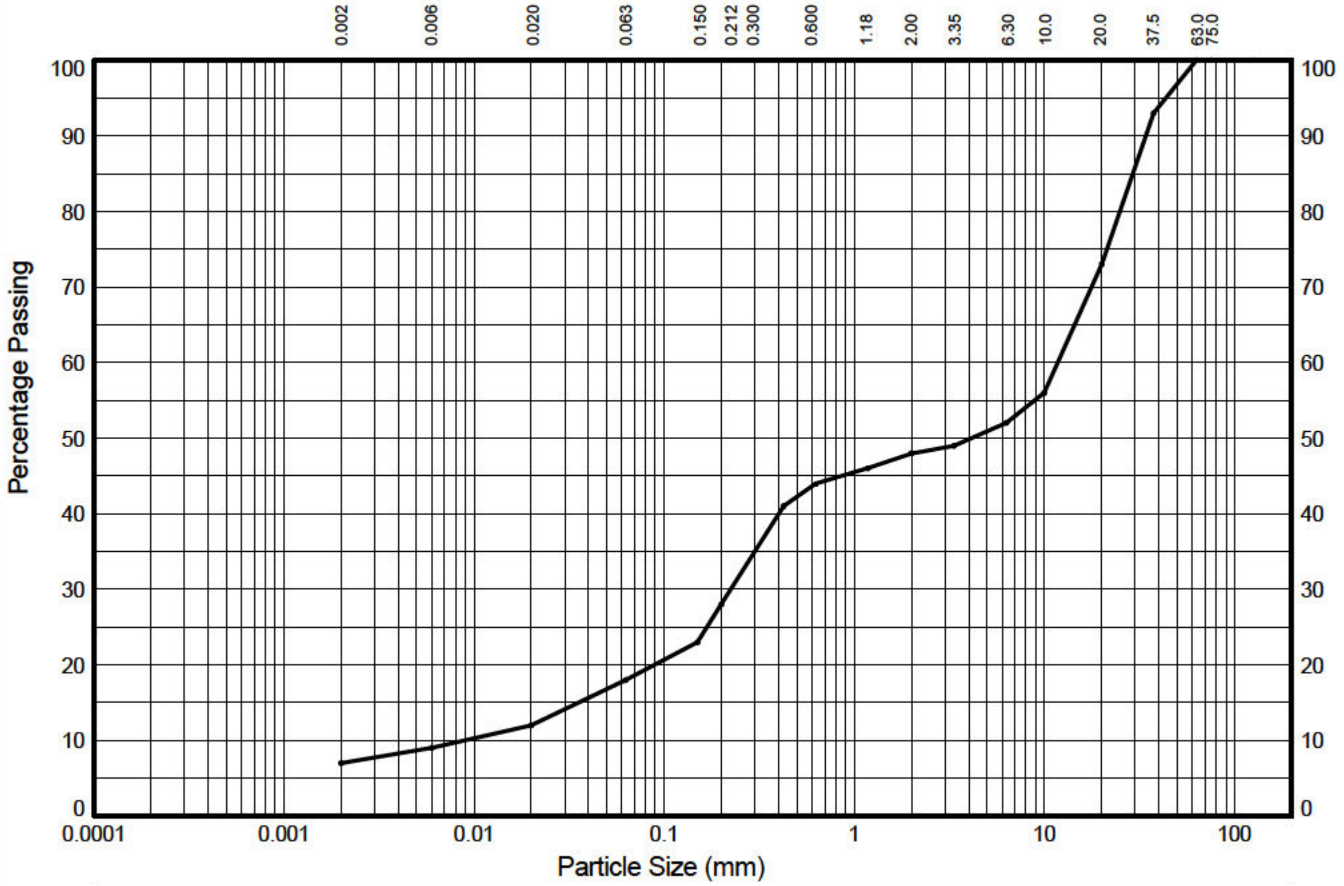
GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - ALINE STANDARD - 17892 - A4P | 785042-FLIXBOROUGH.GPJ - v10_01 | 09/11/21 - 09:53 | LW5 |
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk.

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

NON-STANDARD TEST

Position ID: **MW08** Sample Ref: **3** Sample Type: **B** Depth (m): **0.80**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	2%	3%	6%	10%	16%	4%	4%	21%	27%	
	SILT			SAND			GRAVEL			
7%	11%			30%			52%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**93**
20.0	**73**
10.0	**56**
6.30	**52**
3.35	**49**
2.00	**48**
1.18	**46**
0.630	**44**
0.425	**41**
0.200	**28**
0.150	**23**
0.063	**18**

Particle Diameter (mm)	Percent Passing (%)
0.02	**12**
0.006	**9**
0.002	**7**
Sedimentation sample was not pre-treated	

Coefficients	
D_{10} (mm)	**0.009**
D_{15} (mm)	**0.035**
D_{30} (mm)	**0.225**
D_{50} (mm)	**4.135**
D_{60} (mm)	**11.771**
D_{85} (mm)	**29.163**
D_{90} (mm)	**34.126**
C_U	**1313**
C_C	**0.48**

Soil Description:

Brown very sandy silty clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LUKE FISHER**	**11/11/21**
Contract **Flixborough**	Contract Ref: **785042**	

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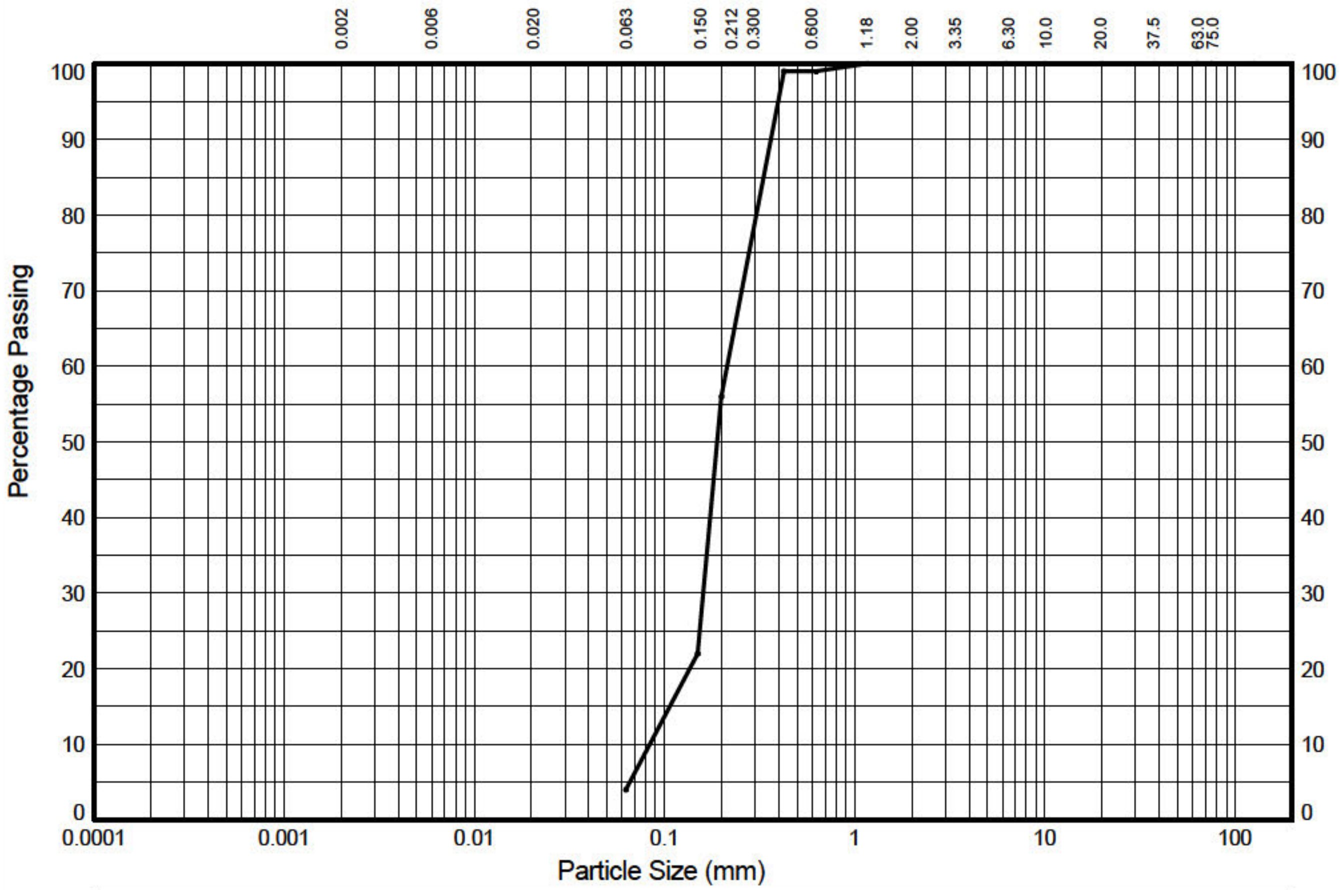
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **MW08** Sample Ref: **9** Sample Type: **B** Depth (m): **3.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	52%	43%	1%	0%	0%	0%	
	SILT			SAND			GRAVEL			
4%				96%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**100**
0.630	**99**
0.425	**99**
0.200	**56**
0.150	**22**
0.063	**4**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.084**
D_{15} (mm)	**0.107**
D_{30} (mm)	**0.161**
D_{50} (mm)	**0.190**
D_{60} (mm)	**0.215**
D_{85} (mm)	**0.333**
D_{90} (mm)	**0.363**
C_U	**2.6**
C_C	**1.4**

Soil Description:

Brown slightly clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
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Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**09/11/21**

Contract	Contract Ref:
Flixborough	**785042**

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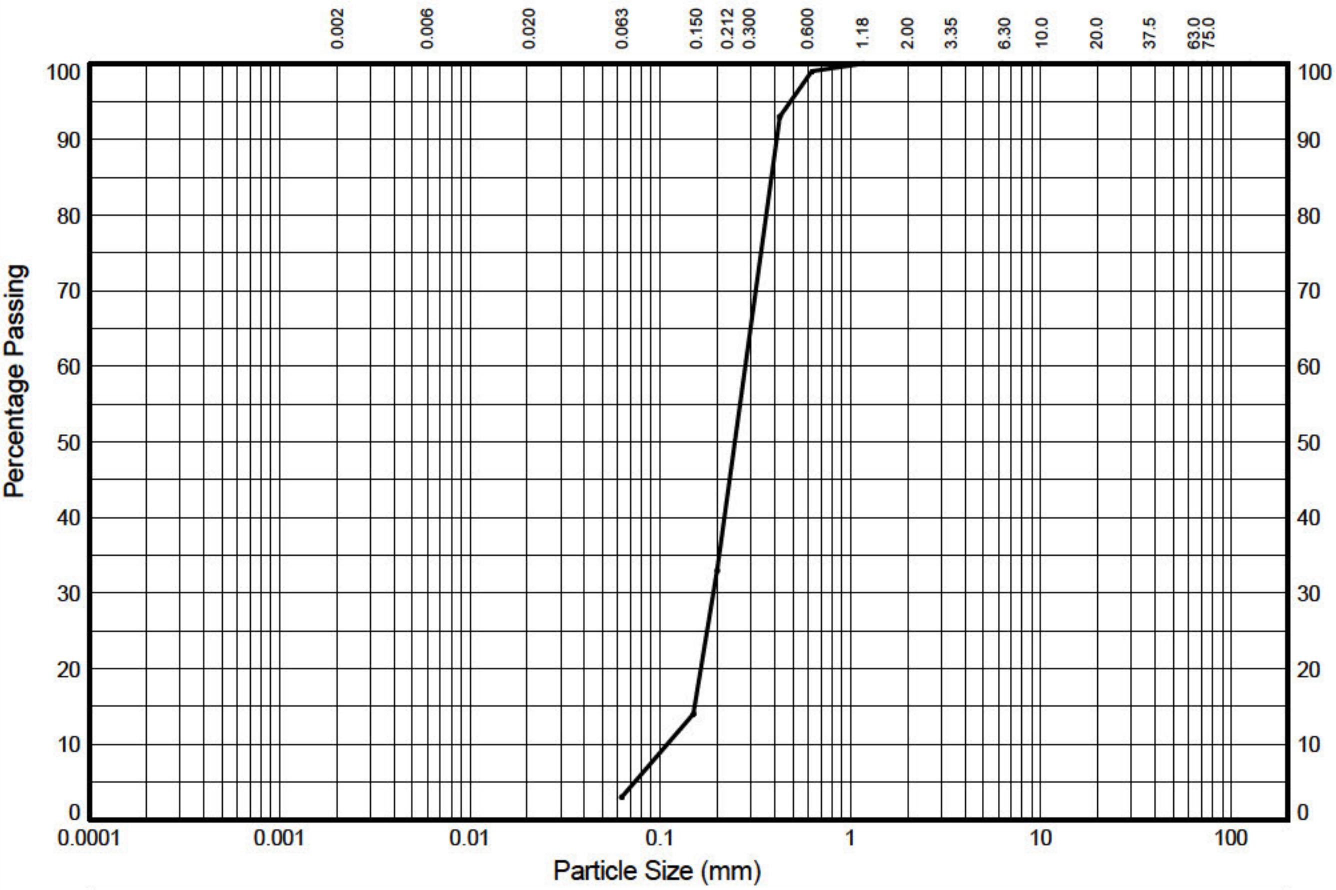
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS14** Sample Ref: **6** Sample Type: **B** Depth (m): **3.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	30%	66%	1%	0%	0%	0%	
	SILT			SAND			GRAVEL			
3%				97%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**100**
0.630	**99**
0.425	**93**
0.200	**33**
0.150	**14**
0.063	**3**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.109**
D_{15} (mm)	**0.152**
D_{30} (mm)	**0.191**
D_{50} (mm)	**0.248**
D_{60} (mm)	**0.281**
D_{85} (mm)	**0.384**
D_{90} (mm)	**0.409**
C_U	**2.6**
C_C	**1.2**

Soil Description:

Grey slightly organic SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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Compiled By		Date
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Contract	Contract Ref:
Flixborough	**785042**

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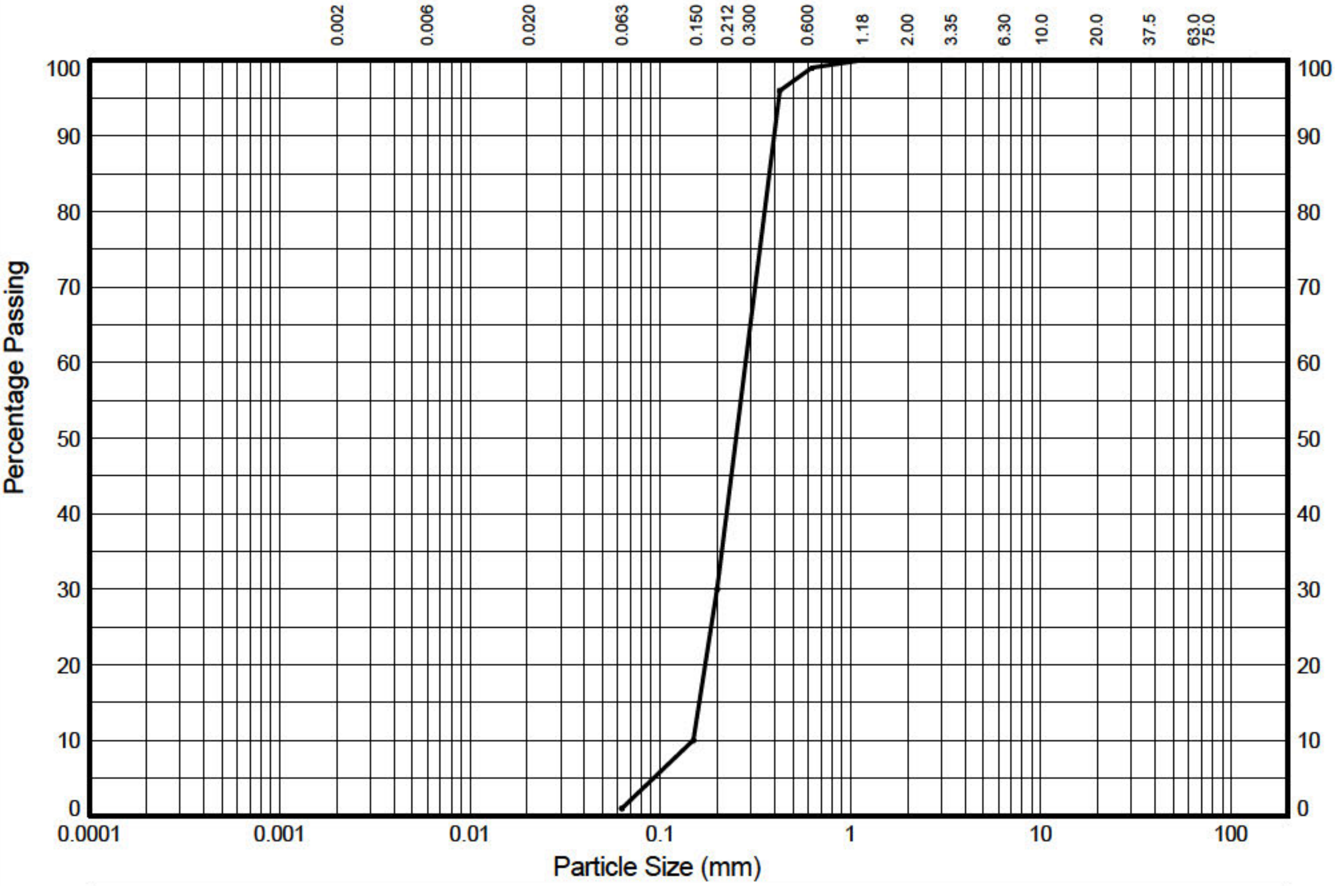
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS21** Sample Ref: **5** Sample Type: **B** Depth (m): **2.00**



	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
CLAY	-	-	-	29%	69%	1%	0%	0%	0%	COBBLES
	SILT			SAND			GRAVEL			
1%				99%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**100**
0.630	**99**
0.425	**96**
0.200	**30**
0.150	**10**
0.063	**1**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.150**
D_{15} (mm)	**0.161**
D_{30} (mm)	**0.200**
D_{50} (mm)	**0.251**
D_{60} (mm)	**0.282**
D_{85} (mm)	**0.375**
D_{90} (mm)	**0.397**
C_U	**1.9**
C_C	**0.95**

Soil Description:

Brown slightly clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**09/11/21**

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Contract Ref:

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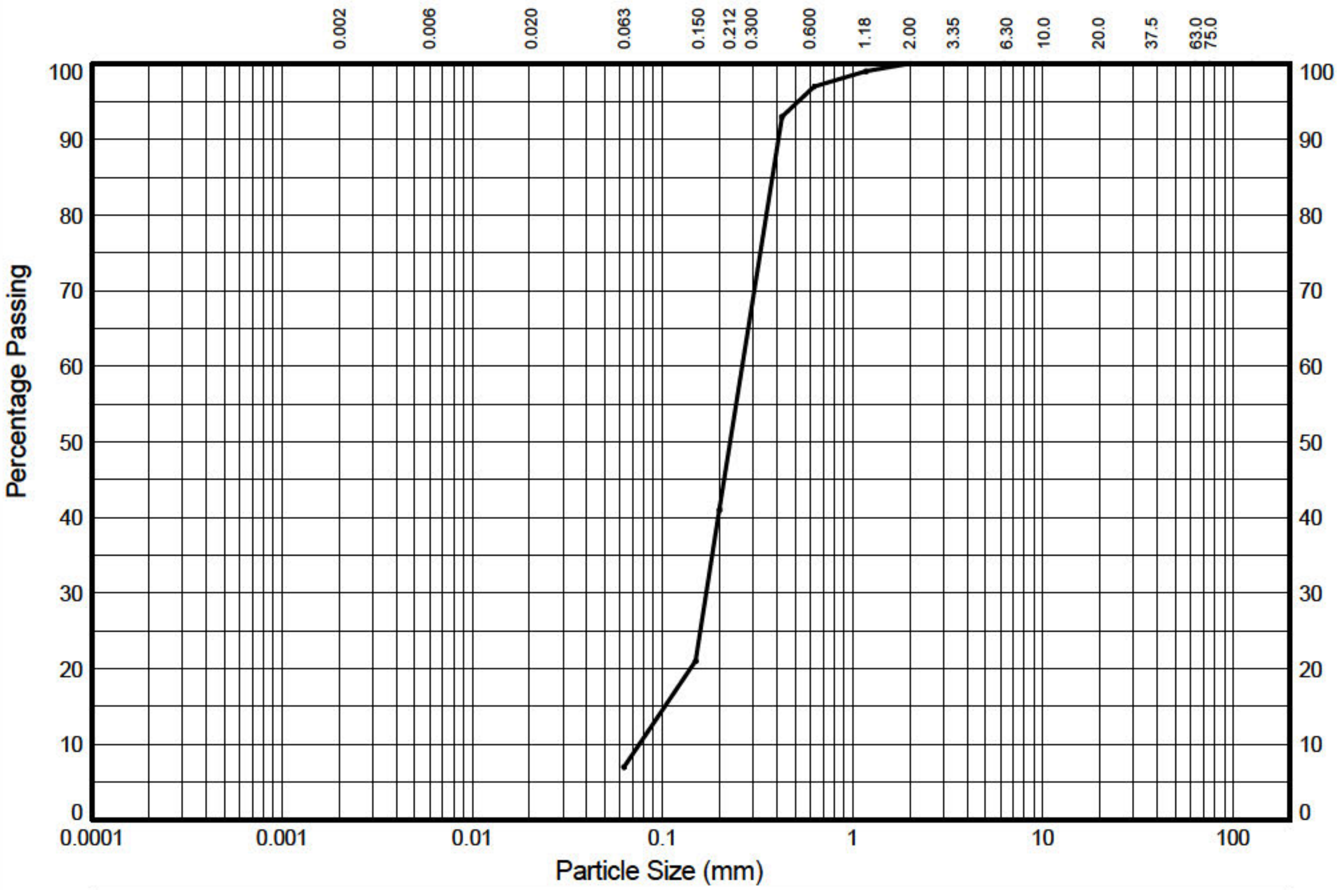
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk, | 09/11/21 - 09:55 | LW5 |

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS32** Sample Ref: **5** Sample Type: **B** Depth (m): **2.00**



CLAY	SILT fine	SILT medium	SILT coarse	SAND fine	SAND medium	SAND coarse	GRAVEL fine	GRAVEL medium	GRAVEL coarse	COBBLES
	-	-	-	34%	56%	3%	0%	0%	0%	
7%				93%			0%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**100**
1.18	**99**
0.630	**97**
0.425	**93**
0.200	**41**
0.150	**21**
0.063	**7**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.076**
D_{15} (mm)	**0.103**
D_{30} (mm)	**0.171**
D_{50} (mm)	**0.228**
D_{60} (mm)	**0.263**
D_{85} (mm)	**0.378**
D_{90} (mm)	**0.407**
C_U	**3.5**
C_C	**1.5**

Soil Description:

Brown clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**09/11/21**

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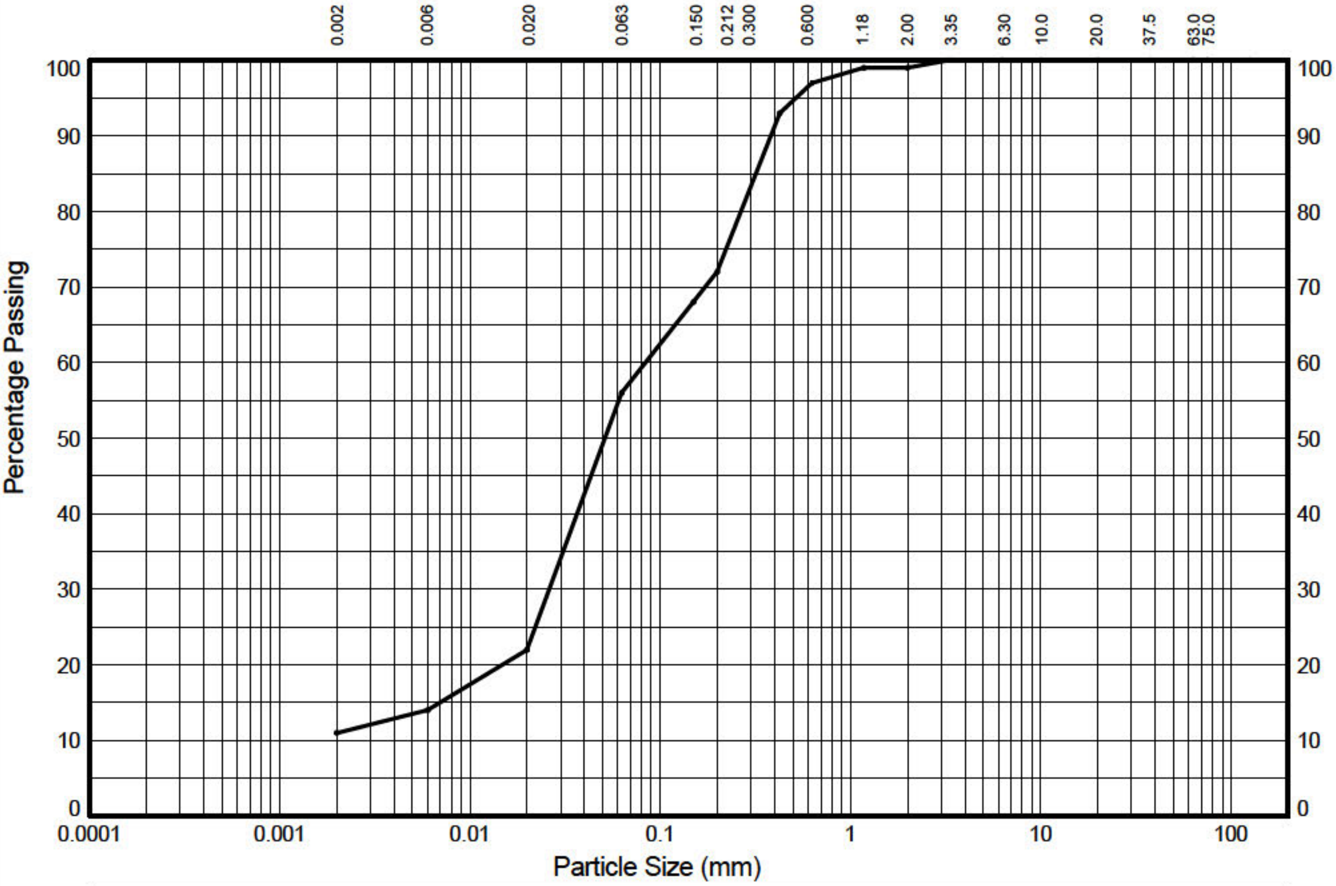
GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 785042-FLIXBOROUGH.GPJ - v10_01. Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 09/11/21 - 09:55 | LW5 |

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Window Sample: **WS35** Sample Ref: **4** Sample Type: **B** Depth (m): **1.50**



	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
CLAY	3%	8%	34%	16%	25%	2%	1%	0%	0%	COBBLES
	SILT			SAND			GRAVEL			
11%	45%			43%			1%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**99**
1.18	**99**
0.630	**97**
0.425	**93**
0.200	**72**
0.150	**68**
0.063	**56**

Particle Diameter (mm)	Percent Passing (%)
0.02	**22**
0.006	**14**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.007**
D_{30} (mm)	**0.026**
D_{50} (mm)	**0.051**
D_{60} (mm)	**0.084**
D_{85} (mm)	**0.319**
D_{90} (mm)	**0.382**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly clayey very sandy SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**LORNA WHITWORTH**	**09/11/21**

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Contract Ref:

785042

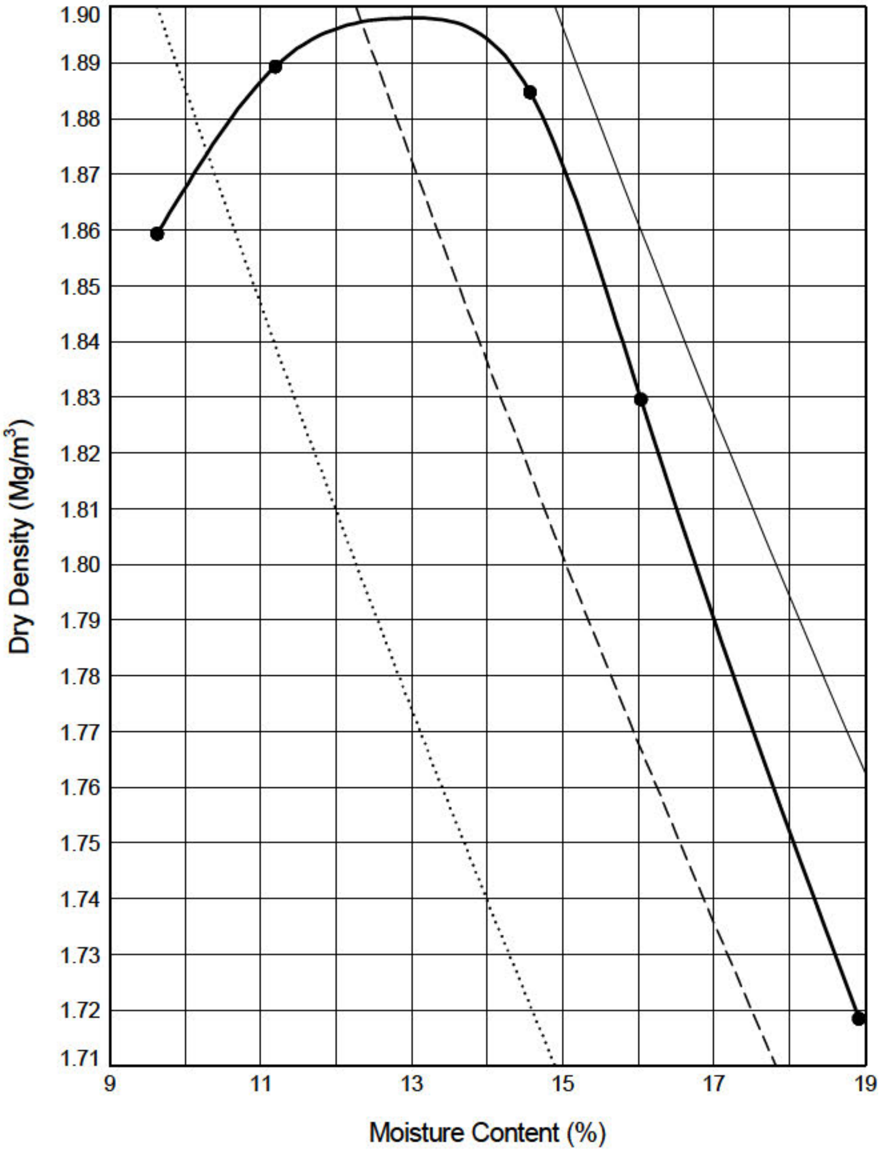
AGS

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 785042-FLIXBOROUGH.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 09/11/21 - 09:55 | LW5 |

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Position ID: **MW08** Sample Ref: **2** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions		Test Details	Test Results
Initial Moisture Content (%)	: **16**	Compaction Type : **Heavy**	Maximum Dry Density (Mg/m³) : **1.89**
% Retained on 37.5mm BS Sieve	: **0**	Mass of Rammer (kg): **4.5**	Optimum Moisture Content (%) : **11**
% Retained on 20.0mm BS Sieve	: **2**	Type of Mould : **1 LITRE**	Method Used: **Clause 3.5**
Particle Density - assumed (Mg/m³)	: **2.65**		Remarks:
Size of Soil Pieces	: **<20MM**	Single sample was used.	

Sample Description	Key to Air Voids Lines		
Brown slightly gravelly SAND	——— 0%	– – – – 5%	········· 10%

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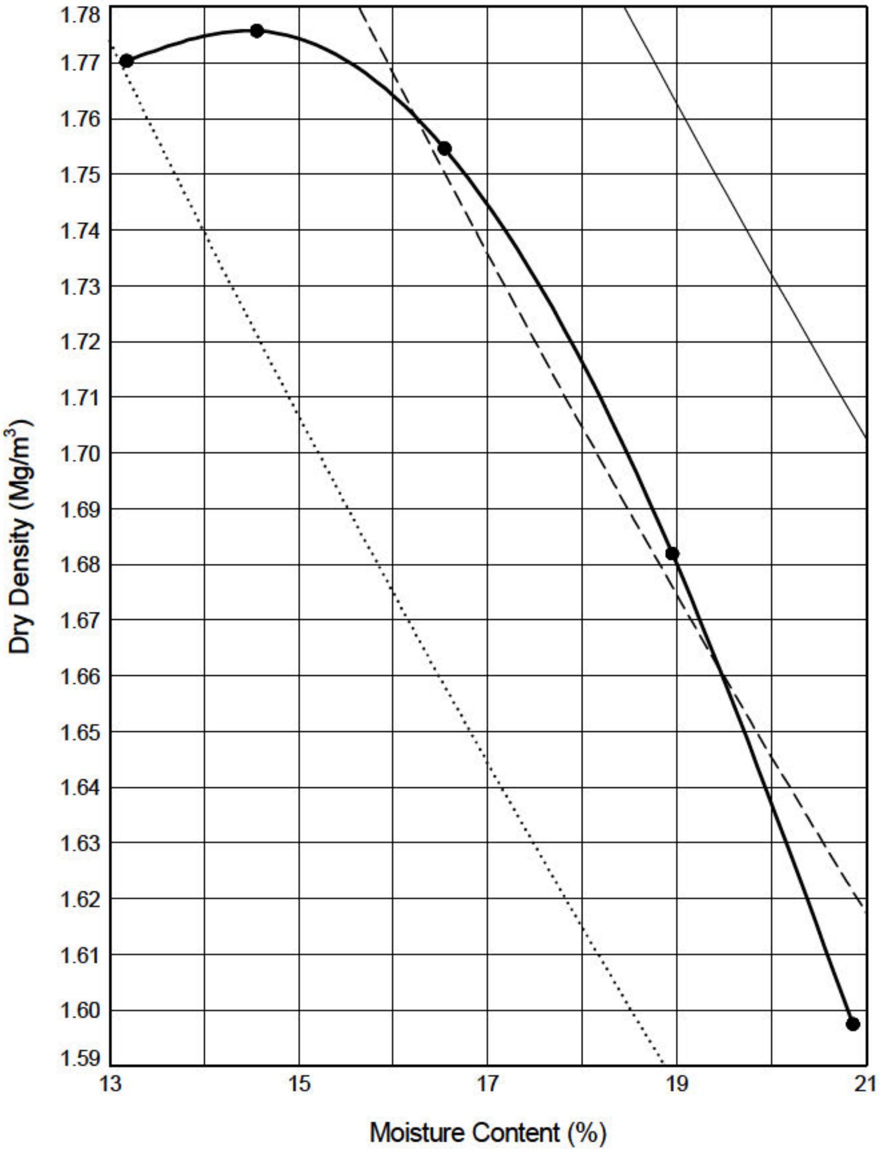
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

	Compiled By	Date
[redacted]	LUKE FISHER	09/11/21
Contract **Flixborough**	Contract Ref: **785042**	

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Position ID: **MW08** Sample Ref: **7** Sample Type: **B** Depth (m): **2.00**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **19**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	: **1.78**
% Retained on 37.5mm BS Sieve	: **0**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **15**
% Retained on 20.0mm BS Sieve	: **0**	Type of Mould	: **1 LITRE**	Method Used:	**Clause 3.5**
Particle Density - assumed (Mg/m^3)	: **2.65**			Remarks:	
Size of Soil Pieces	: **<20mm**	Single sample was used.			

Sample Description	Key to Air Voids Lines		
Brown slightly clayey SAND	——— 0%	– – – – 5%	·········· 10%

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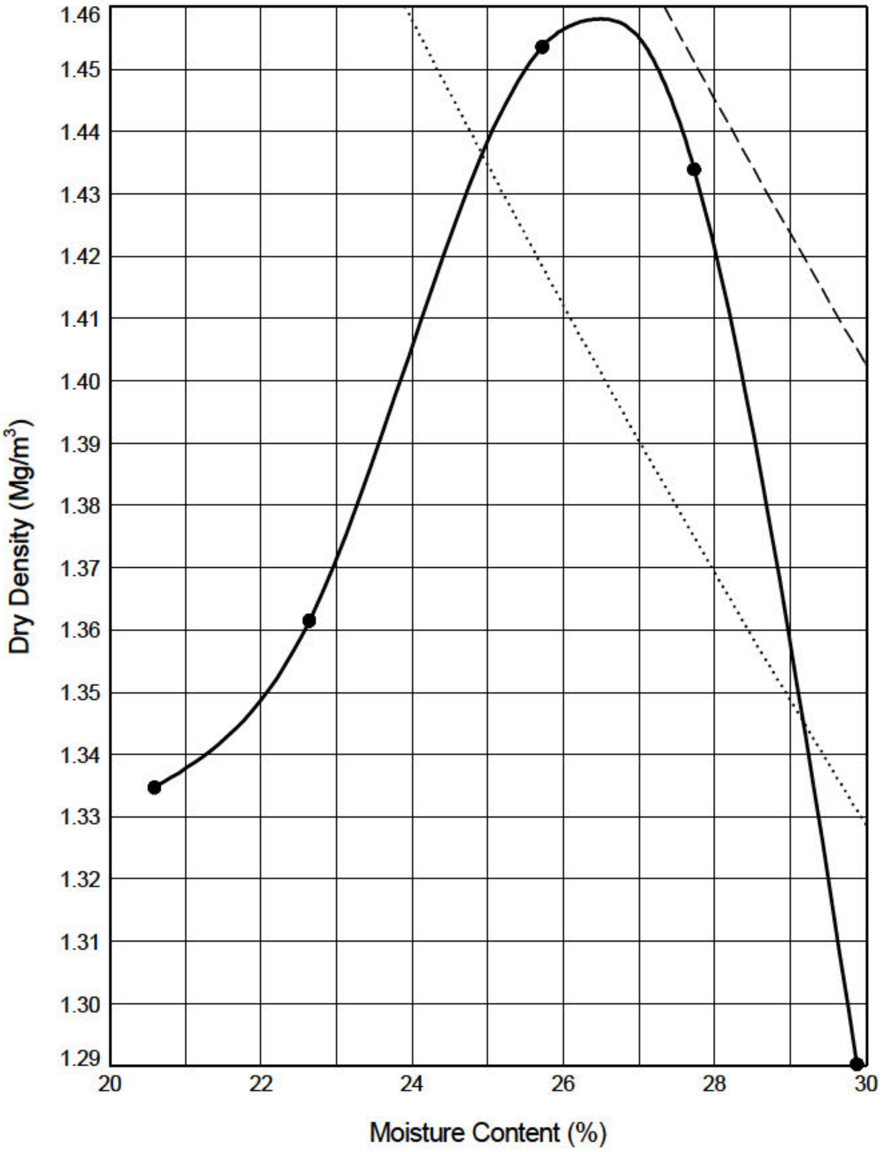
	Compiled By	Date
[redacted]	**LUKE FISHER**	**11/11/21**
Contract **Flixborough**	Contract Ref: **785042**	

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Window Sample: **WS14** Sample Ref: **2** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **28**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m³)	: **1.45**
% Retained on 37.5mm BS Sieve	: **0**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **26**
% Retained on 20.0mm BS Sieve	: **0**	Type of Mould	: **1 LITRE**	Method Used:	**Clause 3.5**
Particle Density - assumed (Mg/m³)	: **2.65**			Remarks:	
Size of Soil Pieces	: **<20mm**	Single sample was used.			

Sample Description	Key to Air Voids Lines		
Brown	——— 0%	– – – – 5%	·········· 10%

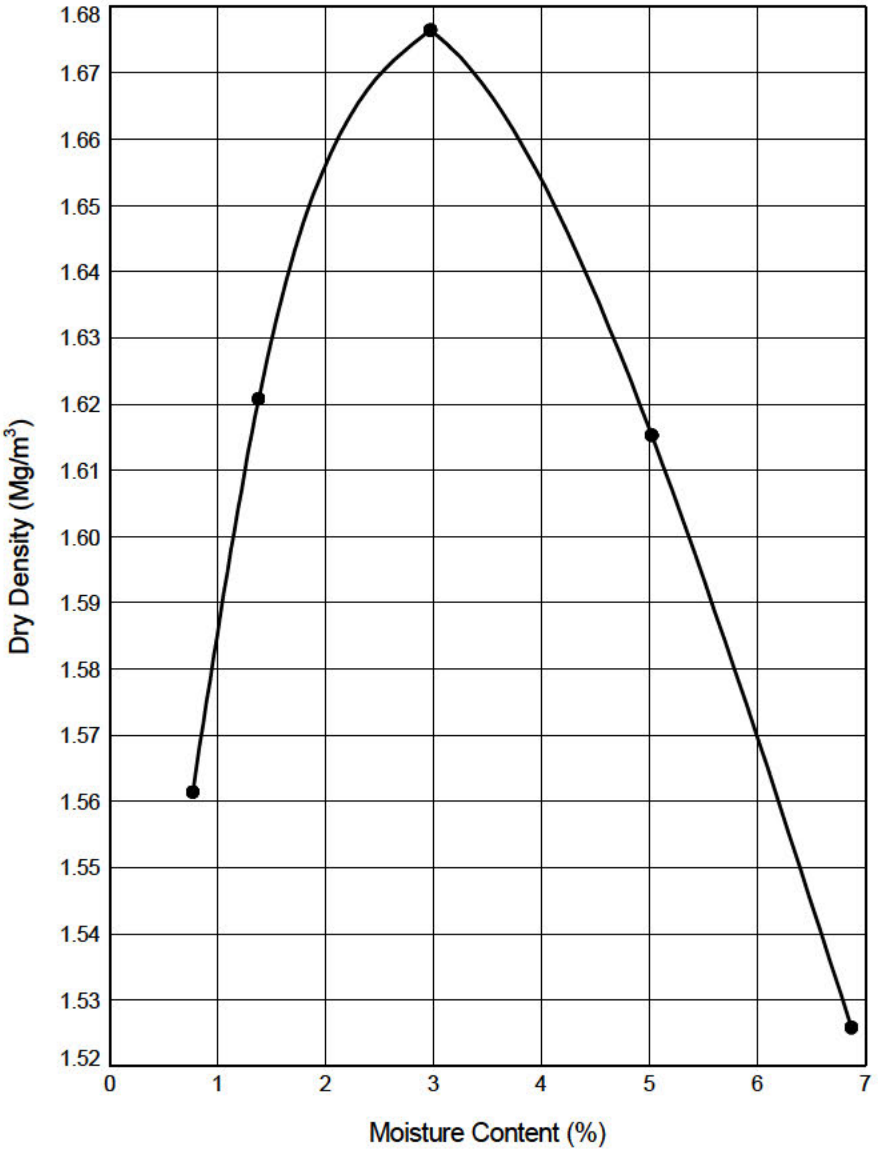
STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	[redacted] Compiled By		Date
		LUKE FISHER	**09/11/21**
	Contract **Flixborough**	Contract Ref: **785042**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - COMPACTIONS - A4P | 785042-FLIXBOROUGH.GPJ - v10_01. Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 09/11/21 - 09:56 | LW5 |

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Window Sample: **WS16** Sample Ref: **3** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions	Test Details	Test Results
Initial Moisture Content (%) : **5.0**	Compaction Type : **Heavy**	Maximum Dry Density (Mg/m^3) : **1.68**
% Retained on 37.5mm BS Sieve : **0**	Mass of Rammer (kg): **4.5**	Optimum Moisture Content (%) : **3.00**
% Retained on 20.0mm BS Sieve : **0**	Type of Mould : **1 LITRE**	Method Used: **Clause 3.5**
Particle Density - assumed (Mg/m^3) : **2.65**		Remarks:
Size of Soil Pieces : **<20MM**	Single sample was used.	

Sample Description	Key to Air Voids Lines		
Brown SAND	——— 0%	– – – – 5%	·········· 10%

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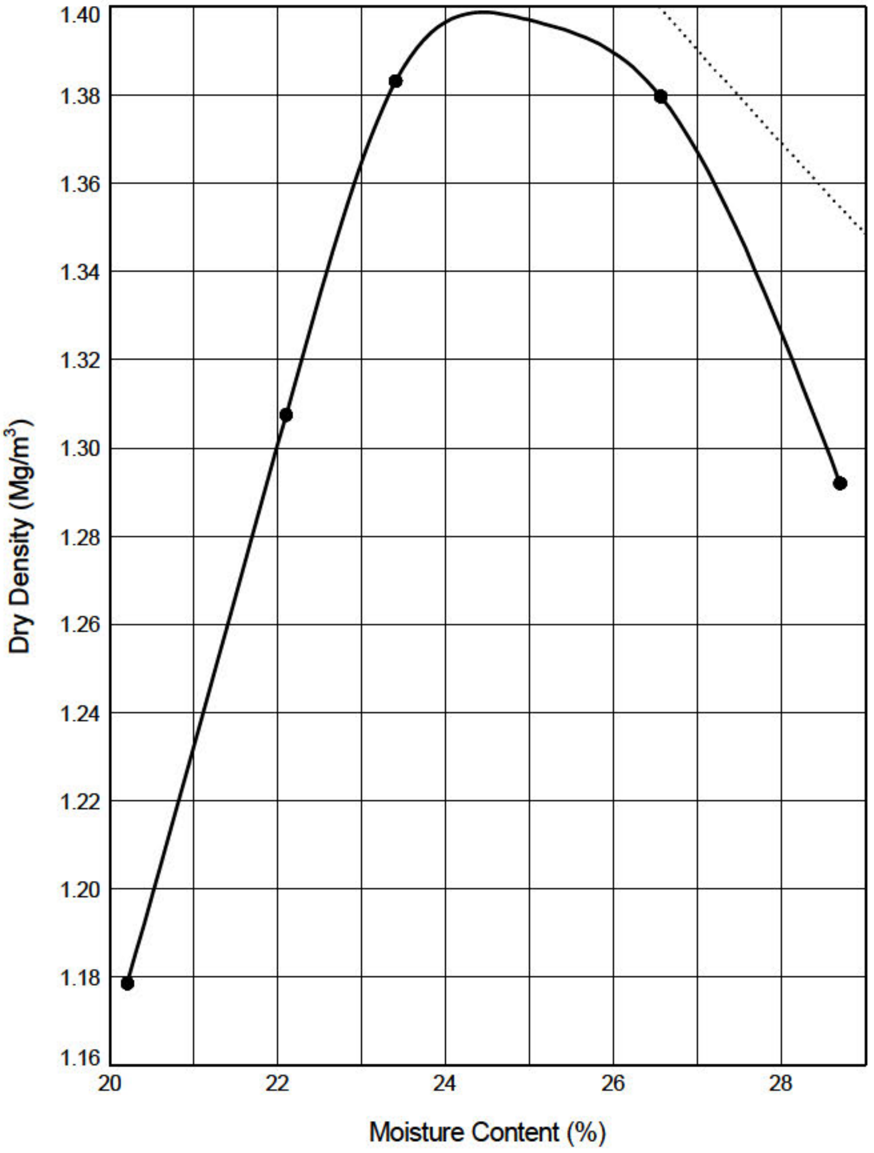
	Compiled By	Date
[redacted]	**LAURA SCHRAMM**	**11/11/21**
Contract **Flixborough**	Contract Ref: **785042**	

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Window Sample: **WS35** Sample Ref: **2** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	27	Compaction Type	**Heavy**	Maximum Dry Density (Mg/m^3)	**1.38**
% Retained on 37.5mm BS Sieve	0	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	**23**
% Retained on 20.0mm BS Sieve	0	Type of Mould	**1 LITRE**	Method Used:	**Clause 3.5**
Particle Density - assumed (Mg/m^3)	2.65			Remarks:	
Size of Soil Pieces	<20mm	Single sample was used.			

Sample Description	Key to Air Voids Lines		
Brown slightly clayey SAND	——— 0%	– – – – 5%	··········· 10%

STRUCTURAL SOILS
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Castleford
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[redacted]	Compiled By	Date
	LUKE FISHER	**09/11/21**

Contract: **Flixborough**

Contract Ref: **785042**

TESTING VERIFICATION CERTIFICATE

1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **11/11/2021 16:20:51**.

Testing reported after this date is not covered by this Verification Certificate.

[redacted]

Approved Signatory
Luke Fisher (Laboratory Manager)

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STRUCTURAL SOILS LTD	Contract: **Flixborough**	Job No: **785042**

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APPENDIX F GROUND GAS MONITORING REPORT (2022)

Date: May 2022

NORTH
LINCOLNSHIRE
GREEN
ENERGY PARK

SOLAR | 21

North Lincolnshire Green Energy Park

Ground Gas Monitoring

March 2022

The business of sustainability

ERM

Document details	The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.
Document title	North Lincolnshire Green Energy Park
Document subtitle	Ground Gas Monitoring
Project No.	
Date	March 2022
Version	0
Author	Sonia Devons
Client Name	North Lincolnshire Green Energy Park Limited

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
Draft	00	Sonia Devons	Russell Cullen	Name	00.00.0000	Text

Signature Page

March 2022

North Lincolnshire Green Energy Park

Ground Gas Monitoring

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CONTENTS

List of Figures

Acronyms and Abbreviations

Name	Description
CGS	Characteristic Gas Situation
CHP	Combined Heat and Power
CIRIA	Construction industry research and information association
DHPWN	District Heat and Private Wire Network
ERF	Energy Recovery Facility
ERM	Environmental Resources Management
GFM	Gas Flow Metre
GSV	Gas Screening Value
l/hour	Litres per hour
NGLEP	North Lincolnshire Green Energy Park
OEL	Occupational Exposure Limit
PAC	Potential Area of Concern
PID	Photoionisation Detector
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

1. INTRODUCTION

1.1.1.1 ERM understands that Solar 21 intends to construct a new Energy Recovery Facility (ERF) and Associated Development (the Project) on land near Flixborough which constitutes a thermal combustion combined heat and power (CHP) plant with a potential power output capacity of up to 100 MWe from a total thermal capacity of 316 MWth.

1.1.1.2 ERM undertook an intrusive baseline site investigation at the NGLEP site in August/September 2021 as originally set out in the proposal dated 21 June 2021, which was reported in November 2021[1]. Following completion of the site investigation, including soil and groundwater monitoring, eight rounds of ground gas monitoring were undertaken. This report is an addendum to the 2021 report presenting the results and evaluation of the ground gas monitoring results.

1.2 Site Setting

1.2.1.1 The main part of the site is located on brownfield and agricultural land to the south and east of Flixborough Wharf and south of the Flixborough Industrial Estate in North Lincolnshire. The site includes land within and adjacent to Flixborough Port (RMS Trent Ports) on the River Trent in North Lincolnshire.

1.2.1.2 The site has been split into four main areas, the NGELP land, the railway reinstatement land, the northern DHPWN land and the southern DHPWN land. Figure 1 presents the site layout. Based on the conclusions of the Phase 1[2] site assessment report, the monitoring wells detailed in this report were all installed on the NGLEP land.

1.2.2 Geology

1.2.2.1 The 2021 site investigation showed that at the northern end of the NGLEP land Made Ground was encountered to a depth of 2.2m bgl, consisting of sandy gravelly clay or gravelly sand containing slag, concrete, brick, and sandstone cobbles. The Made Ground overlies a silty, or sandy clay or sandy silt layer containing rootlets and decomposed vegetation matter with peat layers identified at some locations.

1.2.2.2 Made Ground was not encountered at the north-eastern corner of the NGLEP Land or the central and southern end of the NGLEP land where the land is predominantly agricultural. At the north-eastern corner of the NGELEP land the geology consisted of organic gravelly clay overlying gravelly or clayey sand.

1.2.2.3 At the central and southern end of the NGLERP land, topsoil consisting of sandy or silty clay with rootlets (up to a depth of 0.6m bgl) was observed to overly a silty sandy clay overlying a peat layer of varying thickness

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[1] North Lincolnshire Green Energy Plant Phase II Site Investigation, November 2021, ERM

[2] North Lincolnshire Green Energy Park, Phase I Environmental Site Assessment, January 2021, ERM

(approximately 0.6 – 4.7m thickness) which in turn overlies medium sand. The boreholes were advanced to a maximum depth of 5.5m bgl.

1.2.2.4 Bedrock was not encountered at any locations on site during the site works however this is understood to comprise of Mercia Mudstone from a depth of approximately 20m bgl.

1.2.2.5 Further details of the site geology and hydrogeology are presented in the Phase 1 Site Assessment and Phase 2 Site Investigation reports.

Figure 1-1: Site Layout

2. FIELD WORK METHODOLOGY

2.1.1.1 During the 2021 site investigation works, a deep groundwater monitoring well (screened to between approximately 3 and 5m bgl) and shallow gas monitoring well (screened between 0.5 and 1m bgl) were installed at five locations as presented in Figure 2. Both series were monitored for the ground gas.

2.1.1.2 The borehole logs for the five monitoring wells are presented in Annex A.

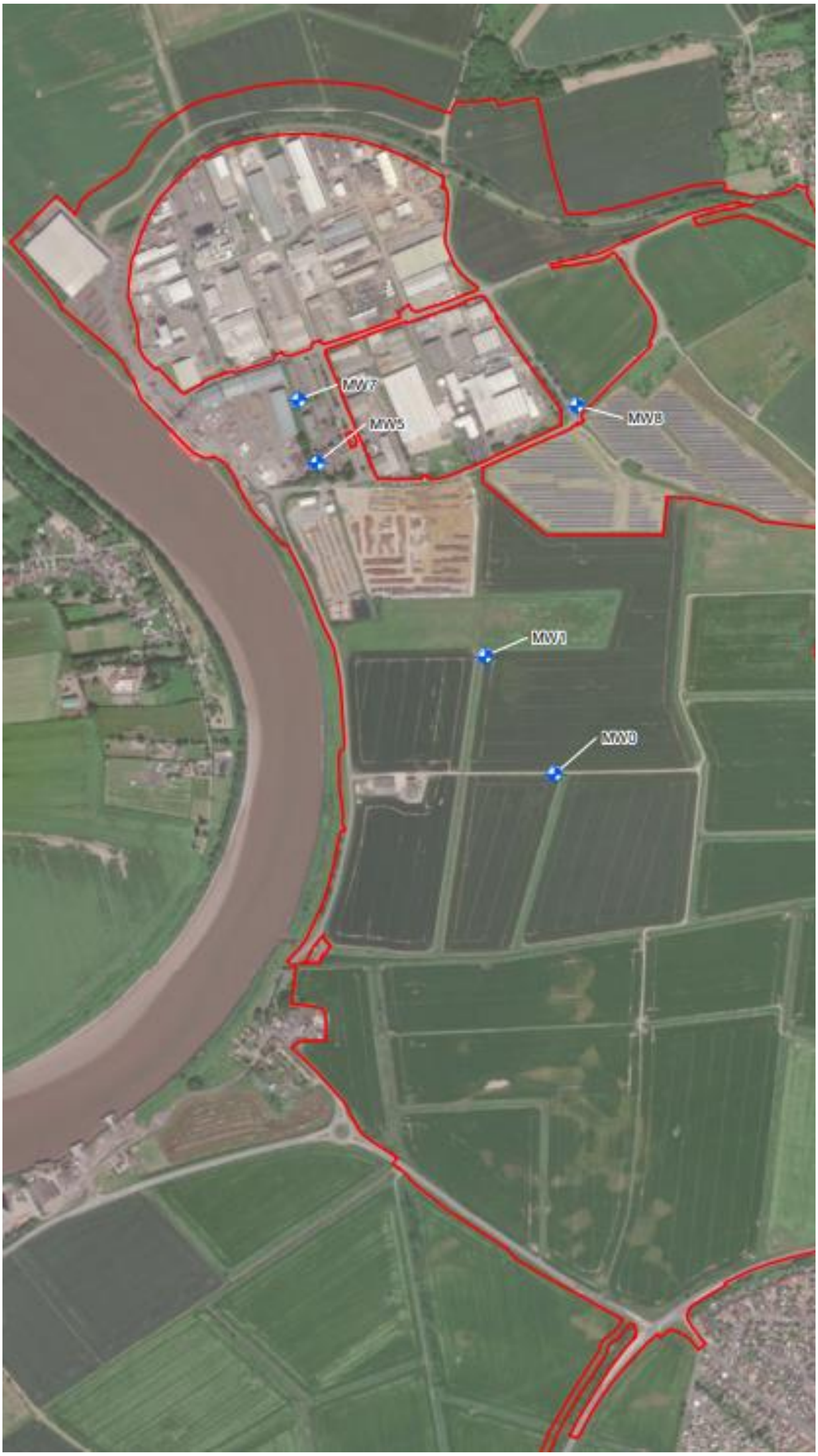
2.1.1.3 Eight rounds of ground gas monitoring were undertaken in each of the wells between September 14th and December 6th 2021, over a thirteen week period.

2.1.1.4 At each monitoring well the following measurements were undertaken:

- Concentration of Volatile Organic Compounds (VOCs) using a handheld 10.6 eV Photoionisation Detector (PID);
- Flow rate, atmospheric pressure, oxygen, methane, carbon dioxide, carbon monoxide and hydrogen sulphide concentrations using a portable gas flow meter (GFM) Landfill Analyser; and
- Depth to water and the depth to base using a hand held dip meter.

2.1.1.5 Table B1, Annex B presents the field results of the eight rounds of ground gas monitoring undertaken between September 14th and December 6th 2021. The ‘s’ series wells are the specific gas monitoring wells installed to 1m bgl. The ‘d’ series wells are the specific groundwater monitoring wells installed to between 3 and 5m bgl.

Figure 2-1: Monitoring Well Locations



3. RESULTS AND EVLAUATION

3.1.1.1 The gas monitoring results identified relatively low or concentrations or non detects of methane and carbon dioxide at all locations with the exception of potentially significant concentrations of methane (>1%) and carbon dioxide (>5%) at the following locations:

- MW1d: concentration of methane above 1% on six occasions (ranging from 1.2 to 24.2%) and the concentration of carbon dioxide wasabove 5% on seven occasions (ranging from 8 – 13%); and
- MW8d: concentration of carbon dioxide was at or above 5% on all occasions (ranging from 5 – 17.3%).

3.1.1.2 Throughout all the monitoring events barometric pressure was found to be reasonably high (>1000mb).

3.1.1.3 Barometric pressure readings from nearby private weather stations[3] indicate that barometric pressure was falling during the first two rounds of monitoring (w/c14th and 30th September) but was rising on the third and fourth monitoring events (w/c 4th and 11th October). The fifth to seventh monitoring events (w/c 18th October, 1st November and 22nd November) were undertaken during falling barometric pressure and the final event (w/c 6th December) was undertaken during rising barometric pressure.

3.2 Ground Gas Evaluation

3.2.1.1 It is possible for ground gas to accumulate to form an explosive and/or asphyxiating atmosphere when the right conditions are present. Methane is a flammable, colourless and odourless gas and is potentially explosive in the range 5% to 15% by volume, in the presence of oxygen of at least 13% by volume. In confined spaces, carbon dioxide can displace oxygen and accumulate to form asphyxiating conditions.

3.2.1.2 Ground gas concentrations were assessed against the guidance detailed within CIRIA report C665 “Assessing Risks Posed by Hazardous Ground Gases to Buildings”, 2015 British Standard “Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings” BS 8485:2015.

3.2.1.3 The guidance identifies that the assessment of risks from ground gases requires consideration of both gas concentrations and borehole flow rates whereby the combination of the two can be used to define a characteristic situation for a site based on the limiting borehole gas volume flow for methane and carbon dioxide known as the Gas Screening Value (GSV).

3.2.1.4 The GSV is calculated by multiplying the borehole flow rate (l/h) by the gas concentration (%). Table B2, Annex B presents the GSV calculated for each

---

[3] Historical data from three different weather stations; IBURTONU3, ISCUNT2, and ISCUNT7, was reviewed from the website: [redacted]

location and each round. An initial worst case check was undertaken, whereby the maximum flow recorded at any monitoring location is multiplied by the maximum gas concentration at any other location.

3.2.1.5 In line with BS8485:2015+A1:2019, where the dataset is considered to be temporarily or spatially comprehensive, a less conservative approach may then be taken. This considers the flow and gas concentration at the same location only (i.e. flows and concentrations from different boreholes are not combined).

3.2.1.6 A Characteristic Gas Situation (CGS) is then assigned dependant on the calculated GSV.

3.2.1.7 The following range of GSVs have been calculated across the site:

- A worst case check using the maximum recorded steady flow (10 l/hour at MW1d on the 14th September 2021 only) results in a GSV of 2.41 at MW1d and 1.73 at MW8d. With the exception of MW7d (GSV 0.03 l/hour) all other locations returned a GSV of between 0.07 and 0.7 l/hour.
- When considering the highest flow and gas concentration at the same location (i.e. flows and concentrations from different boreholes are not combined) all locations with the exception of MW1d returned a GSV below 0.07 l/hour. MW1d returned a GSV of 1.98 l/hour based on the high flow recorded on 14th September.

3.2.1.8 With the exception of MW1d during the first round of gas monitoring (14th September) the flow rate at all locations remained consistently low at or below 0.1 l/hour. This, combined with the location of the monitoring wells, suggests that it is acceptable to assume a low flow rate for all locations with the exception of MW1d. Five rounds of gas monitoring were undertaken during falling barometric pressure when flow rates from the monitoring wells are likely to be higher. The remaining three rounds were undertaken during rising barometric pressure. Monitoring during the 14th September was during falling atmospheric pressure although the elevated flow rate (10l/hour) was not repeated during other events undertaken during falling atmospheric pressure.

3.2.1.9 A GSV at or below 0.07 l/hour returns a CGS situation 1 and is considered to have a very low hazard potential. However if the methane concentration is >1% and Carbon dioxide > 5%, consideration should be given to increasing to CGS 2.

3.2.1.10 MW0s, MW0d, MW1s, MW5s, MW5d, MW7s, MW7d and MW8s all returned a GSV below 0.7 l/hour and methane and carbon dioxide concentrations consistently below 1% and 5% respectively. Therefore these locations can be classified as CGS 1 (very low) typical of natural soils with low organic content or "typical Made Ground".

3.2.1.11 MW8d returned a GSV consistently below 0.7 l/hour based on a flow rate of between 0 and 0.1 l/hour, however carbon dioxide concentrations of

5% or greater were measured during each monitoring round. It should therefore be considered CGS 2 (low), typical of natural soils with high organic content or "typical Made Ground". MW8 is installed in in clayey sand or sand, which may not be the source of elevated ground gas concentrations, however the permeability of the soils could allow the migration of ground gas from another nearby location.

3.2.1.12 Based on the maximum flow rate recorded at MW1d, this area should be classified as CGS 3 (medium). Based on the flow rates recorded of between 0 and 0.1 l/hour it should be classified as CGS 2 based on the recorded concentrations of methane and carbon dioxide. MW1d is installed entirely in peat which is the likely source of the elevated ground gas concentrations. MW1s, returned lower concentrations and is screened across a silty sandy clay layer with peat inclusions.

3.3 Carbon Monoxide and Hydrogen Sulphide Results

3.3.1.1 As noted in BS8485:2015+A1:2019, other trace permanent gases might also be present at lower concentrations than those of methane and carbon dioxide. A risk assessment has therefore been undertaken to assess the potential risks from detected trace permanent gases.

3.3.1.2 Carbon monoxide concentrations were generally recorded as 1ppm or less, with the exception of MW1d on the 14th September 2021 at a concentration of 31ppm. The long term eight hour Occupation Exposure Limit (OEL) for carbon monoxide, considered appropriate for a commercial / industrial land use, is 20ppm. The short term 15 minute OEL is 100ppm.

3.3.1.3 Hydrogen sulphide was not recorded above the instrument limit of detection at any of the locations.

3.3.1.4 The direct comparison of ground gas data against the OEL as above is considered to be conservative. It does not take into account the movement of soil gas to indoor air through bulk building layers such as concrete slabs or dilution of the gases once released into indoor air.

3.3.1.5 The aggregate effect of these physical and chemical attenuation mechanisms can be quantified through the use of a vapour intrusion attenuation factor, which is defined as the ratio of the indoor air concentration arising from vapour intrusion to the soil gas concentration at the source or monitoring point.

3.3.1.6 A generic attenuation factor of 0.03 is recommended for sub slab soil gas and "near source" soil gas in the 2015 USEPA OSWER publication (4). This figure is subsequently referenced in the recent UK Technical Paper 'Risk and reliability in gas protection design – 20 years on: Part 1' where it is also noted that it is reasonable to assume a floor slab construction will provide an

---

(4) OSWER Technical Guide for Assessing and Mitigating the Vapour Intrusion Pathway from Subsurface Vapour Sources to indoor Air, USEPA, June 2015

attenuation factor of at least 100 (0.01) between gas concentrations in the ground and the interior of a building ⁽⁵⁾.

3.3.1.7 Although these are generic attenuation factors, they indicate that the marginal soil gas exceedances recorded for carbon monoxide at MW1d, when conservatively compared directly against OEL, are considered very unlikely to represent a significant risk to future site users when taking into account attenuation and dilution.

---

(5) Risk and reliability in gas protection design - 20 years on: Part 1, Ground Engineering , Card Lucas and Wilson, August/September 2019

4. CONCLUSIONS AND RECOMMENDATIONS

4.1.1.1 Eight rounds of ground gas monitoring were undertaken at five locations (shallow and deep at each location) on the NGLEP Land between September and December 2021.

4.1.1.2 Based on the monitoring results, the majority of locations returned a gas characteristic scenario 1 (very low) indicative of natural ground with low organic content or ‘typical’ Made Ground.

4.1.1.3 MW8d has returned a CGS 2 (low), typical of natural soils with high organic content or "typical Made Ground".

4.1.1.4 At MW1d, the proposed site of the Polymer Plant, a GCS of 2 to 3 (medium) was calculated depending on the flow rate. It is likely that the elevated carbon dioxide and methane concentrations are due to the underlying peat layers in the superficial deposits.

4.1.1.5 Both CGS 2 and CGS 3 may require gas remedial measures incorporated into the project design. Therefore further gas monitoring and a gas detailed quantitative risk assessment (DQRA) is recommended to inform the detailed design of buildings in these areas.

4.1.1.6 Due to the Made Ground conditions it was not possible to install monitoring wells in the wharf area (northern NGLEP land) during the site investigation. Although concentrations of carbon dioxide and methane were low across the majority of locations, with the exception of MW1d and MW8d, the presence of peat layers across the NGELP do require further investigation once the footprints of the proposed development have been finalised.

APPENDIX A BOREHOLE LOGS

March 2022

Boring/ Well ID: MW0

Drill Start/End Date: 08-Sep-2021 / 08-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: M.W
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

Northing: 413791.06
Easting: 486659.05
Surface Elevation: 3.0 m AOD
Datum Elevation: 3.0 m AOD
Borehole Diam./Depth: 100 mm / 5.5 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

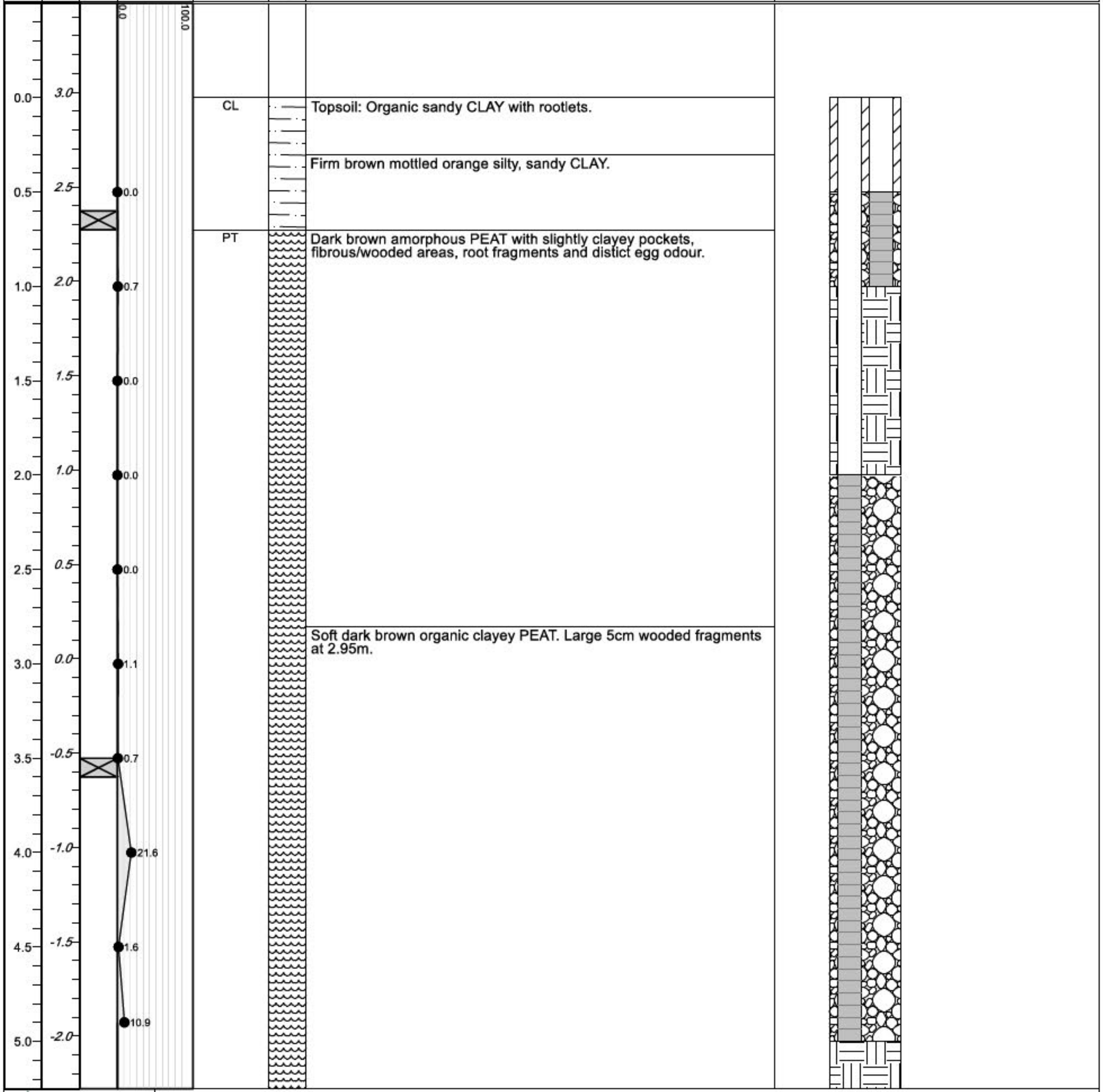
Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

WELL CONSTRUCTION

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithology	Stratigraphic Description



Topsoil: Organic sandy CLAY with rootlets.

Firm brown mottled orange silty, sandy CLAY.

Dark brown amorphous PEAT with slightly clayey pockets, fibrous/wooded areas, root fragments and distict egg odour.

Soft dark brown organic clayey PEAT. Large 5cm wooded fragments at 2.95m.

Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter
m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surface

ERM

Boring/ Well ID: MW0

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithology	Stratigraphic Description	WELL CONSTRUCTION
			0.0 100.0	PT		Soft dark brown organic clayey PEAT. Large 5cm wooded fragments at 2.95m.	
				SW		Grey medium SAND.	
5.5	-2.5						
6.0	-3.0						
6.5	-3.5						
7.0	-4.0						
7.5	-4.5						
8.0	-5.0						
8.5	-5.5						
9.0	-6.0						
9.5	-6.5						
10.0	-7.0						
10.5	-7.5						
11.0	-8.0						
11.5	-8.5						
12.0	-9.0						

Remarks:

SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter

m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surface

Sheet: Page 2 of 2

Boring/ Well ID: MW1

Drill Start/End Date: 08-Sep-2021 / 08-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0.3 m

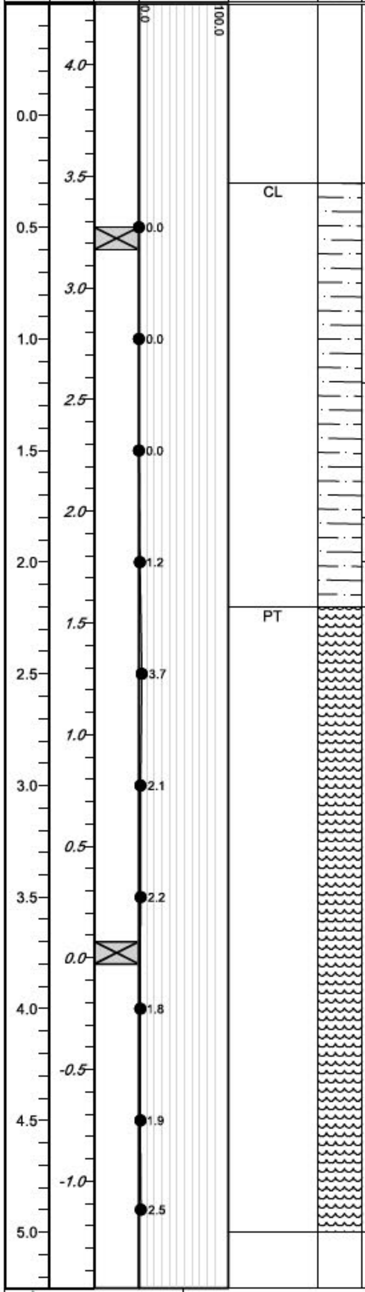
Northing: 413999.65
Easting: 486534.98
Surface Elevation: 3.8 m AOD
Datum Elevation: 3.8 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE

Depth (m)	Elevation (m AOD)	Sample Interval	PID (ppm)	USCS	Lithiolgy	Stratigraphic Description



Soft brown mottled orange silty sandy CLAY with peat inclusions.

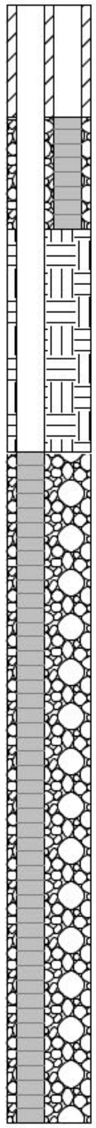
Firm dark brown mottled orange and brown silty CLAY.

Soft dark brown and black silty CLAY.

Dark grey and black silty CLAY with rootlets and wooden fragments.

Dark brown amorphous PEAT with rootlets, wooden fragments, fibrous peat and distict odour of rotten eggs.

WELL CONSTRUCTION



Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter
m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surface

Sheet: Page 1 of 1

Boring/ Well ID: **MW5**

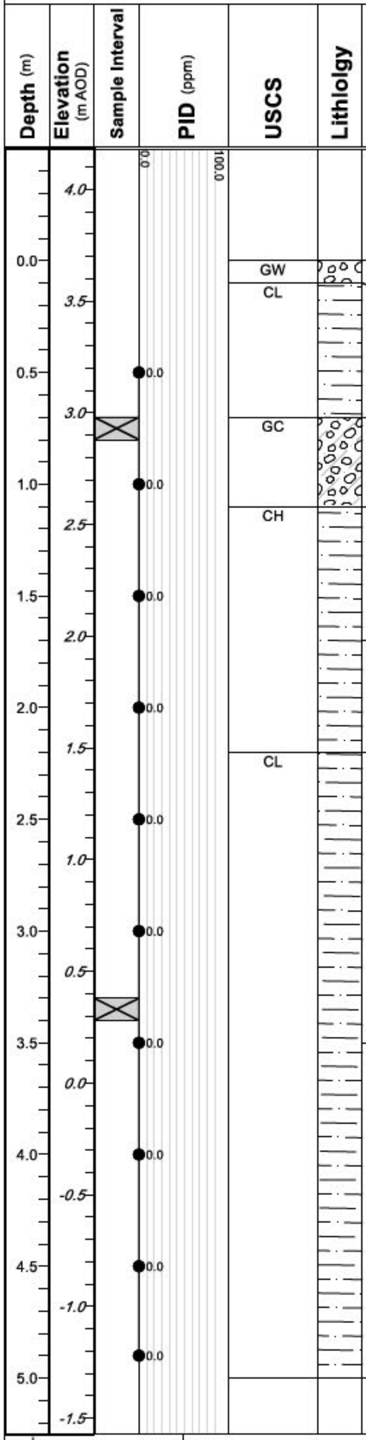
Drill Start/End Date: 31-Aug-2021 / 31-Aug-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

Northing: 414370.75
Easting: 486199.44
Surface Elevation: 3.7 m AOD
Datum Elevation: 3.7 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

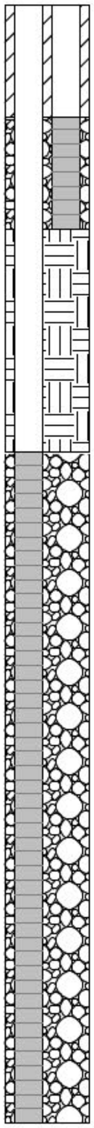
Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE



USCS	Stratigraphic Description
GW	Made Ground: Brown sandy landscaping AGGREGATE.
CL	Brown sandy, gravelly low plasticity CLAY with cobbles. Sand is medium to coarse. Gravel is angular to well-rounded fine to coarse. Cobbles are angular of slag and aggregate.
GC	Brown sandy, clayey, GRAVEL with cobbles. Gravel is well rounded. Cobbles are concrete up to 200mm across.
CH	Soft brown sandy gravelly medium plasticity CLAY with rootlets, rare wooded fragments andorganic fragments. Sand is fine to coarse. Gravel is subrounded to angular fine to medium slags and concrete.
	Soft brown mottled grey sandy gravelly high plasticity CLAY with rootlets. Sand is fine to coarse. Gravel is subrounded to angular fine to medium slags and concrete.
CL	Soft grey brown silty CLAY with rare sandy and gravel inclusions and rare rootlets.
	Grey - dark grey moist silty high plasticity CLAY.

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance	m - meter
PID - Photoionization Detector	ppm - parts per million
NA - not available or not applicable	AOD - Above Ordance Datum
mm - millimeter	m bgs - meters below ground surface

Sheet: Page 1 of 1

Boring/ Well ID: MW6

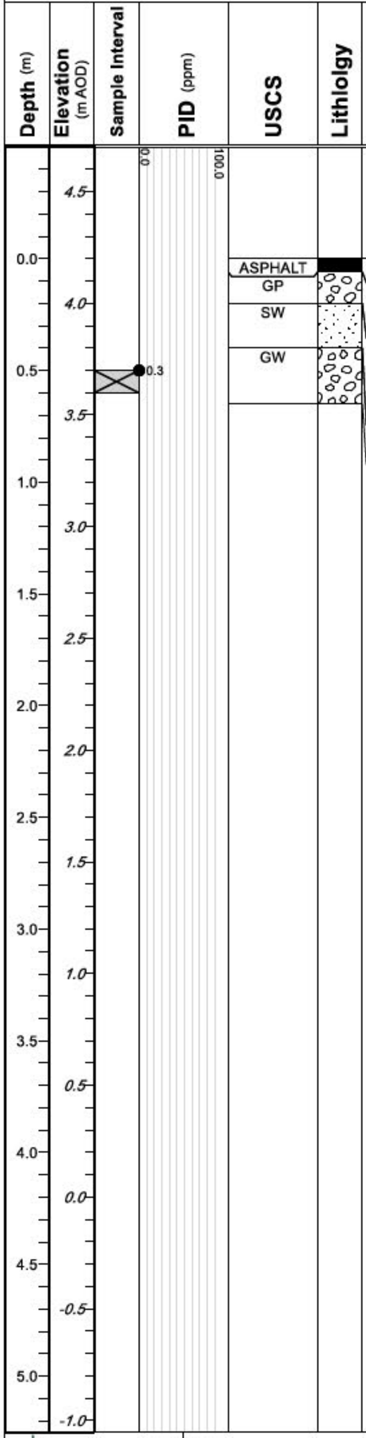
Drill Start/End Date: 02-Sep-2021 / 10-Nov-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 0 m

Northing: 414435.05
Easting: 486073.20
Surface Elevation: 4.2 m AOD
Datum Elevation: 4.2 m AOD
Borehole Diam./Depth: 50 mm / 0.7 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

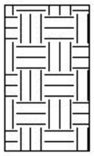
Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE



USCS	Stratigraphic Description
ASPHALT	MADE GROUND: Tarmacadam
GP	MADE GROUND: Grey sandy concrete and limestone. Sand is fine to coarse. Concrete and limestone are angular to subrounded medium.
SW	
GW	MADE GROUND: Light greyish brown gravelly SAND with medium cobble content. Sand is medium. Gravel is angular to subrounded fine and medium concrete, slag and limestone. Cobbles are angular concrete and slag. Slag boulder obstruction at 0.30m to 0.50m (300mm x 200mm).
	MADE GROUND: Grey sandy COBBLES. Sand is medium. Cobbles are angular and subangular of concrete and slag.

WELL CONSTRUCTION



Remarks:

SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter
m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surface

ERM

Boring/ Well ID: **MW7**

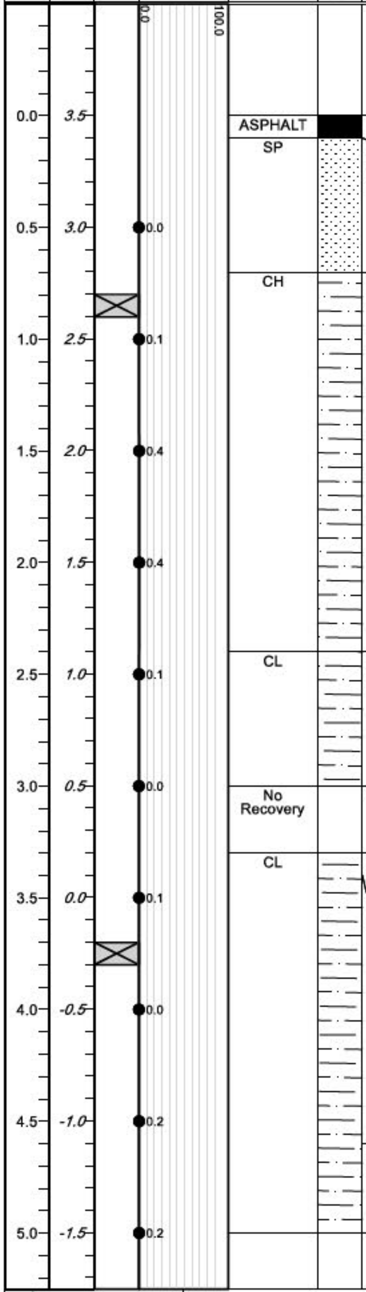
Drill Start/End Date: 01-Sep-2021 / 01-Sep-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 414488.84
Easting: 486164.50
Surface Elevation: 3.5 m AOD
Datum Elevation: 3.5 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

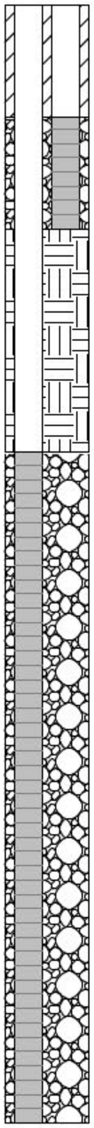
Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE



USCS	Stratigraphic Description
ASPHALT	Made ground: TARMACADAM and GRAVEL. Gravel is fine to coarse.
SP	Made ground: Brown gravelly SAND with cobbles. Sand is fine to coarse. Gravel is fine to coarse of slag, concrete and brick. Cobbles are medium of slag, concrete and brick.
CH	Soft to firm dark brown mottled grey slightly sandy silty high plasticity CLAY with dark organic staining.
CL	Soft to very soft grey/brown mottled orange and yellow silty high plasticity CLAY with dark organic staining.
No Recovery	No recovery
CL	Soft to very soft grey/brown mottled orange and yellow silty high plasticity CLAY with dark organic staining.
	Soft grey/brown slightly silty CLAY and amorphous PEAT with root/stem fragments.
	Soft grey/brown slightly silty CLAY and amorphous PEAT with root/stem fragments. 2cm wooded horizon at 4.85m.

WELL CONSTRUCTION



Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter
m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surface

Boring/ Well ID: **MW8**

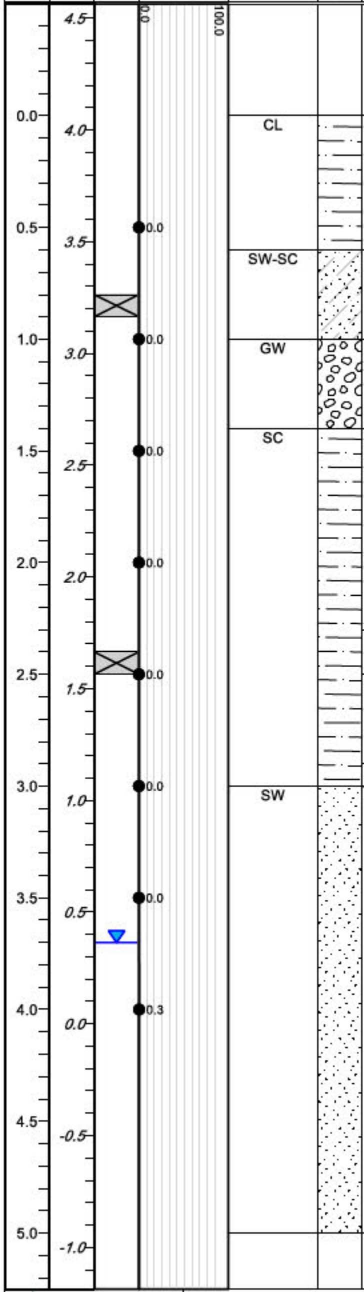
Drill Start/End Date: 31-Aug-2021 / 31-Aug-2021
Drilling Contractor: Geotron
Drilling Method: Direct Push
Rig Make/Model: Dart
Driller: MW
SSC Contractor: Geotron
SSC Method: Shovel
SSC Diam./Depth: 100 mm / 1.5 m

Northing: 414480.80
Easting: 486698.36
Surface Elevation: 4.1 m AOD
Datum Elevation: 4.1 m AOD
Borehole Diam./Depth: 100 mm / 5.0 m
Water Encountered: 3.7 m bgs
Logged By: LR
Reviewed By: SFD

Client: Solar 21

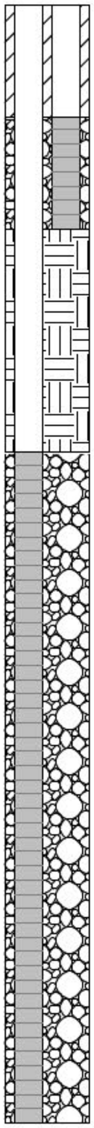
Site Name: Solar 21 NLGEP
Location: Flixborough

SOIL PROFILE



USCS	Stratigraphic Description
CL	Topsoil: Brown organic gravelly sandy CLAY.
SW-SC	Light brown orangey clayey SAND with cobbles. Cobbles are subrounded to rounded of flat flint.
GW	Yellow/brown highly compacted sandy gravelly COBBLES. Sand is coarse. Gravel is rounded to angular fine to coarse. Cobbles are limestone and flint.
SC	Soft to firm brown clayey SAND with darker patches of coarse grained sand and silt.
	Firm orangey brown clayey SAND with black organic streaking.
	Orangey light brown clayey SAND. Sand is fine to medium.
	Light brown clayey SAND. Sand is fine to medium.
SW	Light brown SAND. Sand is fine to medium.

WELL CONSTRUCTION



Remarks:
SSC - Subsurface Clearance
PID - Photoionization Detector
NA - not available or not applicable
mm - millimeter
m - meter
ppm - parts per million
AOD - Above Ordance Datum
m bgs - meters below ground surface

ERM

APPENDIX B RESULTS TABLES

Table B1: Field Results

Flixborough Gas Monitoring: w/c 13th September 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.84	4.945	0.2	1023	0.8	0.3	1.4	0.3	20.5	20.1	0	0	1	1	0.1
MW0s			0.2	1023	0.2	0.1	1	1	20.1	20.1	0	0	1	0	0.1
MW1d	1.715	4.965	0	1047	19.8	19.8	13.1	13	11	11	0	0	32	31	10
MW1s	Dry		1.8	1047	0.3	0.3	4.1	4.1	19.2	19.2	0	0	1	1	0.1
MW5d	1.77	4.86	1.2	1037	0.2	0.2	2.3	2.3	18.9	18.9	0	0	1	0	0.1
MW5s	Dry		0.2	1037	0.2	0.1	2.7	1.6	19.7	19.7	0	0	0	0	0.1
MW7d	1.92	4.93	0	1047	0.1	0.1	0.1	0.1	20.9	20.9	0	0	1	0	0.1
MW7s	Dry		0.2	1047	0.1	0.1	0.2	0.2	20.5	20.5	0	0	1	0	0.1
MW8d	2.45	4.62	2.7	1023	0.1	0.1	5	5	15.9	15.9	0	0	1	1	0.1
MW8s	Dry		0.6	1023	0.3	0.1	3.1	3	18.9	18.9	0	0	2	0	0.1

Flixborough Gas Monitoring: w/c 27th September 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.82	5	0	1012	0	0	0	0	20.6	20.6	0	0	0	0	0.1
MW0s	0.81	1.02	0	1012	0	0	0	0	20.5	20.5	0	0	0	0	0.1
MW1d	1.47	5.06	0	1012	22.2	22.2	12	12	12	12	0	0	0.466	0.466	0.1
MW1s	Dry	1	0	1012	0	0	2.5	2.5	19.1	19.1	0	0	0	0	0.1
MW5d	1.51	4.83	0	1012	0	0	1.1	1.1	18.8	18.8	0	0	0.001	0.001	0.1
MW5s	Dry	1.05	0	1012	0	0	0.8	0.8	19.3	19.3	0	0	0	0	0.1
MW7d	1.38	4.83	0.1	1012	0	0	0.2	0.2	20.3	20.3	0	0	0	0	0
MW7s	Dry	1.03	0	1012	0	0	1.1	1.1	20.2	20.2	0	0	0	0	0.1
MW8d	2.24	4.6	0	1012	0	0	16	16	4.6	4.6	0	0	0	0	0
MW8s	Dry	0.8	0.1	1012	0	0	3	3	17.7	17.7	0	0	0	0	0.1

Flixborough Gas Monitoring: w/c - 4th October 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.8	5.06	0	1010	0	0	0.1	0	20.8	20.5	0	0	0	0	0.1
MW0s	0.81	1.02	0	1010	0	0	0.1	0	20.7	20.5	0	0	0	0	0.1
MW1d	1.42	5.01	0	1010	2.3	2.3	9	9	15.8	14.2	0	0	0	0	0.1
MW1s	Dry	1.05	0	1010	0	0	2.2	2.2	21	19.6	0	0	0	0	0.1
MW5d	1.5	4.8	0	1020	0	0	0.9	0.6	20.3	19.5	0	0	0	0	0.1
MW5s	Dry	1.03	0	1020	0	0	0.8	0.8	20.2	19.5	0	0	0	0	0.1
MW7d	1.36	4.93	0	1020	0	0	0.1	0	20.7	20.3	0	0	0	0	0.1
MW7s	Dry	1.04	0	1020	0	0	0.2	0	20.4	20.4	0	0	0	0	0.1
MW8d	2.2	4.58	0	1020	0	0	13.7	13.7	19.9	6.8	0	0	0	0	0.1
MW8s	Dry	1	0	1020	0	0	2.8	2.8	20.4	17.9	0	0	0	0	0.1

Flixborough Gas Monitoring: w/c - 11th October 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.76	5	0	1006	0	0	0.3	0.3	20.3	20.3	0	0	0	0	0.1
MW0s	0.75	1.02	0	1006	0	0	0.1	0.1	20.4	20.4	0	0	0	0	0.1
MW1d	1.45	5.06	0	1006	24.1	24.1	11.6	11.6	11.2	11.2	0	0	0	0	0.1
MW1s	Dry	1	0	1006	0	0	3.3	3.3	18.7	18.7	0	0	0	0	0.1
MW5d	1.42	4.83	0	1006	0	0	0.9	0.9	19.1	19.1	0	0	0	0	0
MW5s	Dry	1.05	0.3	1006	0	0	0.6	0.6	19.5	19.5	0	0	0	0	0.1
MW7d	1.32	4.83	0	1006	0	0	0.3	0.3	20.2	20.2	0	0	0	0	0.1
MW7s	Dry	1.03	0.2	1006	0	0	1.5	1.5	19.7	19.7	0	0	0	0	0.1
MW8d	2.22	4.6	0	1006	0	0	17.3	17.3	3.5	3.5	0	0	0	0	0.1
MW8s	Dry	0.8	0.4	1006	0	0	3.7	3.7	17.1	17.1	0	0	0	0	0.1

Flixborough Gas Monitoring: w/c - 18th October 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.8	5.05	0	1007	0	0	0.1	0.1	20.8	20.5	0	0	0	0	0.1
MW0s	0.79	1.02	0	1007	0	0	0.1	0.1	20.7	20.5	0	0	0	0	0.1
MW1d	1.4	5.01	0	1007	3.8	3.8	12.1	9	15	10.5	0	0	0	0	0.1
MW1s	-	1.05	0	1007	0	0	2.2	2.2	21	19.6	0	0	0	0	0.1
MW5d	1.47	4.79	0	1008	0	0	0.8	0.8	20.5	19.5	0	0	0	0	0.1
MW5s	-	1.03	0	1008	0	0	1	0.8	20.2	19.1	0	0	0	0	0.1
MW7d	1.33	4.91	0	1008	0	0	0.6	0.1	20.4	20.1	0	0	0	0	0.1
MW7s	-	1	0	1008	0	0	0.3	0.1	20.4	20.4	0	0	0	0	0.1
MW8d	2.19	4.56	0	1007	0	0	13.9	13.8	19.9	6.8	0	0	0	0	0.1
MW8s	-	1	0	1007	0	0	2.3	2.3	20.4	17.9	0	0	0	0	0.1

Flixborough Gas Monitoring: w/c – 1st November 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.82	5.05	0	1010	0	0	0.1	0.1	21	20.6	0	0	0	0	0.1
MW0s	0.8	1.02	0	1010	0	0	0.1	0.1	20.4	20.4	0	0	0	0	0.1
MW1d	1.4	5.01	0	1010	1.2	1.2	9.5	9.3	19	11.4	0	0	0	0	0.1
MW1s	-	1.05	0	1010	0	0	1.9	1.9	20.9	19.9	0	0	0	0	0.1
MW5d	1.5	4.79	0	1010	0	0	1.1	1	20.6	19.6	0	0	0	0	0.1
MW5s	-	1.02	0	1010	0	0	0.8	0.8	20.2	19	0	0	0	0	0.1
MW7d	1.35	4.91	0	1010	0	0	0.4	0.1	20.5	20.2	0	0	0	0	0.1
MW7s	-	1	0	1010	0	0	0.4	0.1	20.4	20.3	0	0	0	0	0.1
MW8d	2.19	4.57	0	1010	0	0	13.1	13.1	20.3	8.4	0	0	0	0	0.1
MW8s	-	1.01	0	1010	0	0	2.4	2.3	20.4	17.9	0	0	0	0	0.1

Flixborough Gas Monitoring: w/c – 22nd November 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.82	5.05	0	1010	0	0	0.1	0.1	19.8	19.6	0	0	0	0	0.1
MW0s	0.83	1.02	0	1010	0	0	0.1	0.1	20.7	20.5	0	0	0	0	0.1
MW1d	1.39	5.01	0	1010	0.1	0.1	2.2	2.2	19.3	15.7	0	0	0	0	0.1
MW1s	-	1.03	0	1010	0	0	1.7	1.7	20.6	19.9	0	0	0	0	0.1
MW5d	1.51	4.79	0	1010	0	0	1.1	1	20.5	19.4	0	0	0	0	0.1
MW5s	-	1	0	1010	0	0	0.9	0.9	20.2	19.1	0	0	0	0	0.1
MW7d	1.33	4.9	0	1010	0	0	0.5	0.1	20.7	20	0	0	0	0	0.1
MW7s	-	1	0	1010	0	0	0.4	0.1	20.4	20.1	0	0	0	0	0.1
MW8d	2.2	4.54	0	1010	0	0	13	13	20	9.5	0	0	0	0	0.1
MW8s	-	1.02	0	1010	0	0	2.4	2.3	20.4	17.8	0	0	0	0	0.1

Flixborough Gas Monitoring: w/c – 6th December 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		CO2		O2		H2S		CO		Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		(%)		(%)		ppm		ppm		l/hour
					peak	steady	peak	steady	peak	steady	peak	steady	peak	steady	steady
MW0d	0.82	5.03	0	1010	0	0	0.1	0.1	19.8	19.6	0	0	0	0	0.1
MW0s	0.84	1.02	0	1010	0	0	0.1	0.1	20.7	20.5	0	0	0	0	0.1
MW1d	1.38	5.01	0	1010	0.1	0.1	12.2	8	16	14.9	0	0	0	0	0.1
MW1s	-	1.04	0	1010	0	0	2	2	20.6	19.9	0	0	0	0	0.1
MW5d	1.5	4.8	0	1010	0	0	0.9	0.9	20.5	19.4	0	0	0	0	0.1
MW5s	-	1	0	1010	0	0	0.9	0.8	20.2	19.1	0	0	0	0	0.1
MW7d	1.34	4.9	0	1010	0	0	0.5	0.1	20.7	20	0	0	0	0	0.1
MW7s	-	1	0.2	1010	0	0	0.4	0.1	20.4	20.1	0	0	0	0	0.1
MW8d	2.2	4.52	0	1010	0	0	13.6	13.6	20	7.6	0	0	0	0	0.1
MW8s	-	1.02	0.1	1010	0	0	2.4	2.3	20.4	17.8	0	0	0	0	0.1

Table B2: Ground Gas Evaluation

Flixborough Gas Monitoring: w/c - 13th Serpember 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.84	4.945	0.2	1023	0.8	0.3	0	0.08	1.4	0.3	0	0.03	0
MW0s	-	-	0.2	1023	0.2	0.1	0.0002	0.02	1	1	0.001	0.1	0.1
MW1d	1.715	4.965	0	1047	19.8	19.8	1.98	1.98	13.1	13	1.3	1.3	10
MW1s	Dry	-	1.8	1047	0.3	0.3	0.0003	0.03	4.1	4.1	0.0041	0.41	0.1
MW5d	1.77	4.86	1.2	1037	0.2	0.2	0	0.02	2.3	2.3	0	0.23	0
MW5s	Dry	-	0.2	1037	0.2	0.1	0	0.02	2.7	1.6	0	0.16	0
MW7d	1.92	4.93	0	1047	0.1	0.1	0	0.01	0.1	0.1	0	0.01	0
MW71	Dry	-	0.2	1047	0.1	0.1	0	0.01	0.2	0.2	0	0.02	0
MW8d	2.45	4.62	2.7	1023	0.1	0.1	0	0.01	5	5	0	0.5	0
MW8s	Dry	-	0.6	1023	0.3	0.1	0.0003	0.03	3.1	3	0.003	0.3	0.1

Flixborough Gas Monitoring: w/c - 27th September 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.82	5	0	1012	0	0	0	0	0	0	0	0	0.1
MW0s	0.81	1.02	0	1012	0	0	0	0	0	0	0	0	0.1
MW1d	1.47	5.06	0	1012	22.2	22.2	0.0222	2.22	12	12	0.012	1.2	0.1
MW1s	Dry	1	0	1012	0	0	0	0	2.5	2.5	0.0025	0.25	0.1
MW5d	1.51	4.83	0	1012	0	0	0	0	1.1	1.1	0.0011	0.11	0.1
MW5s	Dry	1.05	0	1012	0	0	0	0	0.8	0.8	0.0008	0.08	0.1
MW7d	1.38	4.83	0.1	1012	0	0	0	0	0.2	0.2	0	0.02	0
MW7s	Dry	1.03	0	1012	0	0	0	0	1.1	1.1	0.0011	0.11	0.1
MW8d	2.24	4.6	0	1012	0	0	0	0	16	16	0	1.6	0
MW8s	Dry	0.8	0.1	1012	0	0	0	0	3	3	0.003	0.3	0.1

Flixborough Gas Monitoring: w/c - 4th October 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.8	5.06	0	1010	0	0	0	0	0.1	0	0	0	0.1
MW0s	0.81	1.02	0	1010	0	0	0	0	0.1	0	0	0	0.1
MW1d	Dry	1.05	0	1010	0	0	0	0	2.2	2.2	0.0022	0.22	0.1
MW1s	1.42	5.01	0	1010	2.3	2.3	0.0023	0.23	9	9	0.009	0.9	0.1
MW5d	1.5	4.8	0	1020	0	0	0	0	0.9	0.6	0.0006	0.06	0.1
MW5s	Dry	1.03	0	1020	0	0	0	0	0.8	0.8	0.0008	0.08	0.1
MW7d	1.36	4.93	0	1020	0	0	0	0	0.1	0	0	0	0.1
MW71	Dry	1.04	0	1020	0	0	0	0	0.2	0	0	0	0.1
MW8d	2.2	4.58	0	1020	0	0	0	0	13.7	13.7	0.0137	1.37	0.1
MW8s	Dry	1	0	1020	0	0	0	0	2.8	2.8	0.0028	0.28	0.1

Flixborough Gas Monitoring: w/c - 11th October 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.76	5	0	1006	0	0	0	0	0.3	0.3	0.0003	0.03	0.1
MW0s	0.75	1.02	0	1006	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW1d	1.45	5.06	0	1006	24.1	24.1	0.0241	2.41	11.6	11.6	0.0116	1.16	0.1
MW1s	Dry	1	0	1006	0	0	0	0	3.3	3.3	0.0033	0.33	0.1
MW5d	1.42	4.83	0	1006	0	0	0	0	0.9	0.9	0	0.09	0
MW5s	Dry	1.05	0.3	1006	0	0	0	0	0.6	0.6	0.0006	0.06	0.1
MW7d	1.32	4.83	0	1006	0	0	0	0	0.3	0.3	0.0003	0.03	0.1
MW71	Dry	1.03	0.2	1006	0	0	0	0	1.5	1.5	0.0015	0.15	0.1
MW8d	2.22	4.6	0	1006	0	0	0	0	17.3	17.3	0.0173	1.73	0.1
MW8s	Dry	0.8	0.4	1006	0	0	0	0	3.7	3.7	0.0037	0.37	0.1

Flixborough Gas Monitoring: w/c - 18th October 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.8	5.05	0	1007	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW0s	0.79	1.02	0	1007	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW1d	1.4	5.01	0	1007	3.8	3.8	0.0038	0.38	12.1	9	0.009	0.9	0.1
MW1s	Dry	1.05	0	1007	0	0	0	0	2.2	2.2	0.0022	0.22	0.1
MW5d	1.47	4.79	0	1008	0	0	0	0	0.8	0.8	0.0008	0.08	0.1
MW5s	Dry	1.03	0	1008	0	0	0	0	1	0.8	0.0008	0.08	0.1
MW7d	1.33	4.91	0	1008	0	0	0	0	0.6	0.1	0.0001	0.01	0.1
MW71	Dry	1	0	1008	0	0	0	0	0.3	0.1	0.0001	0.01	0.1
MW8d	2.19	4.56	0	1007	0	0	0	0	13.9	13.8	0.0138	1.38	0.1
MW8s	Dry	1	0	1007	0	0	0	0	2.3	2.3	0.0023	0.23	0.1

Flixborough Gas Monitoring: w/c – 1st November 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.82	5.05	0	1010	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW0s	0.8	1.02	0	1010	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW1d	1.4	5.01	0	1010	1.2	1.2	0.0012	0.12	9.5	9.3	0.0093	0.93	0.1
MW1s	Dry	1.05	0	1010	0	0	0	0	1.9	1.9	0.0019	0.19	0.1
MW5d	1.5	4.79	0	1010	0	0	0	0	1.1	1	0.001	0.1	0.1
MW5s	Dry	1.02	0	1010	0	0	0	0	0.8	0.8	0.0008	0.08	0.1
MW7d	1.35	4.91	0	1010	0	0	0	0	0.4	0.1	0.0001	0.01	0.1
MW71	Dry	1	0	1010	0	0	0	0	0.4	0.1	0.0001	0.01	0.1
MW8d	2.19	4.57	0	1010	0	0	0	0	13.1	13.1	0.0131	1.31	0.1
MW8s	Dry	1.01	0	1010	0	0	0	0	2.4	2.3	0.0023	0.23	0.1

Flixborough Gas Monitoring: w/c – 22nd November 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.82	5.05	0	1010	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW0s	0.83	1.02	0	1010	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW1d	1.39	5.01	0	1010	0.1	0.1	0.0001	0.01	2.2	2.2	0.0022	0.22	0.1
MW1s	Dry	1.03	0	1010	0	0	0	0	1.7	1.7	0.0017	0.17	0.1
MW5d	1.51	4.79	0	1010	0	0	0	0	1.1	1	0.001	0.1	0.1
MW5s	Dry	1	0	1010	0	0	0	0	0.9	0.9	0.0009	0.09	0.1
MW7d	1.33	4.9	0	1010	0	0	0	0	0.5	0.1	0.0001	0.01	0.1
MW71	Dry	1	0	1010	0	0	0	0	0.4	0.1	0.0001	0.01	0.1
MW8d	2.2	4.54	0	1010	0	0	0	0	13	13	0.013	1.3	0.1
MW8s	Dry	1.02	0	1010	0	0	0	0	2.4	2.3	0.0023	0.23	0.1

Flixborough Gas Monitoring: w/c – 6th December 2021

Exploratory Hole	Water Level	Base Level	PID	Atm Pressure	CH4		GSV	GSV peak	CO2		GSV	GSV peak	Flow
	(m bgl)	(m bgl)	ppm	mbar	(%)		l/hour		(%)		l/hour		l/hour
					peak	steady			peak	steady			steady
MW0d	0.82	5.03	0	1010	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW0s	0.84	1.02	0	1010	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW!d	1.38	5.01	0	1010	0.1	0.1	0.0001	0.01	12.2	8	0.008	0.8	0.1
MW1s	Dry	1.04	0	1010	0	0	0	0	2	2	0.002	0.2	0.1
MW5d	1.5	4.8	0	1010	0	0	0	0	0.9	0.9	0.0009	0.09	0.1
MW5s	Dry	1	0	1010	0	0	0	0	0.9	0.8	0.0008	0.08	0.1
MW7d	1.34	4.9	0	1010	0	0	0	0	0.5	0.1	0.0001	0.01	0.1
													l/hour
					peak	steady			peak	steady			steady
MW0d	0.76	5	0	1006	0	0	0	0	0.3	0.3	0.0003	0.03	0.1
MW0s	0.75	1.02	0	1006	0	0	0	0	0.1	0.1	0.0001	0.01	0.1
MW1d	1.45	5.06	0	1006	24.1	24.1	0.0241	2.41	11.6	11.6	0.0116	1.16	0.1
MW1s	Dry	1	0	1006	0	0	0	0	3.3	3.3	0.0033	0.33	0.1
MW5d	1.42	4.83	0	1006	0	0	0	0	0.9	0.9	0	0.09	0
MW5s	Dry	1.05	0.3	1006	0	0	0	0	0.6	0.6	0.0006	0.06	0.1
MW7d	1.32	4.83	0	1006	0	0	0	0	0.3	0.3	0.0003	0.03	0.1
MW71	Dry	1.03	0.2	1006	0	0	0	0	1.5	1.5	0.0015	0.15	0.1