

Geo-Environmental Report – Geotechnical Category 1

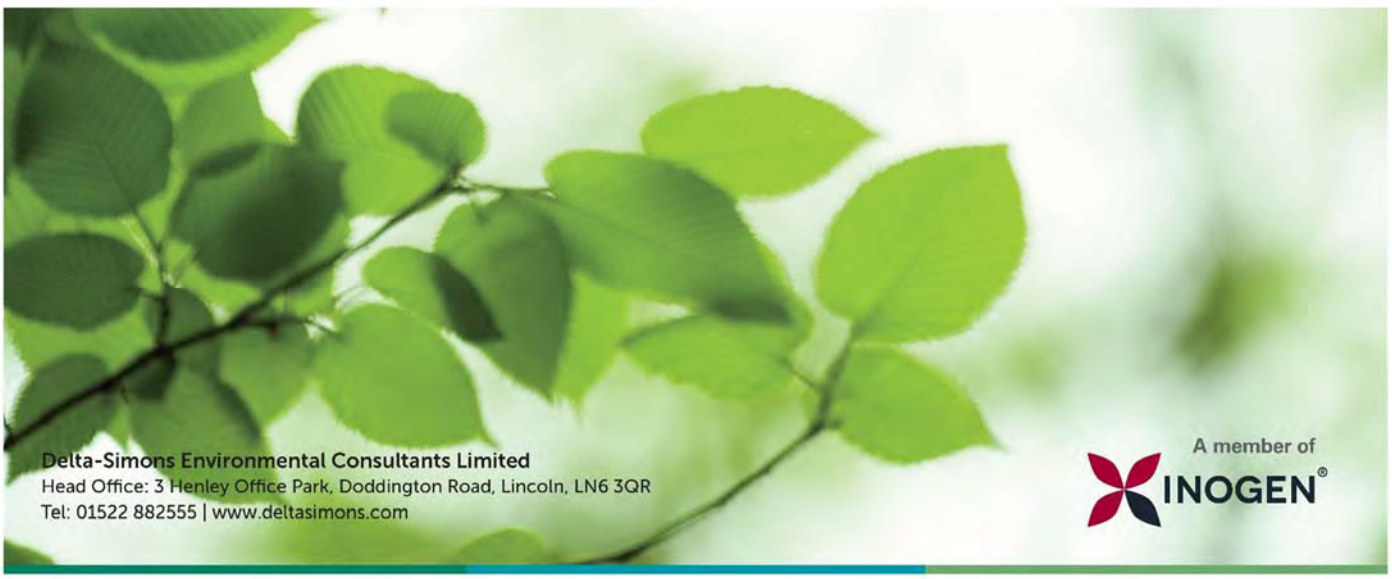
Pear Tree Farm, St James Road, Long Sutton

Presented to **Mr G Franklin**

Issued: September 2018

Delta-Simons Project No. 17-0252.03

deltasimons



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Report Details

Client	Mr G Franklin
Report Title	Geo-Environmental Report – Geotechnical Category 1
Site Address	Pear Tree Farm, St James Road, Long Sutton, Spalding, PE12 9BA
Project No.	17-0252.03
Report Date	September 2018
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
2	Final	4th September 2018				
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About us

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Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from nine locations - Lincoln, Birmingham, Dublin, Durham, Leeds, London, Manchester, Norwich and Nottingham - we employ over 75 environmental professionals, bringing experience from across the private consultancy and public sector markets.

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1.0 Introduction

1.1 Authorisation

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Robert Doughty Consultancy Ltd on behalf of Mr G Franklin (the "Client") to prepare a Geo-Environmental Report – Geotechnical Category 1 for land at Pear Tree Farm, St James Road, Long Sutton, PE12 9BA (the "Site"). A Site Location Map is included as Figure 1.

1.2 Context & Purpose

Delta-Simons has previously undertaken a Preliminary Environmental Risk Assessment for the Site (Ref. 17-0252.02) dated March 2018. This Report should be read in conjunction with the Preliminary Environmental Risk Assessment, however, a summary is provided in Section 3.1.

This Report has been undertaken generally in accordance with British Standard BS 5930:2015 Code of practice for Site investigations and is intended as a Geotechnical Category 1 (CAT1) report in accordance with British Standard BSEN1997-1:2004 Eurocode 7: Geotechnical Design – Part 1: General rules, or as part of a preliminary investigation in a Geotechnical Category 2 situation.

The purpose of this investigation was to undertake an initial limited appraisal of the geo-environmental ground conditions and obtain data on chemical and geotechnical parameters at the Site for use by the Client considering potential development planning, design and engineering for construction.

This Report has been based on a desk study together with fieldworks comprising soil sampling and in-situ geotechnical testing. Selected soil samples were scheduled for laboratory chemical analysis and geotechnical testing. Monitoring was carried out on the Site for water levels and concentrations of hazardous ground gas.

The results of the sampling, with the relevant laboratory work, have been presented in the Appendices.

The methods of desk study and fieldworks have been described in Section 2.

The interpretation of the results has been presented as a table in Section 3 with desk study, a conceptual Site model (CSM) and initial risk assessment based on the source-pathway-receptor principle and recommendations for aspects of planning design and construction.

Foundation design may be undertaken by engineers using methods as described in Building Regulations/Standards, National House Building Council (NHBC) Standards, Building Research Establishment (BRE) guidance or if appropriate British Standard BS 8103-1:2011 Structural design of low-rise buildings — Part 1: Code of practice for stability, Site investigation, foundations and ground floor slabs for housing. Recommendations with respect to the ground conditions for the assistance of the engineer as designer based on local knowledge and experience of past projects in the region is also provided.

The Limitations associated with this assessment are presented in Appendix A.

1.3 Scope

The scope of works performed for this Report comprised the following:

- Desk Study appraisal;
- Soil sampling;
- In-situ penetration testing;
- In-situ permeability testing;
- Laboratory testing;
- Ground gas monitoring;
- Contamination assessment; and

- Geotechnical assessment.

According to BSEN 1997-1:2004+A1:2013, Geotechnical Category 1 (GC1) should only include small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk. The designer/engineer is responsible for checking the Client's requirements for compliance with the Eurocodes, and GC1.

This Report may exceed the minimum standards by inclusion of some quantitative data to support local knowledge and experience in making recommendations.

Delta Simons Standard Limitations for this assessment are included as Appendix A.

2.0 Investigation Methodology

2.1 Planning, Health & Safety (CDM), Setting Out & Services

Unless otherwise stated, the investigation has been planned on a scope of works agreed with the Client which is typically based on multiples of one day on-Site with various drilling and sampling equipment, or a measured amount of drilling and testing.

For most projects Delta-Simons adopts a role equivalent to principal contractor (PC) where none exists for the project and complies a construction phase plan (CPP) The CPP is incorporated into a comprehensive Health and Safety Plan with relevant information, risk assessments and method statements where applicable intended to keep the field staff safe.

Clients are requested to provide all service plans in original form from suppliers so a service avoidance risk assessment (SARA) can be undertaken as part of a formal Site-specific Health and Safety Plan. The SARA is based on guidance provided in HSG47 Avoiding danger from underground services.

Exploratory hole and subsequent sample locations are selected to provide suitable coverage of the Site, having regard for the likely presence of services and any other constraints such as existing structures and sub-structures. Where applicable, suspected emissions locations, or geological variations may have been targeted.

The locations of the investigations are shown on Figure 4 and the field records are provided in Appendix B.

2.2 Dynamic Sampler Boreholes

Dynamic sampler borehole systems are not explicitly described in Eurocodes, or in the relevant British Standard BSENISO 22475-1:2006 Geotechnical investigation and testing – Sampling methods and groundwater measurements – Part 1: Technical principles for execution.

The dynamic sampler system comprises a series of varying diameter metal tubes of 1 m or 2 m length, which allows a liner to be inserted. The tubes are driven into the ground using a percussive weight falling through a standard drop onto an anvil attached to solid rods, and withdrawn by use of a hydraulic jack. The soil is pushed into the tube/liner during the driving, and samples are recovered from the tube once it has been split for description. Alternatively, liners are omitted and the metal tubes have slots or windows cut into the sides where samples can be taken directly by hand. The liner method potentially offers a lower degree of sample disturbance.

The system can achieve typical depths of around 3 m to 5 m in favourable soil conditions. The system is limited by coarse gravel or other large fragments, and also in wet sands where the hole collapses. Some casing systems exist. The details of the ground conditions encountered are presented on the relevant field record sheets, which also detail the type and depths of samples taken and the results of any in-situ tests. Other relevant information may also be recorded including groundwater levels and details of any standpipe installations.

2.3 Standpipe Installations

Two dynamic sampler boreholes have been fitted with a gas/water monitoring standpipe of 50 mm internal diameter UPVC slotted and plain casing to the required depth as appropriate, capped by a gas tap bung and cover generally in accordance with BSENISO 22475-1:2006 for an open standpipe. The location of the monitoring installations are shown on Figure 4.

2.4 Standard Penetration Tests

Standard penetration testing is undertaken generally in accordance with BS EN ISO 22476-2:2005+A1:2011 *Geotechnical investigation and testing. Field testing. Standard Penetration Testing*.

2.5 Borehole Falling Head Test

A borehole falling head test involves filling a shallow depth dynamic sampler borehole with water. The depth to the water level in the hole is recorded using an electronic dip meter at regular intervals until the water has dissipated, or over a suitable period of typically 60 minutes. This method of testing should only be considered

to give an indication of the potential suitability of using conventional soakaways and may require confirmation of design parameters through other techniques.

2.6 Monitoring Groundwater & Ground Gas

Groundwater monitoring is undertaken using an electronic dip meter, which records the depth to water in a standpipe. Ground gas composition and flow monitoring is undertaken where standpipes have been installed. Both flow (litres per hour) and composition (%) are measured using an infra-red gas monitor, calibrated for methane, carbon dioxide & oxygen. Records are also taken of atmospheric pressure. The monitoring field records are presented in Appendix C.

2.7 Chemical Analysis

The results of the chemical analysis are presented in Appendix D.

2.8 Geotechnical Testing

The results of the geotechnical testing are presented in Appendix E.

2.9 Generic Quantitative Risk Assessment (GQRA)

Human Health

In the absence of a statutory contamination thresholds in the UK a set of Generic Assessment Criteria (GAC) derived principally using the Contaminated Land Exposure Assessment (CLEA) Framework have been adopted to assess the significance of the contamination encountered. The values adopted are for a residential with plant uptake end-use. The GAC adopted are principally for risks to human health.

The Delta-Simons methodology for GQRA comprises comparison of limited chemical analysis results with the criteria for the most sensitive plausible end-use scenario in the proposed scheme.

Exceedance of criteria indicates that risk above “minimal” level may exist in a worst-case scenario across the whole Site. The precautionary principle is applied with respect to protection of human health recommending; further risk assessment (increased characterisation including extents/zones), or Site-wide remediation.

If no criteria exceedance is observed, recommendations for further risk assessment, or remediation due to uncertainty over full characterisation of the Site.

Post-report action should be Site-specific and based on a Client’s resource/risk profile in undertaking developments in accordance with any regulatory requirements. Under UK planning control, the responsibility for a safe development remains with the Developer.

Ground Gas

Ground gas monitoring is undertaken as routine when monitoring boreholes for groundwater level.

Ground gas monitoring is used either; where a source has been identified in the desk study as part of a risk assessment which will be recommended to be extended by increased monitoring, or where no sources are identified as a limited verification of ground gas absence (which only supports reduction in uncertainty).

Assessment of ground gas risk is achieved using guidance in BS 8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, and NHBC publication Guidance on Evaluation of Development Proposals on Site where Methane and Carbon Dioxide are Present including the update Technical Extra 20 (issued April 2016).

3.0 Results & Interpretation

3.1 Desk Study Review

Site Description & Walkover	The Site comprises an irregular shaped parcel of land of 1.1 Ha, located off St James Road, Long Sutton, approximately 2 km north-east of Sutton St James. A Site Location Map is presented as Figure 1. A Site walkover was undertaken on 7th November 2017. Relevant features identified on-Site are described below and a Relevant Features Plan is included as Figure 2. The Site comprised of a farmyard which was used to store farm vehicles/tools, tanks and farm produce. The majority of the Site surface comprised of concrete hardstanding that was fractured in some places with vegetation surrounding the outskirts and then encroaching onto concrete. Ash trees are also present around the eastern border, adjacent to the nearby residential house. Two stockpiles of Made Ground were present on- Site, one in the south-eastern corner and the other in the north-eastern corner; both comprising of brick and concrete. The Site surface was relatively even with no obvious topographic slope. The north of the Site was bound by a metal gate and wire fencing whereas the east of the Site was bound by wire fencing and tall ash trees separating the adjacent residential housing. In the south of the Site a hedgerow separated the Site from the adjoining agricultural land. Evidence of possible ACMs were present within on Site out-buildings and farm storage warehouses. Four above ground storage tanks (ASTs) were noted on-Site, associated with the storage of oil, however, no evidence of spillages or staining were observed. One out-building contained warning signs against toxic, corrosive and hazardous substances, although there was no evidence to suggest the nature of these substances.
Proposed Development	The proposed development for the Site comprises the construction of a single new residential dwelling with associated access, vehicle parking and landscaped garden areas. A Proposed Development Plan is attached as Figure 3.
Current Land Feature Sources	The Envirocheck® Report lists a Manufacturing and Production Point of Interest on-Site relating to livestock farming. Off-Site potentially contaminative land uses within 250 m of the Site include: One Manufacturing and Production Point of Interest located approximately 10 m north-east of the Site, relating to arable farming.
Historical Land Feature Sources	From the earliest map edition dated 1888, the Site appeared to have comprised a residential property with associated garden area and mature trees until circa 1972, where further buildings were shown to be present on Site including a piggery. The historical maps therefore indicate that the Site was in agricultural use from circa 1972 to present day. The piggery was still present at the time of the Site walkover.
Map Geology & Commentary	The British Geological Survey (BGS) mapping indicates that the Site is underlain by superficial Tidal Flat Deposits (clay and silt), followed by bedrock of the Ampthill Clay Formation (mudstone). A BGS borehole is located approximately 150 m west of the Site (Ref. TF42SW2) and indicates ground conditions to comprise the following: ▲ Clayey topsoil from ground level to a depth of approximately 0.4 m bgl; ▲ Medium density fine brown / grey sandy silt to a depth of approximately 3.35 m bgl;

	▲ Medium density fine dark grey clayey peaty sandy silt to a depth of approximately 6.40 m bgl; ▲ Compact fine brown silty sand to a depth of approximately 7.01 m bgl; ▲ Medium density dark grey fine and medium sandy silt to a depth of approximately 10.36 m bgl; and ▲ Fairly loose dark grey sand to a maximum depth of approximately 12.19 m bgl. A further BGS borehole (Ref. TF42SW1) is located approximately 180 m south-east fo the Site and indicates ground conditions to comprise the following: ▲ Topsoil comprising soft grey sandy clay to a depth of approximately 0.3 m bgl; ▲ Firm grey and brown silty sandy clay to a depth of approximately 2.29 m bgl; ▲ Soft peat to a depth of approximately 2.44 m bgl; ▲ Soft silt to a depth of approximately 4.27 m bgl; ▲ Medium density fine grey silty sand to a depth of approximately 9.14 m bgl; and ▲ Compact fine grey silty sand with some pockets of soft silty clay and shells to a maximum depth of approximately 12.19 m bgl.
Unexploded Ordnance (UXO)	The Site is within an area considered to be at low risk from WWII bomb strikes.
Mining	Reference to the Coal Authority online viewer indicates that the Site is not within a Coal Mining Reporting Area and is not within a Development High Risk Area. Consequently, a Coal Mining Risk Assessment (CMRA) is unlikely to be required under the planning regime.
Radon	According to the Envirocheck® Report, the Site lies within an area where less than 1% of homes are above the National Radiological Protection Board (NRPB) recommended "action level" for radon. BRE211 (2007) indicates that no radon protective measures are necessary in the construction of new buildings at the Site.
Geotechnical Hazards	The Envirocheck® Data identifies the following geotechnical hazards and associated risk levels for the Site: ▲ Potential for collapsible ground stability hazards – No Hazard; ▲ Potential for compressible ground stability hazards – Moderate; ▲ Potential for ground dissolution stability hazards – No Hazard; ▲ Potential for landslide ground stability hazards – Very Low; ▲ Potential for running sand ground stability hazards – Moderate; and ▲ Potential for shrinking and swelling clay ground stability hazards – Low.
Topographic Elevation	The Site is approximately 1 m above Ordnance Datum (m AOD).
Depth to Groundwater	BGS borehole (Ref. TF42SW1) indicates groundwater to be present at approximately 1.52 m bgl.
Surface Water	The Envirocheck® Data shows no surface water abstractions within 250 m of the Site. The nearest surface water features are agricultural drains located in the south-western and south-eastern corners of the Site.

Wider Environment Sensitive Receptors	In terms of groundwater vulnerability, the EA classifies the superficial geology (Tidal Flat Deposits) and the underlying bedrock geology (Ampthill Clay) as Unproductive Strata. The Site does not lie within a Groundwater Source Protection Zone (SPZ) and there are no groundwater abstractions located within 1 km of the Site.
Key Contaminants and CSM Aspects	The Preliminary Environmental Risk Assessment identified the following CSM aspects on-Site: ▲ Stockpiles of Made Ground and any Made Ground beneath the Site; ▲ The piggery; ▲ Any unrecorded sources; ▲ Above ground storage tanks (ASTs); ▲ Farm machinery and maintenance activities; and ▲ Potential asbestos containing materials (ACMs) within buildings. Key contaminants associated with these types of activities are as follows: ▲ Asbestos; ▲ Heavy metals; ▲ Polycyclic aromatic hydrocarbons (PAHs); ▲ Petroleum hydrocarbons; and ▲ Hazardous ground gases. No off-Site potential sources of contamination have been identified. The Site overlies Unproductive Strata with respect to the superficial and bedrock geology. Additionally, the Site is not located within a groundwater SPZ. There is uncertainty because unrecorded potentially contaminative activities could have taken place. The proposed development may introduce vulnerable receptors to any potential contamination.

3.2 Fieldworks Interpretation

Scope of Investigation	Dynamic Sampler Boreholes with SPT's – 6 No. Monitoring well installation – 2 No.
Geology from the Investigation Works	Made Ground was encountered in all boreholes across the Site, with the exception of DS105, to a maximum depth of 0.8 m bgl in DS106. The Made Ground generally comprised a mixture of granular and cohesive deposits, with gravel content including brick, coal, slate and sandstone. Occasional wood was encountered in DS103. The Made Ground was encountered beneath a layer of concrete (0.1 to 0.15 m bgl) in DS102, DS103 and DS104. Topsoil comprising dark brown slightly sandy gravel comprising of sandstone with frequent rootlets was encountered in DS105 and DS016 to a maximum depth of 0.4 m bgl. The natural superficial geology (Tidal Flat Deposits) was encountered from a minimum depth of 0.2 m bgl (DS102) to a maximum depth of 5.45 m bgl in all boreholes and generally comprised the following:

<table>
<tr><td></td><td>
▲ Very soft to soft orangish / greyish brown clay with varying proportions of sand and silt to a maximum depth of 3.5 m bgl in DS104 and DS106; and
▲ Very loose to loose dark brown / orangish brown / greyish brown fine to medium sand with varying proportions of clay and silt to a maximum depth of 5.45 m bgl.
Visual and olfactory evidence of contamination comprising hydrocarbon odours and staining were noted in the following boreholes:
▲ DS101 from 2.6 to 2.9 m bgl;
▲ DS102 from 0.2 to 1.8 m bgl;
▲ DS103 from 0.3 to 1.7 m bgl; and
▲ DS104 from 1.3 to 1.6 m bgl.
The field logs are included as Appendix B.
</td></tr>
<tr><td>Penetration Test Data
(SPTs)</td><td>
Twenty-six Standard Penetration Tests (SPTs) were undertaken within the DS boreholes at depths of between 1.2 and 5.0 m bgl.
The standard penetration testing generally recorded very low to low resistance to penetration.
Uncorrected SPT (N) values from DS101 to DS106 are summarised below:
▲ Tidal Flat Deposits: N= 0-12.
Full details of the SPT results are presented in the field logs as Appendix B.
</td></tr>
<tr><td>Borehole Falling Head Test Data</td><td>
A falling head test was undertaken in DS103. The water level remained at 0.86 m bgl for the duration of the test (3 hours, 48 minutes), therefore the test is considered to have failed.
</td></tr>
<tr><td>Groundwater in Standpipes</td><td>
Monitoring of groundwater levels was undertaken between 20th and 30th July 2018.
<table>
<tr><th rowspan="3">Location</th><th colspan="5">Depth to Groundwater</th></tr>
<tr><th rowspan="2">Round 1</th><th rowspan="2">Round 2</th><th rowspan="2">Round 3</th><th colspan="2">(m bgl)</th></tr>
<tr><th>Min</th><th>Max</th></tr>
<tr><td>DS101</td><td>2.33</td><td>2.42</td><td>2.31</td><td>2.31</td><td>2.42</td></tr>
<tr><td>DS103</td><td>1.93</td><td>1.95</td><td>1.92</td><td>1.92</td><td>1.95</td></tr>
</table>
Full ground gas and groundwater monitoring records are presented as Appendix C.
</td></tr>
<tr><td>Gas in Standpipes</td><td>
Three rounds of ground gas monitoring were undertaken between 20th and 30th July 2018.
<table>
<tr><th rowspan="2">Monitoring Location</th><th rowspan="2">No of Monitoring Events</th><th>Methane (%v/v)</th><th>Carbon Dioxide (%v/v)</th><th>Oxygen (%v/v)</th><th>Flow Rate (l/hr)</th></tr>
<tr><th>Max</th><th>Max</th><th>Min</th><th>Max</th></tr>
<tr><td>DS101</td><td>3</td><td><0.1</td><td>3.4</td><td>17.5</td><td><0.1</td></tr>
<tr><td>DS103</td><td>3</td><td>3.0</td><td>5.4</td><td>5.7</td><td><0.1</td></tr>
<tr><th colspan="6">Conditions During Monitoring Round</th></tr>
<tr><th colspan="6">Atmospheric Pressure (mb)</th></tr>
<tr><td colspan="3">Min</td><td colspan="3">Max</td></tr>
<tr><td colspan="3">1008</td><td colspan="3">1013</td></tr>
</table>
See Appendix C for full monitoring details.
</td></tr>
</table>

Chemical Analysis	Thirteen samples were scheduled for a selection of the following analytes: standard heavy metals suite, speciated Total Petroleum Hydrocarbons (sTPH), Total TPH, speciated Polycyclic Aromatic Hydrocarbons (sPAH), water soluble sulphate, pH and an asbestos screen. Concentrations of the following analytes were detected above residential with plant uptake guidance criteria within the Tidal Flat Deposits: ▲ DS103 (1.6 m bgl) - naphthalene 3.5 mg/kg compared to GAC of 2.3 mg/kg; ▲ DS103 (1.6 m bgl) – Aromatic TPH >EC12-EC16 380 mg/kg compared to GAC of 140 mg/kg; and ▲ DS103 (1.6 m bgl) – Aromatic TPH >EC16-EC21 440 mg/kg compared to GAC of 260 mg/kg. Heavy metals were not recorded at concentrations exceeding the residential with plant uptake screening criteria. A maximum concentration of 4,800 mg/kg total TPH was identified in DS105 (0.2 m bgl). Asbestos fibres were not detected in the samples tested. Chemical testing results are presented in Appendix D.
Geotechnical Testing	Geotechnical analysis comprised determination of moisture content, Atterberg limits and particle size distribution (PSD). The results of the analyses are as follows: ▲ Moisture content – 26 to 58%; ▲ Liquid limit – 35 to 54%; ▲ Plastic limit – 24 to 26%; and ▲ Plasticity index – 18 to 28%. The clay of the Tidal Flat Deposits was identified to have a low to medium shrinkage potential. The particle size distribution tests indicated that the soils from DS101 (3.6 m bgl), DS102 (3.4 m bgl), DS104 (4.2 m bgl) and DS106 (4.5 m bgl) were very clayey / silty sands. The proportion of silt or clay is not determined during the PSD test. Geotechnical testing results are presented as Appendix F.
Foundation Recommendations	It is understood that the proposed development comprises the construction of a single residential dwelling with associated access, vehicle parking and landscaped garden area. A Proposed Development Plan is included as Figure 3. Underlying strata encountered during the ground investigation comprised Made Ground to a maximum depth of 0.8 m bgl, followed by superficial Tidal Flat Deposits comprising soft to very soft silty sandy clays and very loose to lose clayey silty sands, to a maximum of 5.45 m bgl. The bedrock geology of the Ampthill Clay Formation was not encountered during this investigation. SPT testing within boreholes across the Site indicated very low to low resistance (N=0-12) to penetration within the Tidal Flat Deposits to a depth of 5.45 m bgl. At this stage proposed loads are not known, however given the underlying shallow geology which comprises Made Ground and very soft to soft silty sandy clays and very loose to loose clayey silty sands, traditional strip and pad foundations are unlikely to be suitable. It is recommended that a deeper cable percussion borehole is drilled at the Site in order to inform the requirements for pile design. Due to the risk of shrinking and swelling clay, ground floor slabs are recommended to be suspended with a ventilated void and damp proof membrane (DPM) provision.

	Groundwater strikes were identified between depths of 3.0 and 3.7 m bgl during drilling, and between 1.92 and 2.42 m bgl during return monitoring. All shallow foundation or services excavations at the Site should be considered unstable, therefore, temporary supports of all excavations should be considered when excavating on-Site. Measures to deal with ingress of water are likely to be required in excavations below standing groundwater level or should the excavation be left open for a period of time. Vigilance is required during groundworks for unusual ground conditions, if encountered should be reported and may require further investigation. See Appendix B & C for further details.
Contamination	Elevated concentrations of naphthalene, aromatic TPH >EC12-EC16 and aromatic TPH >EC16-EC21 have been identified locally within the soils in DS103 (1.6 m bgl). The elevated concentrations are considered likely to be associated with the AST in this area. Sources of volatile vapours, comprising elevated concentrations of naphthalene and aromatic TPH >EC12-EC16 have been identified within the soils in DS103, beneath the proposed building footprint. Unless complete removal of these sources is undertaken, the inclusion of a specialist vapour resistant membrane should be considered. No exceedances of heavy metals have been identified within the selected samples. Additionally, asbestos fibres have not been identified within the samples tested.
Fresh Water Pipes	The Local Water Authority should be contacted at an early stage in order that any abnormal costs can be calculated, if required. However, considering that hydrocarbon contamination has been identified at the Site, it is considered likely that upgraded water pipes will be required.
Concrete Grade	In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of the soils at the Site would be classified as Design Sulphate Class DS-1 and ACEC Class AC-1 for soils and groundwater, when considering the most appropriate type of concrete to be used at the Site in order to resist chemical attack from elevated sulphate present in the soils (assuming mobile groundwater in non-pyritic soils).
Ground Gas	Following three rounds of ground gas monitoring at the Site, carbon dioxide has been recorded above the CIRIA C665 threshold value of 5% on one occasion in DS103. As such the Site has been classified as Amber 1 in accordance with NHBC guidance. Ground gas protection measures will be required under this scenario. Given that sources of volatile vapours have been identified, any ground gas protection measures installed will also need to consider the inclusion of a specialist vapour resistant membrane. The foundation recommendations incorporate a degree of inherent gas protection in accordance with BS 8485:2015. Radon protection measures are not required within the proposed development.
Groundwater/ Drainage	The natural ground conditions at the Site were found to be sandy silty clays and clayey silty sands. Groundwater was encountered between depths of 3.0 and 3.7 m bgl during drilling, and between 1.92 and 2.42 m bgl during return monitoring. A falling head test was undertaken in DS103. The results of the test indicate that drainage via the use of soakaways is unlikely to be viable at the Site given the very low permeability of the soils.

	Alternatives such as discharge to an existing facility should be investigated.
Excavations	Trench excavation sides cannot be guaranteed to be stable at this Site, therefore, batters and/or suitable support would be required for excavations. This would also be required where human entry is necessary.
Materials Management	Excavated soils may be suitable for use elsewhere subject to suitability for use and any necessary regulator protocols. Additional testing may be required for optimised off-Site disposal of spoil.
Conclusions and Recommendation	Based on the findings of this Report, the following recommendations are made: ▲ A deeper cable percussion borehole should be drilled at the Site in order to inform the requirements for pile design; ▲ The existing ASTs will require appropriate drainage, with any contents disposed of at a licensed facility and the tanks decommissioned and removed safely from Site; ▲ The Site has classified as Amber 1 with regards to the ground gas regime. Ground gas protection measures will be required within the proposed development under this scenario. Ground gas protection measures installed will also need to consider the inclusion of a specialist vapour resistant membrane; ▲ Any topsoil imported onto the Site as part of the development works, or sourced from the Site and re-used, should be tested to confirm suitability, prior to, and once placed, in landscaped / garden areas; ▲ 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; ▲ Confirmation should be sought from the Local Water Authority as to whether they will require upgraded pipework to be installed for new service installations, although this is considered likely; ▲ Groundwater drainage via traditional soakaways is not considered suitable, discharge to an existing facility is recommended; ▲ Buried concrete may be designed in accordance with DS-1 and ACEC Class AC-1; and ▲ Materials requiring off-Site disposal may attract elevated rates, costing above standard inert waste removal, given identified naphthalene and hydrocarbon compounds.

Pollutant Linkage Assessment				
Source(s)	**Pathway(s)**	**Receptor(s)**	**Risk Rating**	**Justification & Mitigation**
Elevated concentrations of naphthalene, aromatic TPH >EC12-EC16 and aromatic TPH >EC16-EC21 locally within the natural soils in DS103.	Direct contact, ingestion or inhalation of soil bound contaminants / dust during redevelopment	Future residents Construction workers Third parties during construction (adjacent residents)	**Low Risk**	Elevated concentrations of naphthalene and hydrocarbon compounds have been identified locally in DS103, in the vicinity of an AST. It is recommended that a clean cover (600 mm) of topsoil is incorporated into proposed garden areas, with 300 mm in any managed landscaped areas to mitigate the risk of future residents coming into direct contact with contaminated soil. Any topsoil imported onto the Site as part of the development works, or sourced from the Site and re-used, should be tested to confirm suitability, prior to, and once placed in landscaped areas. Groundworkers should use appropriate personal protective equipment (PPE/RPE) and maintain good standards of hygiene to be protected from any soil contamination which may be present.
	Inhalation of vapours associated with contamination	Future residents	**Low to Moderate Risk**	Elevated concentrations of volatile contaminants, naphthalene and aromatic TPH >EC12-EC16, have been identified locally within the natural soils in DS103, beneath the proposed building footprint. Unless complete removal of these sources is undertaken, the inclusion of a specialist vapour resistant membrane should be considered.
	Direct contact between aggressive ground conditions and new infrastructure	The Built Environment and future residents	**Low to Moderate Risk**	Hydrocarbons have the potential to permeate plastic pipes. As elevated concentrations of hydrocarbons have been identified it is considered likely that water supply pipes will require upgrading to ‘protectaline’ or similar. Therefore, it is recommended that the Local Water Authority is consulted prior to the installation of any potable water supply pipes in order to confirm their requirements.

Pollutant Linkage Assessment				
Source(s)	**Pathway(s)**	**Receptor(s)**	**Risk Rating**	**Justification & Mitigation**
	Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or surface waters	The agricultural drains on-Site and in the vicinity of the Site	**Very Low Risk**	Although elevated concentrations of contaminants have been identified locally within the soils at the Site, given presence of Unproductive Strata, the absence of significant surface water receptors and that the Site is not located within a groundwater SPZ, the risk to controlled waters is considered to be very low.
Made Ground beneath the Site Potential ground gas (from unrecorded on/off-Site sources)	Migration of ground gas into on-Site buildings causing asphyxiation or risk of explosion.	The Built Environment and Future residents	**Low Risk**	An elevated carbon dioxide concentration of 5.7% has been identified in DS103. As such, the Site has been classified as Amber 1 in line with NHBC guidance. Ground gas protection measures are necessary under this scenario. Ground gas protection measures installed will also need to consider the inclusion of a specialist vapour resistant membrane.
Asbestos containing materials (ACMs) in buildings	Inhalation of asbestos fibres	Groundworkers and construction workers during redevelopment and future sub-surface maintenance workers Occupiers of adjacent properties during redevelopment	**Low to Moderate Risk**	It is suspected that ACMs are present within the existing buildings at the Site. An asbestos survey should be undertaken for all buildings prior to any demolition works and any ACMs dealt with in a safe and controlled manner to remove the potential risk.
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.

Standard risk definitions and matrices are presented in Appendix F.

Figure 1 – Site Location Map



Scale: 1 / 500,000 @ A4

LEGEND

Site Boundary

N

Moorswood Farm

Willow Farm

Mint Lodge

Home Farm

BENDERSLOUGH DR.

MOORSWOOD GATE

WANTON'S CROSS GATE

JARVIS'S GATE

ST JAMES ROAD

B1390

CHILDERSGATE LANE

BROAD GATE

Scale: 1 / 10,000 @ A4

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TITLE:
Site Location Map
Pear Tree Farm
Sutton St James

DRAWN BY: AW	SCALE: To Scale@A4
CHECKED BY: CW	REVISION: 1
DATE: 31st July 2018	

PROJECT NO: 17-0252.03

FIGURE NO: 1

Figure 2 – Relevant Features Plan

PH01: A suspected plinth of an old fuel tank.

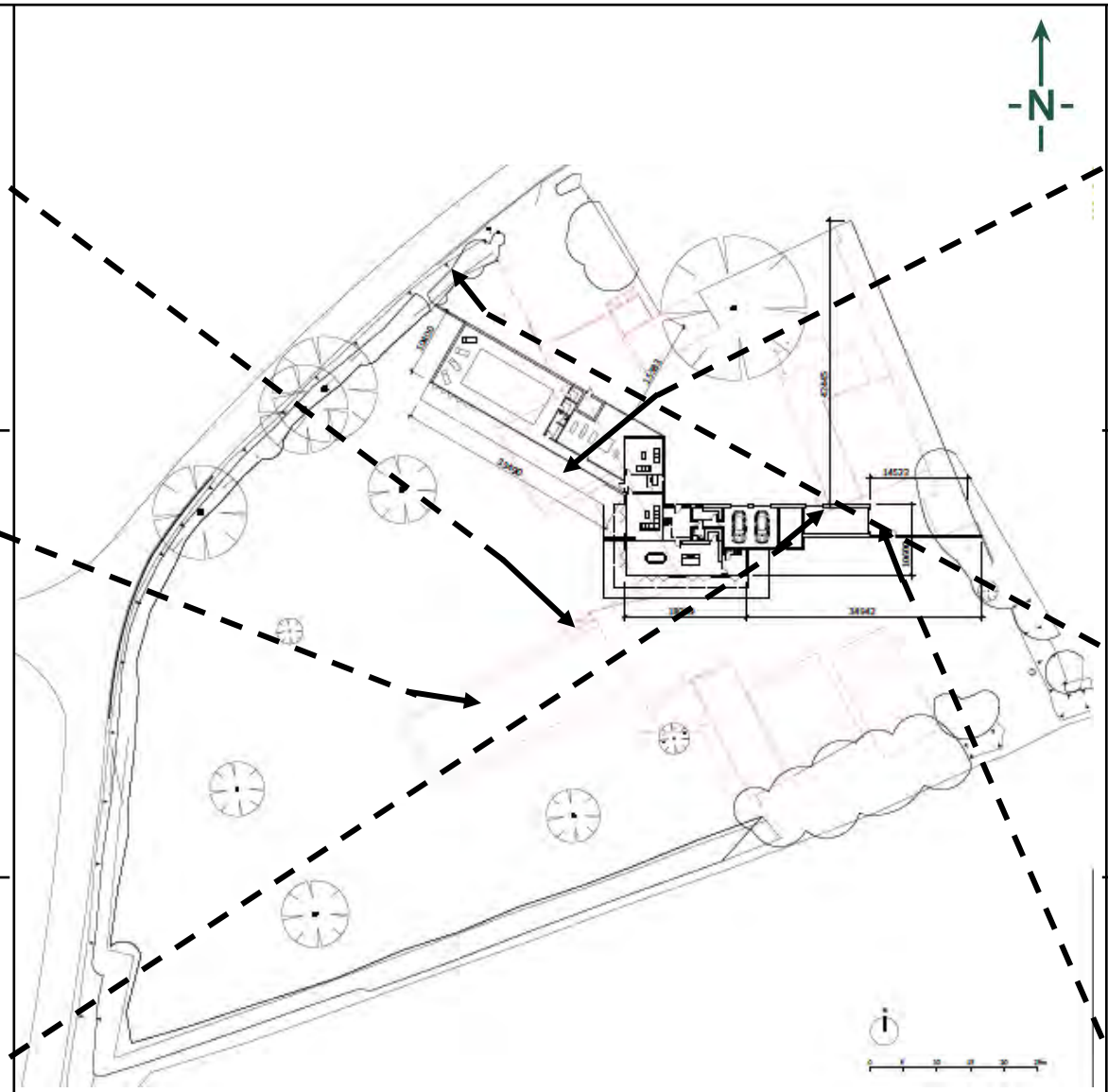


PH02: Asbestos roofing.



PH03: AST in building with blue roof on the right.





PH04: Warning sign regarding the presence of hazardous substances.



PH05: Old fuel tanks.



PH06: A stockpile comprised of brick and concrete.



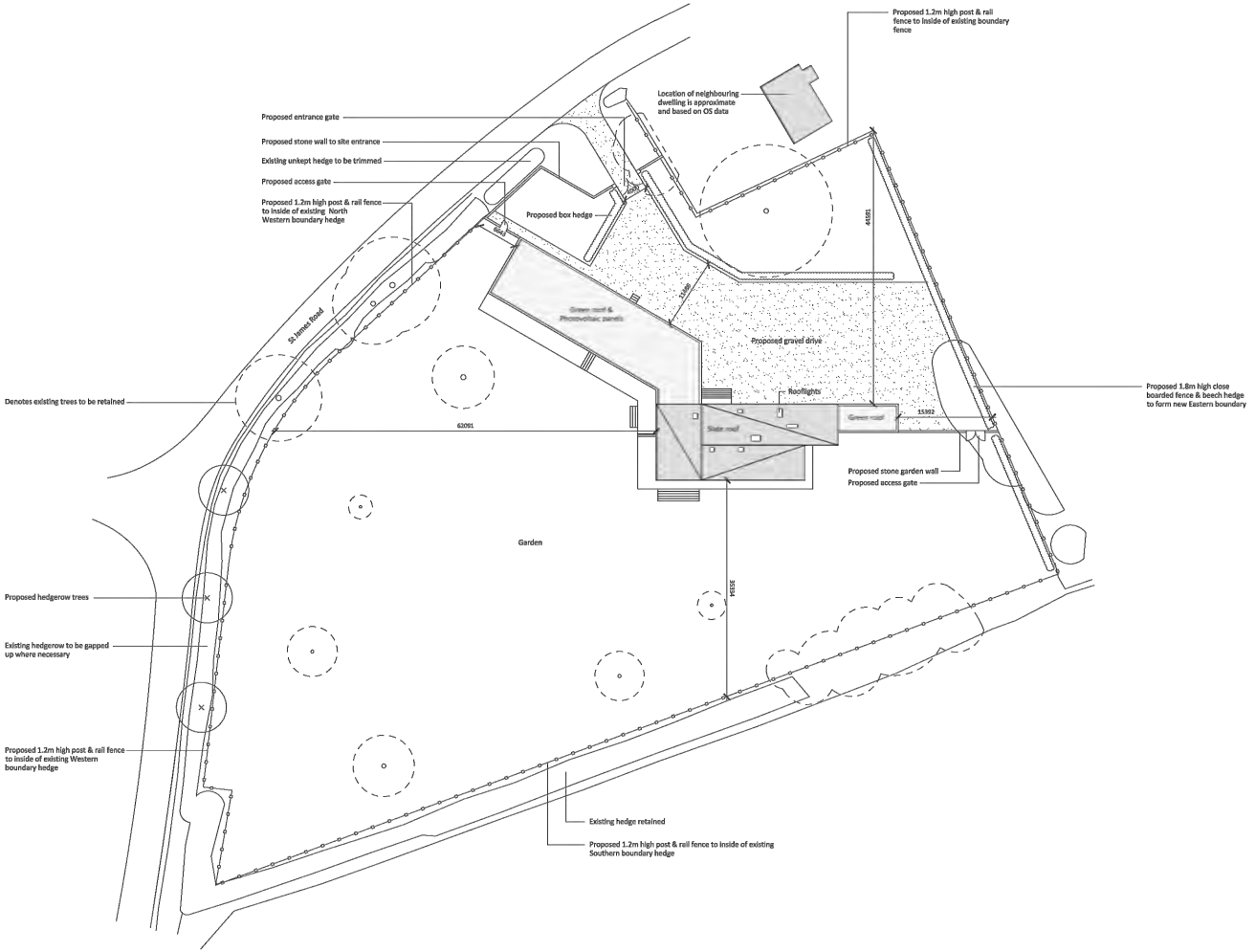
COMMENTS: There is uncertainty as unrecorded land use may have occurred and caused contamination that has not been identified by the observations.

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TITLE:
Relevant Features Plan
Pear Tree Farm, St James Road
Sutton St James

DRAWN BY: CW	SCALE: NTS	PROJECT NO: 17-0252.03	
CHECKED BY: PH	REVISION: -	FIGURE NO: 2	
DATE: 30th July 2018			

Figure 3 – Proposed Development Plan



Notes

Measurements
Do not scale from this drawing.
All measurements should be checked against on site conditions and any discrepancies should be brought to the attention of the Robert Doughty Consultancy.

Ordnance Survey Map
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CDM 2015
This drawing is for illustrative purposes and/or obtaining the relevant planning permission only. It should not be used for construction and accordingly, risk identification under the Construction (Design & Management) Regulations 2015 has not been undertaken.

Rev	By	Notes	Date

rdc Robert Doughty Consultancy
32 High Street, Helpringham
© Sleaford, Lincolnshire NG34 ORA
Tel: 01529 421646
Fax: 01529 421358
Email: admin@rdc-landplan.co.uk
Web: www.rdc-landplan.co.uk

Client: Mr. G. Franklin		
Project: Pear Tree Farm, Long Sutton		
Drawing title: Proposed Block Plan		
Drawing No: 1185-2_PL_BP02	Rev: -	Drawn: WW
Scale: 1:500 @ A2	Date: 08.02.18	Checked: CS

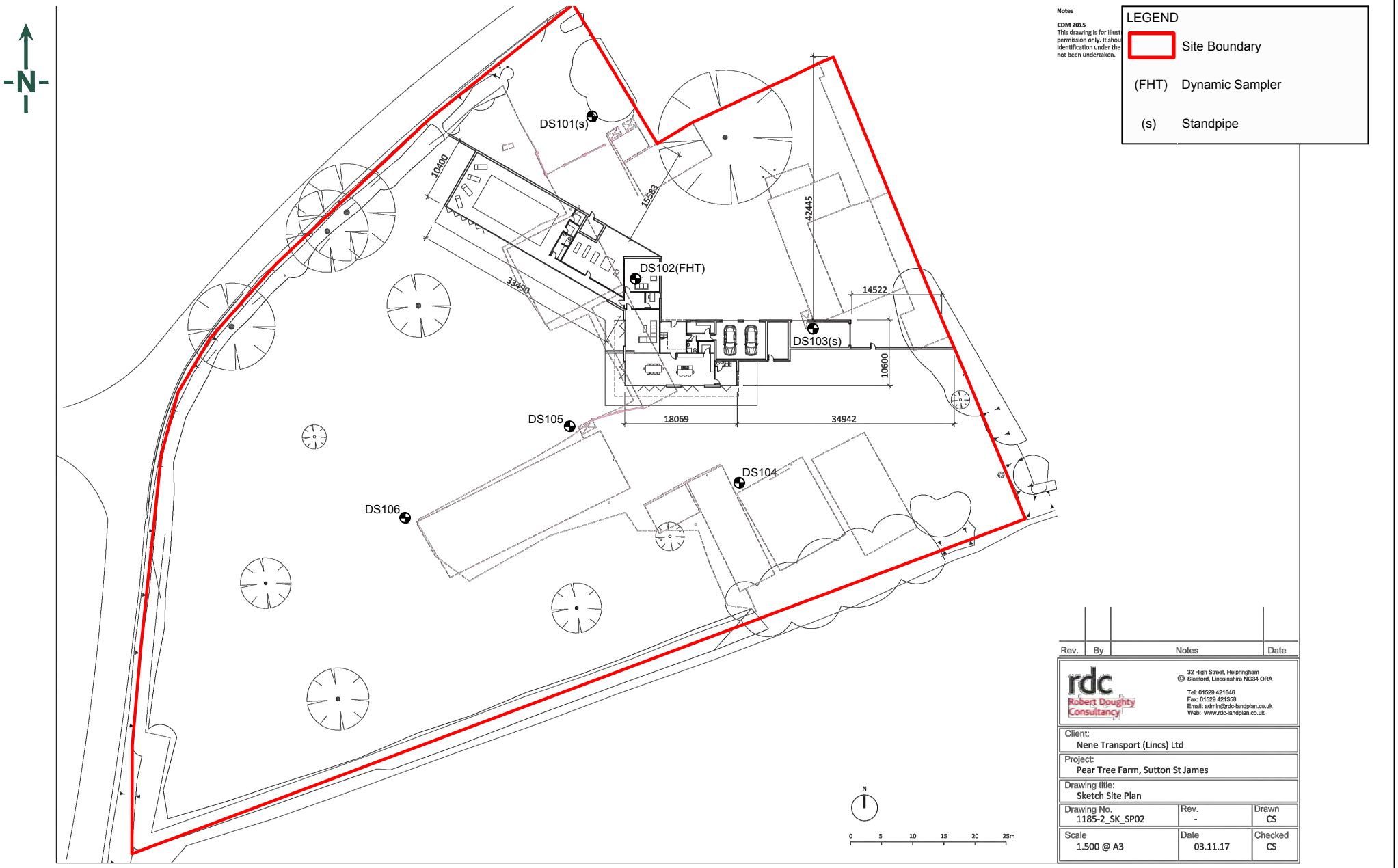
Site Plan Provided by Client

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TITLE:
Proposed Development Plan
Pear Tree Farm
Sutton St James

DRAWN BY: AW	SCALE: Not to Scale	PROJECT NO: 17-0252.03
CHECKED BY: CW	REVISION: 1	FIGURE NO: 3
DATE: 31st July 2018		

Figure 4 – Approximate Intrusive Location Plan



Site Plan Provided by Client

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TITLE:
Approximate Intrusive Location Plan
Pear Tree Farm
Sutton St James

DRAWN BY:	SCALE:	PROJECT NO:
AW	Not to Scale	17-0252.03
CHECKED BY:	REVISION:	FIGURE NO:
CW	1	2
DATE:		
31st July 2018		

Appendix A – 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.

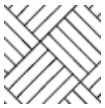
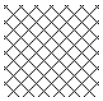
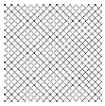
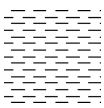
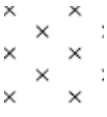
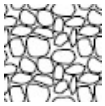
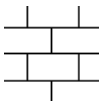
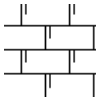
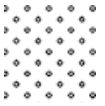
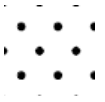
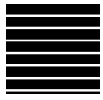
Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be 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.

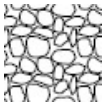
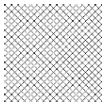
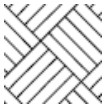
Appendix B – Key to Logs and Field Records

KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

	Topsoil		Made Ground		Made Ground 2
	Concrete		Clay		Silt
	Sand		Gravel		Peat
	Cobbles		Boulders		Mudstone
	Siltstone		Sandstone		Limestone
	Chalk		Coal		Breccia
	Conglomerate		Igneous		Metamorphic
	Volcanoclastic		Gypsum		Shale
	Ironstone		Bedrock (Unidentified)		Void

INSTALLATION / BACKFILL LEGENDS

	Sand		Gravel		Bentonite
	Cement/Grout		Arisings		Concrete
	Plain Pipe		Slotted Pipe		Piezometer Tip

Legend symbols in general accordance with BS 5930 (1999) and AGS.

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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
J	Disturbed Sample - Jar
U	Undisturbed Driven Tube Sample – 70/102mm diameter, 450mm long
U(P)	Undisturbed Pushed Piston Sample – 102mm diameter, 450mm long
U(TW)	Undisturbed Thin Walled Push In Sample – 100mm diameter, 450mm long
V	Disturbed Sample - Vial

TEST TYPES

CPT	Cone Penetrometer Test (kN/m^2)
FID	Flame Ionisation Detector Test (ppm)
HSV	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

	First Water Strike, Second Water Strike etc.
	Standing Water Level – First Strike, Second Strike etc.
	Seepage

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Project No: 17-0252.03 | Hole ID: DS101 | Page: 1 of 1

Project: Sutton St James

Dynamic Sampler Log

Date: 13/07/2018 | Client: Nene Transport (Lincs) Ltd

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: Light brown very sandy gravel of fine to medium subrounded to subangular brick, coal and slate. Sand is fine to coarse. Frequent rootlets.		0.30	(0.30)				0.30	ES	1			
MADE GROUND: Dark brown gravelly fine to coarse sand. Gravel is fine to medium subrounded to subangular slate and brick.		0.70	(0.40)									
Soft to firm dark brown slightly gravelly CLAY. Gravel of fine to medium subrounded to subangular sandstone. (TIDAL FLAT DEPOSITS)		1.20	(0.50)							1.20	SPT(C) N=12 (2,2/2,3,3,4)	
Very soft orangish brown slightly gravelly CLAY. Gravel of fine to medium subrounded to subangular sandstone. (TIDAL FLAT DEPOSITS)		2.10	(0.90)				1.90	D	1	2.00	SPT(C) N=3 (1,0/1,0,1,1)	
Soft to very soft orangish brown slightly silty CLAY. (TIDAL FLAT DEPOSITS)		2.90	(0.80)				2.60	ES	2			
Band of strong hydrocarbon odour and visible staining from 2.6 to 2.9 m bgl.												
Loose from 3.0 m bgl dark brown clayey fine to medium SAND. (TIDAL FLAT DEPOSITS)		4.00	(1.10)			3.60 ▼	3.60	D	2	3.00	SPT(C) N=9 (1,1/2,2,2,3)	
Loose dark brown slightly silty very clayey fine to coarse SAND. (TIDAL FLAT DEPOSITS)		5.00	(1.00)				4.50	ES	3	4.00	SPT(C) N=5 (1,1/1,2,1,1)	
Borehole complete at 5.45 m bgl.										5.00	SPT(C) N=6 (1,1/1,1,2,2)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.
2. Area CAT scanned prior to excavation.
3. Groundwater encountered at 3.60 m bgl.
4. Installed with a 50 mm HDPE standpipe to 4.00 m bgl.

Water Strike			Water Level		Borehole Diameter	
Date	Time	Depth Strike	Duration	Depth Water	Depth Base	Diameter
13/07/2018		3.60 m				

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Dynamic Sampling UK	Premier 110	CW	PB	PB	1:30

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Project No: 17-0252.03 | Hole ID: DS102 | Page: 1 of 1

Project: Sutton St James

Dynamic Sampler Log

Date: 13/07/2018 | Client: Nene Transport (Lincs) Ltd

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.		0.10	(0.10)									
MADE GROUND: orangish yellow very sandy gravel of fine to medium subrounded to subangular sandstone. Sand is fine to coarse.		0.20	(0.10)				0.20	ES	1			
Very soft dark brownish grey slightly gravelly CLAY. Gravel of fine to medium subrounded to subangular sandstone. Slight hydrocarbon odour.		1.20	(1.00)				1.00	ES	2	1.20	SPT(C) N=0 (0,0/0,0,0,0)	
Very soft orangish light brown slightly gravelly CLAY. Gravel of fine to medium subrounded to subangular sandstone. Slight hydrocarbon odour.		1.80	(0.60)				1.80	ES	3	2.00	SPT(C) N=0 (0,1/0,0,0,0)	
Very soft greyish brown slightly silty slightly sandy CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS).		2.60	(0.80)				2.60	D	1			
Loose from 3.0 m bgl greyish orangish brown slightly silty clayey fine to medium SAND. (TIDAL FLAT DEPOSITS).		3.60	(1.00)			3.00 ▼	3.40	D	2	3.00	SPT(C) N=9 (2,2/3,2,2,2)	
Loose from 4.0 m bgl greyish brown very clayey slightly silty fine to medium SAND. (TIDAL FLAT DEPOSITS).		5.00	(1.40)							4.00	SPT(C) N=6 (1,1/1,1,2,2)	
Borehole complete at 5.45 m bgl.										5.00	SPT(C) N=6 (1,1/2,1,2,1)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.
2. Area CAT scanned prior to excavation.
3. Groundwater encountered at 3.00 m bgl.
4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Time	Depth Strike	Duration	Depth Water	Depth Base	Diameter
13/07/2018		3.00 m				

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Dynamic Sampling UK	Premier 110	CW	PB	PB	1:30

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Project No: 17-0252.03 | Hole ID: DS103 | Page: 1 of 1

Project: Sutton St James

Dynamic Sampler Log

Date: 13/07/2018 | Client: Nene Transport (Lincs) Ltd

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.		0.15	(0.15)									
MADE GROUND: Brick cobbles.		0.30	(0.15)									
MADE GROUND: dark brown slightly gravelly clay. Gravel is fine to medium subrounded to subangular brick and occasional wood. Strong hydrocarbon odour.		0.60	(0.30)				0.40	ES	1			
Soft dark brown slightly silty slightly sandy CLAY. Sand is fine to medium. Strong hydrocarbon odour. (TIDAL FLAT DEPOSITS).		1.20	(0.60)				1.20	D	1	1.20	SPT(C) N=0 (0,0/0,0,0,0)	
Very soft greyish brown silty CLAY. Strong hydrocarbon odour and occasional areas of staining. (TIDAL FLAT DEPOSITS)		1.50	(0.30)									
Very soft orangish brown slightly silty CLAY. (TIDAL FLAT DEPOSITS). *Band of strong hydrocarbon staining from 1.5 to 1.7 m bgl.*		2.40	(0.90)				1.60	ES	2	2.00	SPT(C) N=0 (0,0/0,0,0,0)	
Soft to very soft orangish brown very sandy silty CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS).		3.20	(0.80)			3.20 ▼	2.80	D	2	3.00	SPT(C) N=8 (1,1/1,1,3,3)	
Loose dark brown very clayey slightly silty fine to medium SAND. (TIDAL FLAT DEPOSITS).		5.00	(1.80)				4.20	D	3	4.00	SPT(C) N=8 (1,2/2,2,2,2)	
										5.00	SPT(C) N=10 (1,1/2,2,3,3)	
Borehole complete at 5.45 m bgl.												

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.
2. Area CAT scanned prior to excavation.
3. Groundwater encountered at 3.20 m bgl.
4. Installed with a 50 mm HDPE standpipe to 4.00 m bgl.

Water Strike			Water Level		Borehole Diameter	
Date	Time	Depth Strike	Duration	Depth Water	Depth Base	Diameter
13/07/2018		3.20 m				

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Dynamic Sampling UK	Premier 110	CW	PB	PB	1:30

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Project No: 17-0252.03 | Hole ID: DS104 | Page: 1 of 1

Project: Sutton St James

Dynamic Sampler Log

Date: 13/07/2018 | Client: Nene Transport (Lincs) Ltd

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.		0.15	(0.15)									
MADE GROUND: Orangish yellow very sandy gravel of sandstone cobbles. Sand is fine to medium.		0.30	(0.15)									
MADE GROUND: Dark brownish orange slightly gravelly clay. Gravel of fine to medium subrounded to subangular brick.		0.40	(0.10)				0.40	ES	1			
Soft dark brown slightly sandy CLAY. Sand is fine to medium. Slight organic odour. (TIDAL FLAT DEPOSITS).		1.30	(0.90)							1.20	SPT(C) N=4 (1,1/1,1,1,1)	
Soft dark greyish brown silty slightly sandy CLAY. Sand is fine to medium. Slight hydrocarbon odour. (TIDAL FLAT DEPOSITS).		1.60	(0.30)				1.40	ES	2			
Soft light brownish orange slightly sandy silty CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS).		2.30	(0.70)									
Soft to very soft greyish brown very silty CLAY. (TIDAL FLAT DEPOSITS).		3.50	(1.20)			3.30 ▼	2.60	D	1	3.00	SPT(C) N=9 (1,1/1,1,3,4)	
Loose orangish brown slightly clayey slightly silty fine to medium SAND. (TIDAL FLAT DEPOSITS).		4.00	(0.50)				3.60	D	2			
Very loose orangish brown clayey silty SAND. (TIDAL FLAT DEPOSITS).		5.00	(1.00)				4.20	D	3	4.00	SPT(C) N=3 (1,2/1,1,0,1)	
Borehole complete at 5.45 m bgl.										5.00	SPT(C) N=3 (1,0/1,0,1,1)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.
2. Area CAT scanned prior to excavation.
3. Groundwater encountered at 3.30 m bgl.
4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Time	Depth Strike	Duration	Depth Water	Depth Base	Diameter
13/07/2018		3.30 m				

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Dynamic Sampling UK	Premier 110	CW	PB	PB	1:30

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Project No: 17-0252.03 | Hole ID: DS105 | Page: 1 of 1

Project: Sutton St James

Dynamic Sampler Log

Date: 13/07/2018 | Client: Nene Transport (Lincs) Ltd

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
TOPSOIL: Dark brown gravelly fine to medium sand. Gravel of fine to medium subrounded to subangular sandstone.		0.30	(0.30)				0.20	ES	1			
Soft dark brown slightly silty sandy CLAY. Sand is fine to coarse. (TIDAL FLAT DEPOSITS).		1.30	(1.00)							1.20	SPT(C) N=2 (0,0/1,0,1,0)	
Very soft orangish brown slightly sandy CLAY. Sand is fine to medium. (TIDAL FLAT DEPOSITS).							1.50	D	1			
			(1.30)							2.00	SPT(C) N=1 (0,0/1,0,0,0)	
Band of dark grey organic material with shell fragments from 2.4 to 2.6 m bgl.							2.40	ES	2			
		2.60										
Very loose from 3.0 m bgl orangish brown clayey fine to medium SAND. (TIDAL FLAT DEPOSITS).							2.80	D	2			
			(0.80)			3.10 ▼				3.00	SPT(C) N=3 (0,0/0,0,1,2)	
		3.40										
Very loose light brown slightly silty clayey fine to medium SAND. (TIDAL FLAT DEPOSITS).			(0.60)				3.80	D	3			
		4.00								4.00	SPT(C) N=2 (1,0/1,0,1,0)	
Very loose becoming loose from 5.0 m bgl orangish brown slightly clayey slightly silty fine to medium SAND. (TIDAL FLAT DEPOSITS).			(1.00)									
		5.00								5.00	SPT(C) N=5 (1,0/1,0,2,2)	
Borehole complete at 5.45 m bgl.												

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.
2. Area CAT scanned prior to excavation.
3. Groundwater encountered at 3.10 m bgl.
4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Time	Depth Strike	Duration	Depth Water	Depth Base	Diameter
13/07/2018		3.10 m				

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Dynamic Sampling UK	Premier 110	CW	PB	PB	1:30

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Project No: 17-0252.03 | Hole ID: DS106 | Page: 1 of 1

Project: Sutton St James

Dynamic Sampler Log

Date: 13/07/2018 | Client: Nene Transport (Lincs) Ltd

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
TOPSOIL: Dark brown slightly sandy fine to medium subrounded to subangular sandstone gravel. Sand is fine to medium with frequent rootlets.		0.40	(0.40)				0.30	ES	1			
MADE GROUND: Dark brown slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular brick.		0.80	(0.40)									
Very soft dark brownish orange slightly silty CLAY. (TIDAL FLAT DEPOSITS).		1.60	(0.80)				1.10	ES	2	1.20	SPT(C) N=1 (0,0/0,0,1,0)	
Very soft brown slightly clayey fine to medium SAND. (TIDAL FLAT DEPOSITS).		2.00	(0.40)				1.90	D	1			
No recovery.		2.60	(0.60)							2.00	SPT(C) N=1 (0,0/1,0,0,0)	
Soft to very soft orangish brown slightly silty CLAY. (TIDAL FLAT DEPOSITS). *Band of black clay with organic odour from 2.9 to 3.4 m bgl.*		3.50	(0.90)							3.00	SPT(C) N=6 (1,1/2,2,1,1)	
Very loose brown slightly clayey slightly silty fine to medium SAND. (TIDAL FLAT DEPOSITS).		4.00	(0.50)			3.70 ▼	3.50	D	2			
Very loose becoming loose from 5.0 m bgl, orangish brown slightly clayey silty SAND. (TIDAL FLAT DEPOSITS)		5.00	(1.00)				4.50	D	3	4.00	SPT(C) N=3 (1,2/1,1,0,1)	
Borehole complete at 5.45 m bgl.										5.00	SPT(C) N=8 (1,2/2,2,2,2)	

Remarks:
1. Engineer verified logged in general accordance to BS 5930:2015.
2. Area CAT scanned prior to excavation.
3. Groundwater encountered at 3.70 m bgl.
4. Backfilled with arisings.

Water Strike			Water Level		Borehole Diameter	
Date	Time	Depth Strike	Duration	Depth Water	Depth Base	Diameter
13/07/2018		3.70 m				

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		Dynamic Sampling UK	Premier 110	CW	PB	PB	1:30

Appendix C – Monitoring Records

Site Name	Sutton St James	Job number	17-0252.03	WEATHER	Start	End
				Time	11:00	12:00
Client	Nene Transport (Lincs) Ltd	Recorded by	CW	Pressure (mb)	NR	NR
				Wind speed (m/s)	4.00	5.40
Date (DD/MM/YYYY)	20/07/2018			Wind Dir. (from)	NE	NE
Gas Analyser	GFM435 (Gas Kit 5) - 12233	Visit Number	1	Temperature (°C)	17.70	17.70
Readings at start	CH_4 (% v/v) NR	CO_2 (% v/v) NR	O_2 (% v/v) NR	H_2S (ppm) NR		Dry/Rain/Snow/Ice	Dry	Dry
General comments						Rising/Falling Trend (for the three days before visit)	Rising and Falling	

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	3.4	3.4	17.5	17.5	NR	NR	NR	NR	1011	NR	2.33	3.45	
DS103	<0.1	<0.1	<0.1	<0.1	3.3	3.3	7.7	7.7	NR	NR	NR	NR	1013	NR	1.93	3.59	

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Site Name	Sutton St James	Job number	17-0252.03	WEATHER	Start	End
				Time	10:30	11:30
Client	Nene Transport (Lincs) Ltd	Recorded by	CW	Pressure (mb)	1016	1016
				Wind speed (m/s)	2.00	2.00
Date (DD/MM/YYYY)	22/07/2018			Wind Dir. (from)	N	N
Gas Analyser	GFM435 (Gas Kit 5) - 12233	Visit Number	2	Temperature (°C)	19.00	19.00
Readings at start	CH_4 (% v/v) NR	CO_2 (% v/v) NR	O_2 (% v/v) NR	H_2S (ppm) NR		Dry/Rain/Snow/Ice	Sunny/overcast	Sunny/overcast
General comments	Gas Kit G500 - hired gas kit					Rising/Falling Trend (for the three days before visit)	Falling	

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	2.2	2.2	18.7	18.7	NR	NR	NR	NR	1011	NR	2.42	3.45	
DS103	<0.1	<0.1	<0.1	<0.1	5.4	5.4	5.7	5.7	NR	NR	NR	NR	1012	NR	1.95	3.59	

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Site Name	Sutton St James	Job number	17-0252.03	WEATHER	Start	End
				Time	9:00	9:30
Client	Nene Transport (Lincs) Ltd	Recorded by	CO	Pressure (mb)	1008	1008
				Wind speed (m/s)	3.00	3.00
Date (DD/MM/YYYY)	30/07/2018			Wind Dir. (from)	W	W
Gas Analyser	GFM435 (Gas Kit 5) - 12233	Visit Number	3	Temperature (°C)	18.00	18.00
Readings at start	CH_4 (% v/v) NR	CO_2 (% v/v) NR	O_2 (% v/v) NR	H_2S (ppm) NR		Dry/Rain/Snow/Ice	Dry	Dry
General comments						Rising/Falling Trend (for the three days before visit)	Falling	

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	2.7	2.7	18.5	18.5	NR	NR	NR	NR	1008	NR	2.31	3.45	
DS103	<0.1	<0.1	3.0	3.0	1.7	1.7	10.7	10.7	NR	NR	NR	NR	1008	NR	1.92	3.59	Grey sediment at base

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Appendix D – Chemical Analysis

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Analytical Report Number : 18-93129

Project / Site name:	Sutton St James	**Samples received on:**	18/07/2018
Your job number:	17-0252.03	**Samples instructed on:**	18/07/2018
Your order number:	DS39616	**Analysis completed by:**	27/07/2018
Report Issue Number:	1	**Report issued on:**	27/07/2018
Samples Analysed:	2 soil samples		

Signed:

Jordan Hill
Reporting Manager
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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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 18-93129

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1004416	1004417			
Sample Reference				DS101	DS104			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.90	3.60			
Date Sampled				13/07/2018	13/07/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	22	20			
Total mass of sample received	kg	0.001	NONE	0.51	0.45			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	8.8			
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	200	73			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.10	0.036			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	100	36.4			

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 18-93129

Project / Site name: Sutton St James

* 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 *
1004416	DS101	None Supplied	1.90	Brown clay.
1004417	DS104	None Supplied	3.60	Light brown sand.

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Analytical Report Number : 18-93129

Project / Site name: Sutton St James

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-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
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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	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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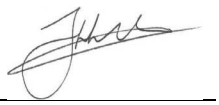
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Analytical Report Number : 18-93221

Replaces Analytical Report Number : 18-93221, issue no. 1

Project / Site name:	Sutton St James	**Samples received on:**	18/07/2018
Your job number:	17-0252.03	**Samples instructed on:**	18/07/2018
Your order number:	DS39616	**Analysis completed by:**	31/07/2018
Report Issue Number:	2	**Report issued on:**	31/07/2018
Samples Analysed:	8 soil samples		

Signed: 

Jordan Hill
Reporting Manager
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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Analytical Report Number: 18-93221

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1004685	1004686	1004687	1004688	1004689
Sample Reference				DS101	DS101	DS102	DS102	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	2.60	0.20	1.00	0.40
Date Sampled				13/07/2018	13/07/2018	13/07/2018	13/07/2018	13/07/2018
Time Taken				None Supplied	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	< 0.1
Moisture Content	%	N/A	NONE	9.0	31	9.8	14	14
Total mass of sample received	kg	0.001	NONE	0.48	0.49	0.52	1.3	1.3
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	-	-	8.3	-
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	87	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	0.044	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	43.7	-
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	0.49	4.4	-	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.10	< 0.05	-	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.2	< 0.05	-	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	1.0	< 0.05	-	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.67	< 0.05	-	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.63	< 0.05	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.70	< 0.05	-	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.39	< 0.05	-	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.60	< 0.05	-	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.36	< 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	0.35	< 0.05	-	-	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	6.53	4.43	-	-	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	-	11	-	15
Boron (water soluble)	mg/kg	0.2	MCERTS	2.4	-	1.9	-	3.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	-	17	-	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23	-	11	-	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	83	-	7.9	-	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	-	9.6	-	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	95	-	27	-	48

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 18-93221

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1004685	1004686	1004687	1004688	1004689
Sample Reference				DS101	DS101	DS102	DS102	DS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	2.60	0.20	1.00	0.40
Date Sampled				13/07/2018	13/07/2018	13/07/2018	13/07/2018	13/07/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	-
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 C10 - C40	mg/kg	10	MCERTS	-	-	-	-	33
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	1.1	-	-	-
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	24	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	25	-	-	-
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	2.1	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	14	< 10	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	36	47	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	52	53	-	-	-

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Analytical Report Number: 18-93221

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1004690	1004691	1004692		
Sample Reference				DS105	DS106	DS106		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20	0.30	1.10		
Date Sampled				13/07/2018	13/07/2018	13/07/2018		
Time Taken				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		
Moisture Content	%	N/A	NONE	10	14	19		
Total mass of sample received	kg	0.001	NONE	1.2	1.1	1.2		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	-	8.4		
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	32		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	0.016		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	16.0		
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	0.60	< 0.05	-		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-		
Fluoranthene	mg/kg	0.05	MCERTS	0.62	< 0.05	-		
Pyrene	mg/kg	0.05	MCERTS	0.53	< 0.05	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.22	< 0.05	-		
Chrysene	mg/kg	0.05	MCERTS	0.31	< 0.05	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.32	< 0.05	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.16	< 0.05	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.23	< 0.05	-		
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	2.99	< 0.80	-		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	12	-		
Boron (water soluble)	mg/kg	0.2	MCERTS	2.7	2.0	-		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	30	-		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	27	28	-		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	25	19	-		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	20	-		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	80	-		

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Analytical Report Number: 18-93221

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1004690	1004691	1004692		
Sample Reference				DS105	DS106	DS106		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20	0.30	1.10		
Date Sampled				13/07/2018	13/07/2018	13/07/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	mg/kg	0.001	MCERTS	-	-	-		
Toluene	mg/kg	0.001	MCERTS	-	-	-		
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	-		
p & m-xylene	mg/kg	0.001	MCERTS	-	-	-		
o-xylene	mg/kg	0.001	MCERTS	-	-	-		
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	-		

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	4800	-	-		
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-		

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Analytical Report Number : 18-93221

Project / Site name: Sutton St James

* 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 *
1004685	DS101	None Supplied	0.40	Brown sandy loam with gravel.
1004686	DS101	None Supplied	2.60	Brown clay and sand.
1004687	DS102	None Supplied	0.20	Light brown sandy clay with gravel.
1004688	DS102	None Supplied	1.00	Brown clay.
1004689	DS104	None Supplied	0.40	Brown clay and sand.
1004690	DS105	None Supplied	0.20	Brown sandy loam with vegetation and fibrous material.
1004691	DS106	None Supplied	0.30	Brown loam and clay with vegetation.
1004692	DS106	None Supplied	1.10	Brown clay and sand with vegetation.

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Analytical Report Number : 18-93221

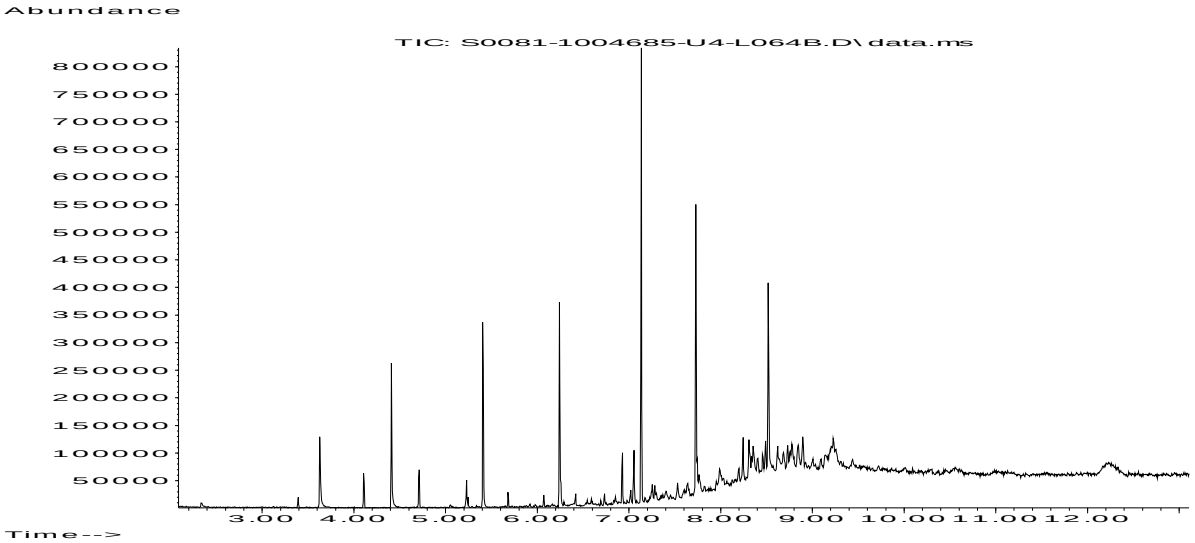
Project / Site name: Sutton St James

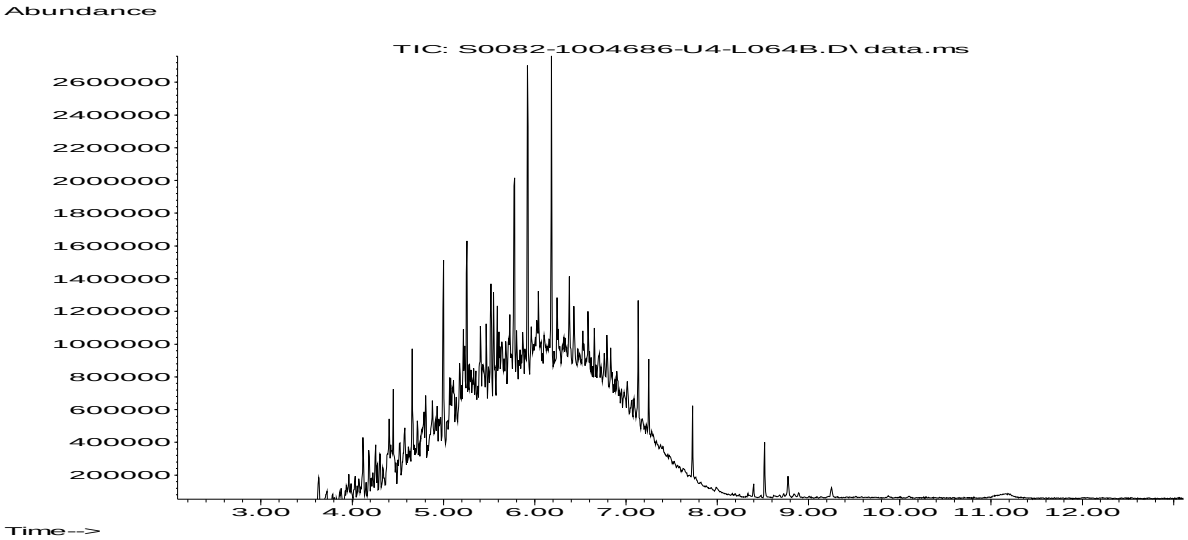
Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

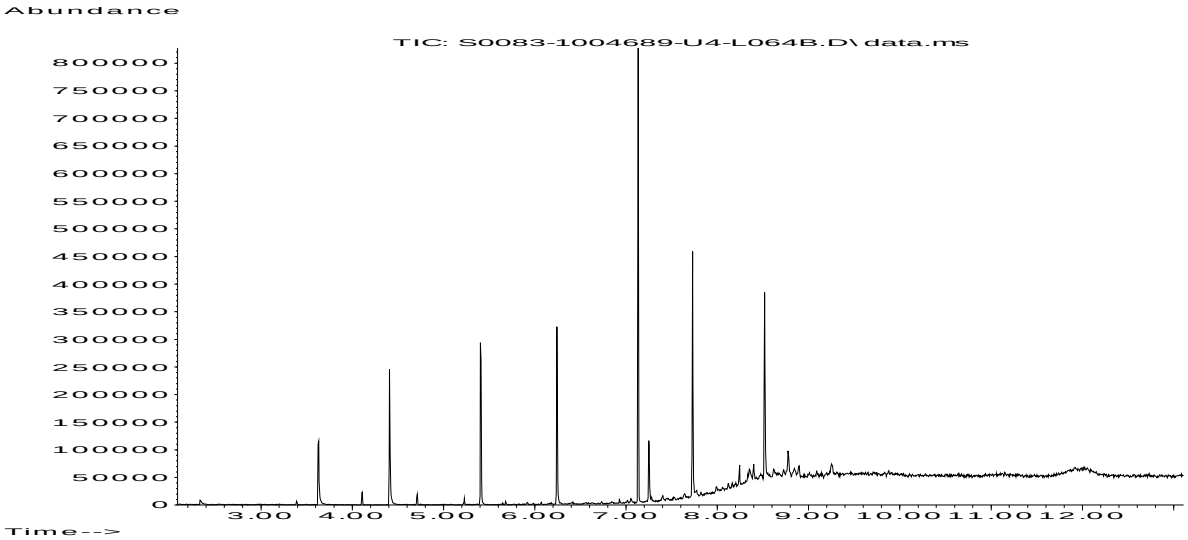
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
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
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
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
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
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
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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

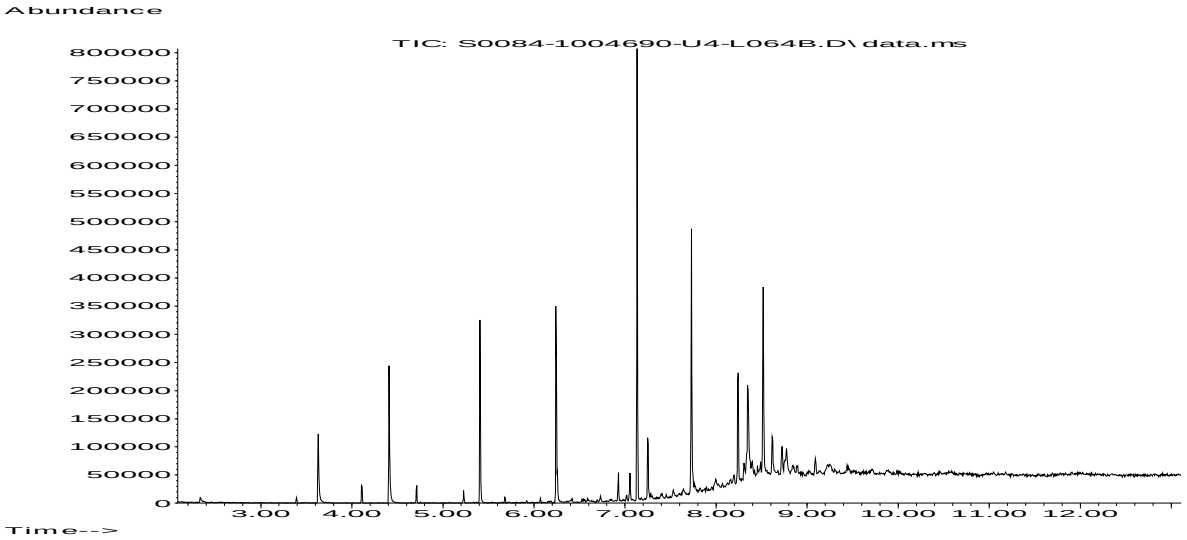
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received 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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Abundance
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600000
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200000
150000
100000
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3.00
4.00
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7.00
8.00
9.00
10.00
11.00
12.00
Time-->


Abundance
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200000
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4.00
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9.00
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11.00
12.00
Time-->


Abundance
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9.00
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11.00
12.00
Time-->


Abundance
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10.00
11.00
12.00
Time-->

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Analytical Report Number : 18-93745

Project / Site name:	Sutton St James	**Samples received on:**	25/07/2018
Your job number:	17-0252.03	**Samples instructed on:**	25/07/2018
Your order number:	DS39616	**Analysis completed by:**	31/07/2018
Report Issue Number:	1	**Report issued on:**	31/07/2018
Samples Analysed:	2 soil samples		

Signed:

Jordan Hill
Reporting Manager
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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Analytical Report Number: 18-93745

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1008082	1008083			
Sample Reference				DS103	DS103			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.40	1.60			
Date Sampled				13/07/2018	13/07/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	15	19			
Total mass of sample received	kg	0.001	NONE	0.30	0.31			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	8.6			
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	400			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.20			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	199			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	3.5			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.78			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	1.6			
Phenanthrene	mg/kg	0.05	MCERTS	0.92	3.5			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.70			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	2.1			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.8			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.53			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.67			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.54			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.27			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.41			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.24			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.33			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.92	16.9			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	-			
Boron (water soluble)	mg/kg	0.2	MCERTS	2.6	-			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	-			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	-			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	16	-			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	-			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	66	-			
Monoaromatics								
Benzene	mg/kg	0.001	MCERTS	-	< 0.001			
Toluene	mg/kg	0.001	MCERTS	-	< 0.001			
Ethylbenzene	mg/kg	0.001	MCERTS	-	0.003			
p & m-xylene	mg/kg	0.001	MCERTS	-	0.008			
o-xylene	mg/kg	0.001	MCERTS	-	0.007			
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	< 0.001			

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Analytical Report Number: 18-93745

Project / Site name: Sutton St James
Your Order No: DS39616

Lab Sample Number				1008082	1008083			
Sample Reference				DS103	DS103			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.40	1.60			
Date Sampled				13/07/2018	13/07/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	2100	-			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	0.016			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	34			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	350			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	540			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	200			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	1100			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	0.079			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	30			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	380			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	440			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	180			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	1000			

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 18-93745

Project / Site name: Sutton St James

* 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 *
1008082	DS103	None Supplied	0.40	Brown clay.
1008083	DS103	None Supplied	1.60	Brown clay.

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Analytical Report Number : 18-93745

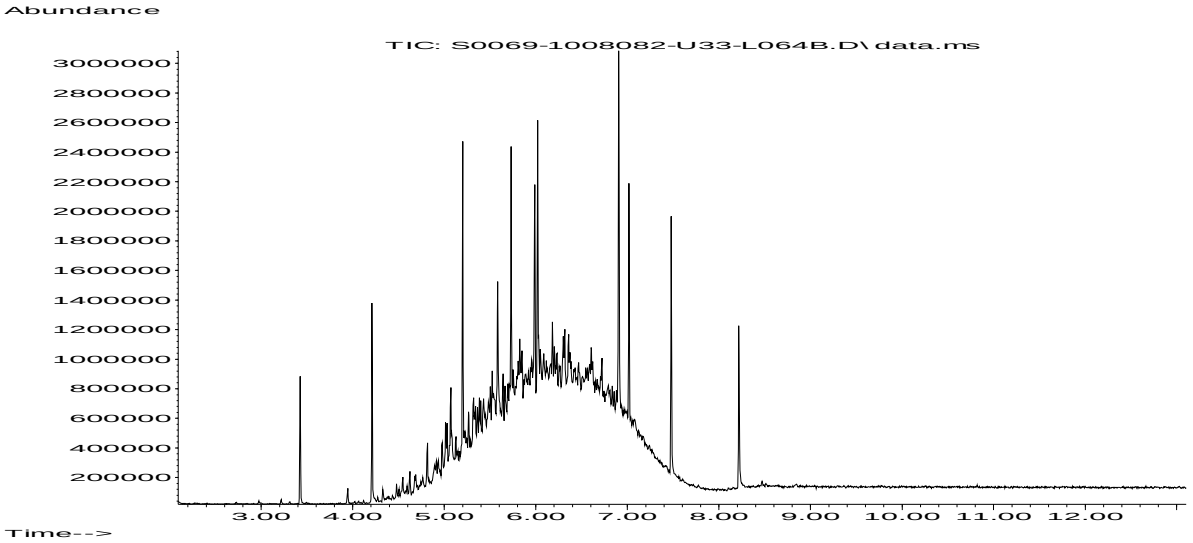
Project / Site name: Sutton St James

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
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
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
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
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
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
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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	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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Abundance
TIC: S0069-1008082-U33-L064B.D\ data.ms
3000000
2800000
2600000
2400000
2200000
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->

Appendix E – Geotechnical Testing

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

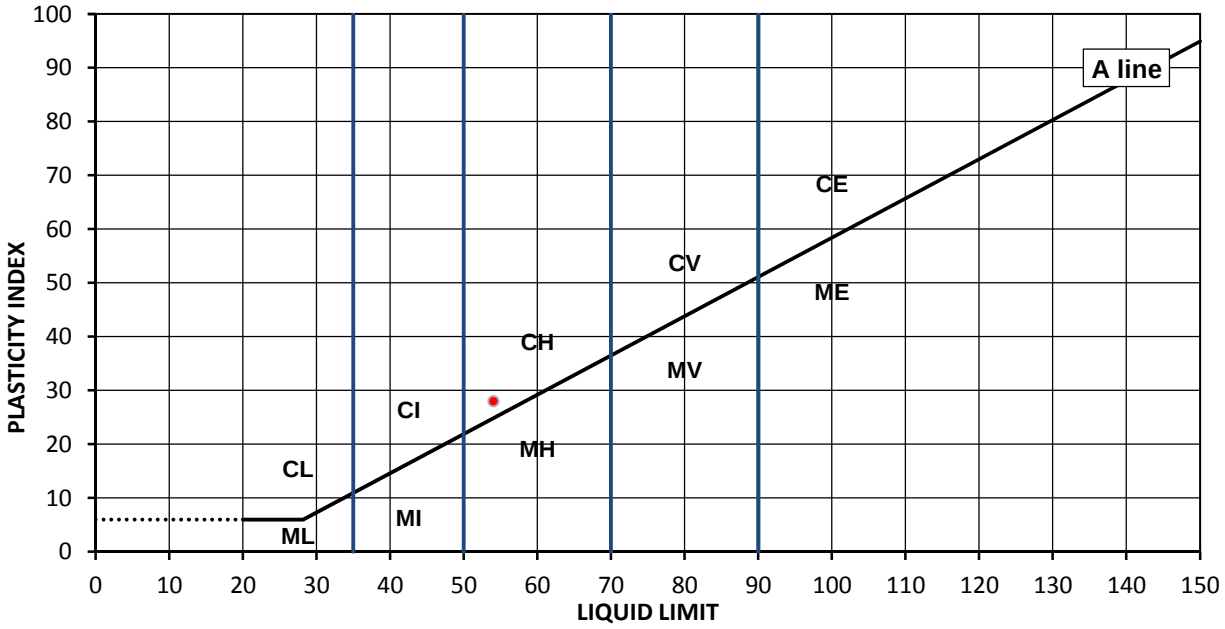
4041

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

Test Results

Laboratory Reference:	1007750	Depth Top [m]:	1.90
Hole No.:	DS101	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown slightly sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
32	54	26	28	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks: NP – non plastic

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Date Reported: 31/07/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

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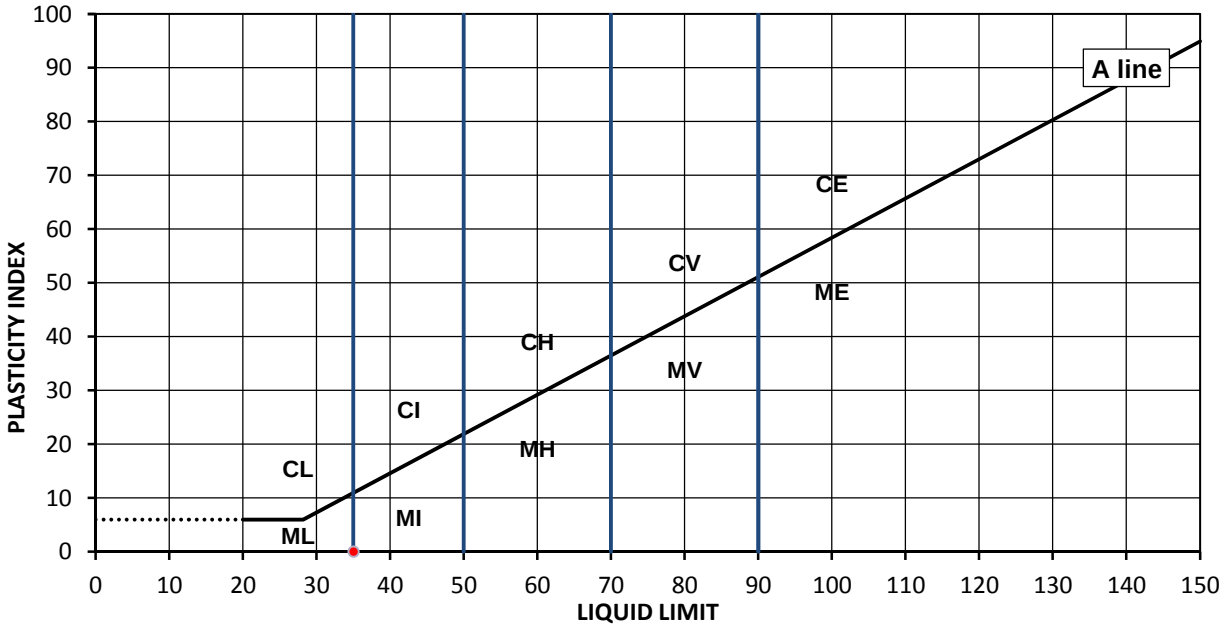
4041

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

Test Results

Laboratory Reference:	1007752	Depth Top [m]:	2.60
Hole No.:	DS102	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown SAND		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
30	35	NP	NP	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks: NP – non plastic

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Date Reported: 31/07/2018

Signed:

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Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

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i2 Analytical Ltd
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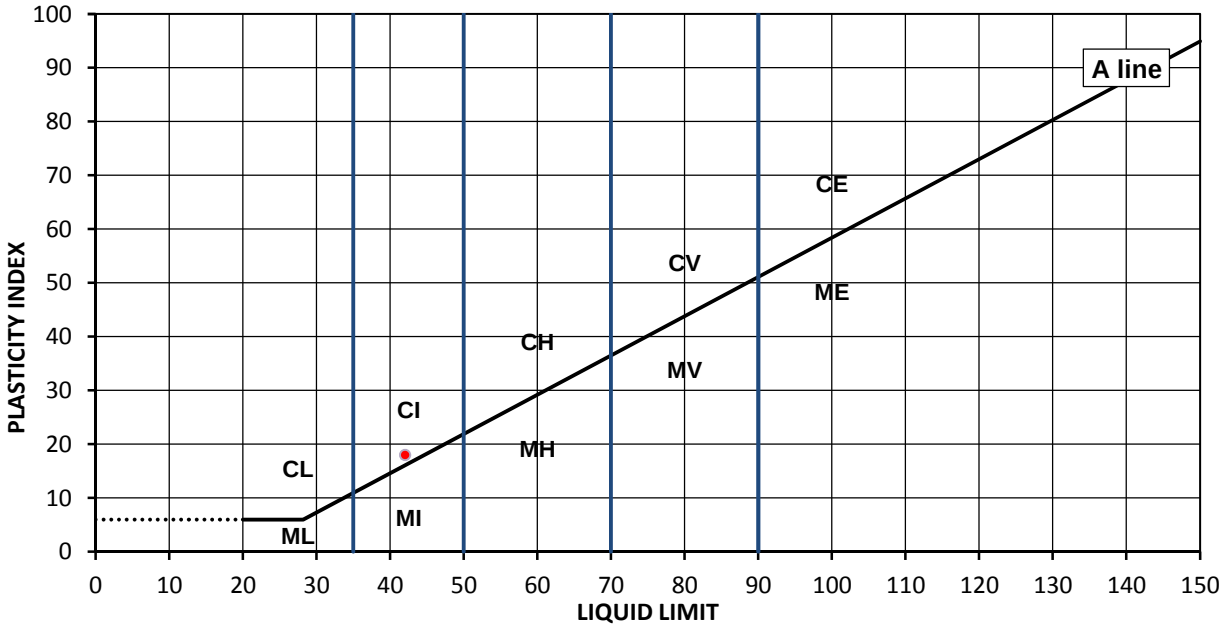
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Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

Test Results

Laboratory Reference:	1007754	Depth Top [m]:	2.60
Hole No.:	DS104	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Dark brown sandy organic CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
40	42	24	18	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Date Reported: 31/07/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

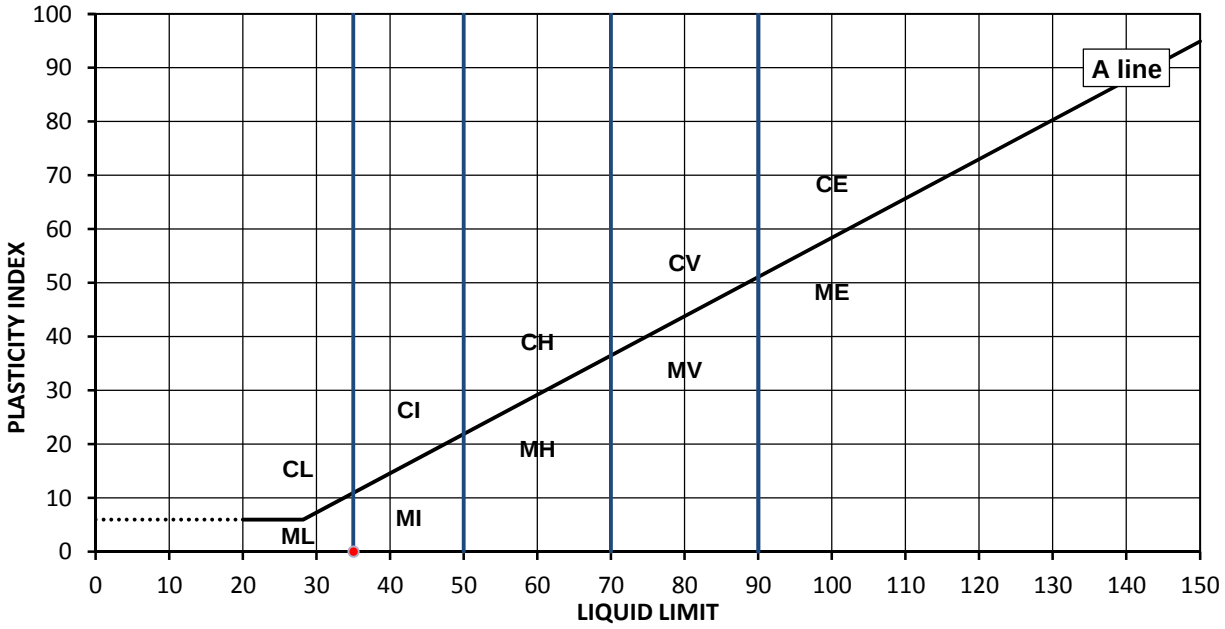
4041

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

Test Results

Laboratory Reference:	1007758	Depth Top [m]:	2.80
Hole No.:	DS105	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown SAND		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	35	NP	NP	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks: NP – non plastic

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Date Reported: 31/07/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client: Delta-Simons
Client Address: 3 Henley Office Park
Doddington Road
Lincoln
LN6 3QR
Contact: Charlotte Walker
Site Name: Sutton St James
Site Address: Not Given

Client Reference: 17-0252.03
Job Number: 18-93699
Date Sampled: 13/07/2018
Date Received: 18/07/2018
Date Tested: 27/07/2018
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	M/C	Atterberg				Density		Total Porosity
		Reference	Top depth [m]	Base depth [m]	Type			% Passing 425um	LL	PL	PI	bulk	PD	
							%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3
1007750	DS101	Not Given	1.90	Not Given	D	Brown slightly sandy CLAY	32	100	54	26	28			
1007751	DS101	Not Given	3.60	Not Given	D	Brown clayey SAND	26							
1007752	DS102	Not Given	2.60	Not Given	D	Brown SAND	30	100	35	NP	NP			
1007754	DS104	Not Given	2.60	Not Given	D	Dark brown sandy organic CLAY	40	100	42	24	18			
1007755	DS104	Not Given	3.60	Not Given	D	Brown SAND	27							
1007756	DS104	Not Given	4.20	Not Given	D	Brown clayey SAND	32							
1007757	DS105	Not Given	1.50	Not Given	D	Brown CLAY	58							
1007758	DS105	Not Given	2.80	Not Given	D	Brown SAND	27	100	35	NP	NP			
1007759	DS106	Not Given	1.90	Not Given	D	Brown SAND	33							
1007760	DS106	Not Given	3.50	Not Given	D	Brown silty CLAY	32							

Comments: NP - non plastic

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 31/07/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client: Delta-Simons
Client Address: 3 Henley Office Park
Doddington Road
Lincoln
LN6 3QR
Contact: Charlotte Walker
Site Name: Sutton St James
Site Address: Not Given

Client Reference: 17-0252.03
Job Number: 18-93699
Date Sampled: 13/07/2018
Date Received: 18/07/2018
Date Tested: 27/07/2018
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	M/C	Atterberg				Density		Total Porosity
		Reference	Top depth [m]	Base depth [m]	Type		%	% Passing 425um %	LL %	PL %	PI %	bulk Mg/m3	PD Mg/m3	Mg/m3
1007761	DS106	Not Given	4.50	Not Given	D	Brown clayey SAND	35							

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 31/07/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

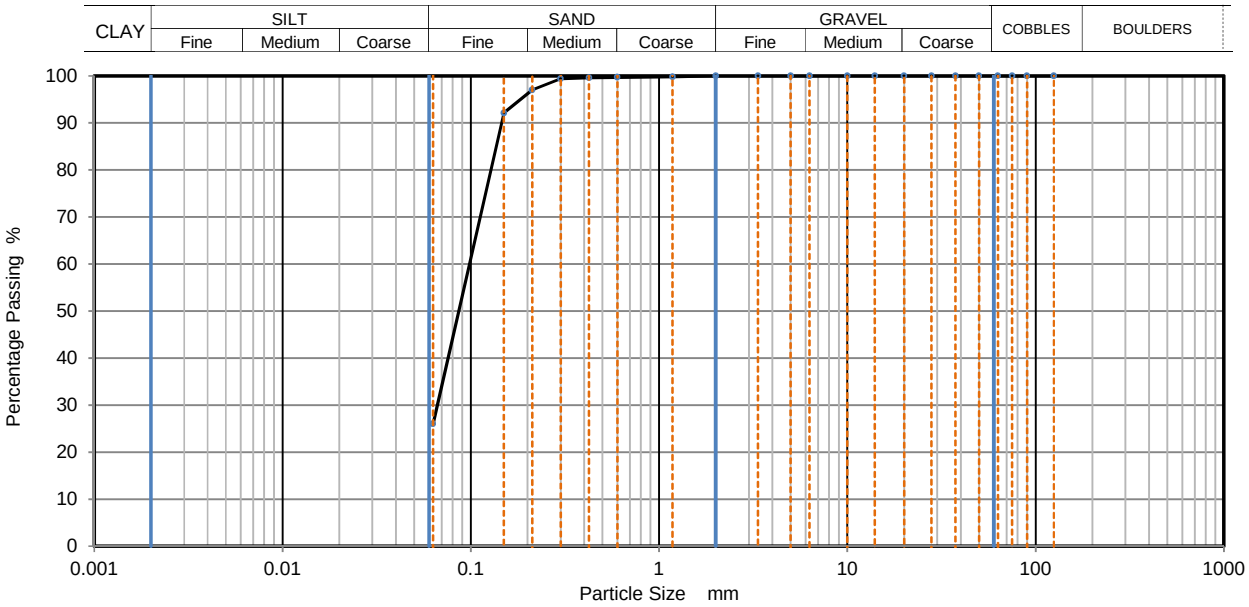
4041

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 1007751

Sample description:	Brown clayey SAND	Sample Reference:	Not Given
Location:	DS101	Sample Type:	D
Supplier:	Not Given	Depth Top [m]:	3.60
		Depth Base [m]:	Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	97		
0.15	92		
0.063	26		

Dry Mass of sample [g]: 145

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	73.80
Fines <0.063mm	26.20

Grading Analysis		
D100	mm	2
D60	mm	0.0983
D30	mm	0.0662
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 31/07/2018

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TEST CERTIFICATE

Determination of Particle Size Distribution

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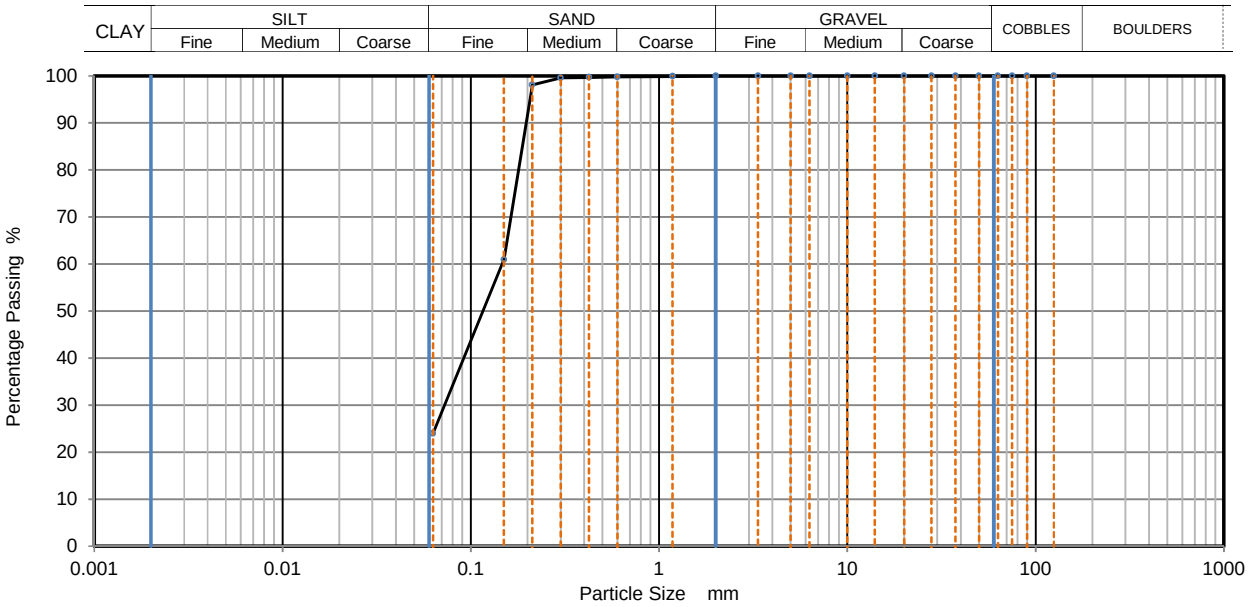
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Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 1007753

Sample description:	Brown clayey SAND	Sample Reference:	Not Given
Location:	DS102	Sample Type:	D
Supplier:	Not Given	Depth Top [m]:	3.40
		Depth Base [m]:	Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	98		
0.15	61		
0.063	24		

Dry Mass of sample [g]: 152

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	75.80
Fines <0.063mm	24.20

Grading Analysis		
D100	mm	2
D60	mm	0.147
D30	mm	0.0723
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 31/07/2018

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TEST CERTIFICATE

Determination of Particle Size Distribution

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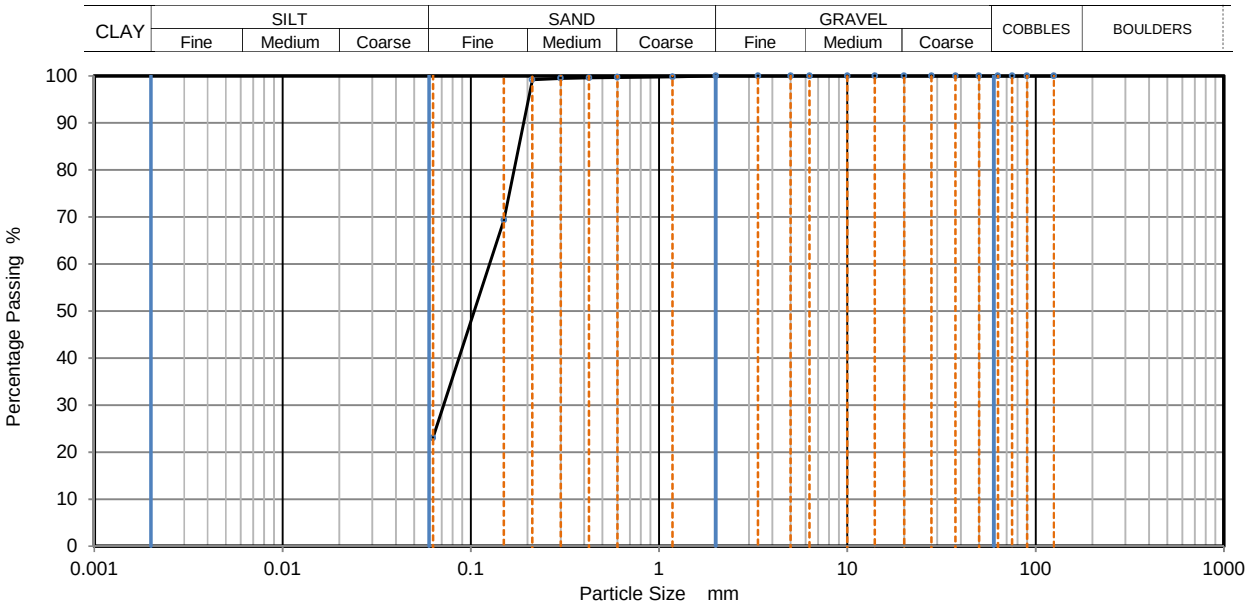
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Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 1007756

Sample description:	Brown clayey SAND	Sample Reference:	Not Given
Location:	DS104	Sample Type:	D
Supplier:	Not Given	Depth Top [m]:	4.20
		Depth Base [m]:	Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	69		
0.063	23		

Dry Mass of sample [g]: 121

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	76.90
Fines <0.063mm	23.10

Grading Analysis		
D100	mm	2
D60	mm	0.126
D30	mm	0.0717
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 31/07/2018

for and on behalf of i2 Analytical Ltd

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The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

TEST CERTIFICATE

Determination of Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

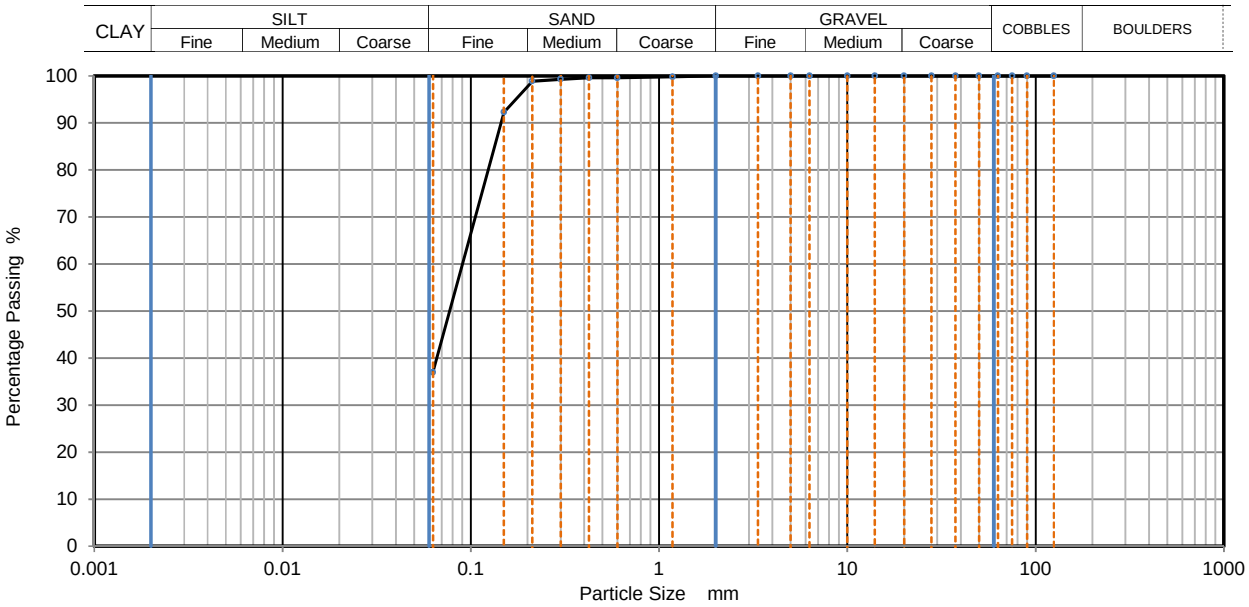
4041

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client:	Delta-Simons	Client Reference:	17-0252.03
Client Address:	3 Henley Office Park Doddington Road Lincoln LN6 3QR	Job Number:	18-93699
		Date Sampled:	13/07/2018
		Date Received:	18/07/2018
Contact:	Charlotte Walker	Date Tested:	27/07/2018
Site Name:	Sutton St James	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 1007761

Sample description:	Brown clayey SAND	Sample Reference:	Not Given
Location:	DS106	Sample Type:	D
Supplier:	Not Given	Depth Top [m]:	4.50
		Depth Base [m]:	Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	99		
0.15	92		
0.063	37		

Dry Mass of sample [g]: 140

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	63.00
Fines <0.063mm	37.00

Grading Analysis		
D100	mm	2
D60	mm	0.0904
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 31/07/2018

for and on behalf of i2 Analytical Ltd

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Appendix F – Risk Definitions

Land Contamination 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.