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DRAFT

Surfleet Primary School

Phase 2 Ground Investigation

Surfleet Primary School
Station Road
Surfleet
Spalding
Lincolnshire
PE11 4DB

Report Ref: 25.09.007a-dr01
December 2025

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DOCUMENT RECORD

Report Title	Phase 2 Ground Investigation Report
Development	Single storey lightweight classroom and the demolition of an existing wall, adjacent to the proposed development.
Project Address	Surfleet Primary School, Station Road, Surfleet, Spalding, Lincolnshire, PE11 4DB
Project Ref	25.09.007a
Client	Surfleet Primary School

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For and on behalf of ListersGeo, trading name of Listers Geotechnical Consultants Ltd

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EXECUTIVE SUMMARY

Project Reference	25.09.007a
Site Location	Surfleet Primary School, Station Road, Surfleet, Spalding, Lincolnshire, PE11 4DB
OS Grid Reference	525794, 328572
Development Proposals	Single storey lightweight classroom and the demolition of an existing wall, adjacent to the proposed development.
Current Site Use	Part of a primary school playground, currently occupied with playground equipment.
Topography	Relatively flat with a very gently slope down towards the north.
Vegetation	Small trees and mature trees up to between 12m and 14m tall (estimated by eye) were observed along the site boundaries, and an approximately 12m high tree (estimated by eye) is adjacent to the proposed plot of the new classroom.
Published Geology	Superficial geology: Tidal Flat Deposits Bedrock geology: Oxford Clay Formation
Ground Conditions Encountered	Topsoil overlying extremely low to low strength brown, sandy, silt and slightly sandy, clay to 2.00m, which in turn overlies very loose and loose, clayey sand becoming medium dense at 5.00m and extending to beyond the base of the investigation at a maximum depth of 8.45m. Blowing sands were encountered below 6.00m depth.
Groundwater Encountered	1.90m and 2.00m. Groundwater monitoring recorded groundwater at 1.30m depth within the Tidal Flats. The water levels encountered during the investigation could potentially be caused by the vibrations from the drilling activities, inducing liquefaction within the Tidal Flat Deposits. As such, groundwater could potentially be at deeper depths although such a water level appears to be reasonable given the site setting.
Risks to Human Health	Negligible
Ground Gas Risks	Negligible
Risks to Controlled Waters	Negligible
Chemical Attack on Buried Concrete	Design Sulphate Class DS-1 ACEC Class AC-1
Geotechnical Hazards	Extremely/very low strength, potentially highly compressible and sensitive soils. Blowing sands were encountered below 6.00m.
Potential Foundation Solutions	Piled raft foundations or piled (driven) foundations
Floor Slabs	Suspended
Infiltration Measures	Rising head tests recorded a permeability (inflow) in the region of $6.3x10^{-4}$m/s. Due to the presence of shallow groundwater and clay soils soakaways are not recommended for the proposed development.
Waste Soil Classification	Topsoil – non-hazardous Tidal Flat Deposits – inert
Limitations and Recommendations	Due to the presence of very low strength, highly compressible soils, shallow groundwater and blowing sands, and the proximity of the existing school building and the proposed development. A specialist piling contractor should be consulted as to the efficiency and suitability of piles installed using their particular systems in these ground conditions, and also their environmental impact. Should piled foundations be considered, we recommend supplementary boreholes with cable percussive techniques in order to aid a piled foundation solution at the site (as required by the piling contractor). The shallow water levels encountered during the investigation could potentially be caused by the drilling activities inducing liquefaction. As such groundwater could be at deeper depths. However, this may not fully highlight seasonal and tidal fluctuations and hence this may need to be verified by additional monitoring.

This executive summary should be read in conjunction with the main report.

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APPENDICES

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PHASE 2 GROUND INVESTIGATION REPORT

INTRODUCTION

A Phase 2 Ground Investigation has been undertaken for a new lightweight, single storey modular classroom at Surfleet Primary School, Station Road, Surfleet, Spalding, Lincolnshire, PE11 4DB. A Site Location Plan is provided in Appendix A. The Ordnance Survey National Grid reference for the approximate centre of the site is 525794, 328572.

Instructions to undertake the investigation were received from Hawker Construction Ltd, acting on behalf of the client, Surfleet Primary School, in their email dated 24th October 2025.

This report describes the intrusive site investigation activities carried out by ListersGeo in order to provide an evaluation of the ground conditions and the extent of any soil, gas or groundwater contamination present on the site. The report presents human health and groundwater risk assessments and discusses the geotechnical implications with regard to the proposed development based on the findings of the fieldwork and subsequent laboratory testing.

This report supplements a previous Phase 1 desk study report prepared by ListersGeo, report reference 25.09.007-f01 dated 9th October 2025.

This current report should be read in conjunction with the previous report for full details of the investigations undertaken at the site.

This report has been prepared for the sole use of the client and their professional advisors. This report shall not be relied upon by third parties without the express written authority of ListersGeo. If an unauthorised third-party comes into possession of this report, they must not rely on it and the authors owe them no duty of care and skill.

SCOPE OF THE INVESTIGATION

The scope of the investigation as requested by the client's structural engineers, Hawker Construction Ltd was to undertake a phase 2 intrusive investigation in order to provide an assessment of the geotechnical engineering properties of the ground and the extent of any soil, gas or groundwater contamination on the site. A contaminated land risk assessment was undertaken based on the Contaminated Land Exposure Assessment (CLEA) and Environment Agency (EA) Remedial Targets Methodology (RTM) guidelines.

The investigation includes a preliminary assessment of the feasibility of adopting a soakaway drainage solution at the site. The investigation also includes an assessment of the waste characteristics of the soil on the site.

PROPOSALS

It is proposed to redevelop the site to accommodate a light weight, single storey, modular classroom and the demolition of an existing wall, adjacent to the proposed development. A proposed site layout plan is provided in Appendix A.

The report is based upon the above development proposals and the existing ground levels. Should either of these alter significantly following issue of this report, then the contents will require re-evaluation.

SITE INFORMATION AND RECONNAISSANCE

A reconnaissance of the site and its immediate surrounds was undertaken on the 10th September 2025, as part of the desk study.

Setting, Size and Current Use

The site lies in a predominantly residential area and is currently occupied by a primary school. Access to the site was afforded via Station Road, occupying an area of approximately 0.60ha.

The site itself can be broadly divided into the main school building in the south and an open field in the North, divided by an approximately 1.60m high retaining wall in the west, the retaining wall was approximately 1.20m high along the northwest facing side, retaining approximately 0.40m of material. The field was utilised as a sports pitch and playground with an allotment and shed in the southwest of the open field

At the time of investigation, the proposed development plot was occupied by some playground equipment.

The southern area of the site is surfaced with asphalt concrete and utilised for vehicle parking.

The main school building and retaining walls were constructed of masonry brick.

The school is enclosed by tall mature trees along the northern, eastern and western site boundaries.

The site is bordered by:

Direction	Feature
North	Open field, denoted as sewage works
East	Residential
South	Residential
West	Station Road, beyond which is the River Glen

Topography and Surface Conditions

The general topography of the area slopes gently down to the northeast. The site itself is generally flat, sloping gently down towards the north with a gradient of approximately 1°.

Potential Pollution Sources

Given the age of the school, it is anticipated that asbestos could potentially be present. Limited hydrocarbon contamination could potentially be present in the car park in the southern area of the site associated with leaks from parked vehicles.

No obvious visual or olfactory signs of contamination were noted during the site reconnaissance.

Vegetation

Small trees and mature trees up to between 12m and 14m tall (estimated by eye) were observed along the site boundaries, and an approximately 12m high tree (estimated by eye) is adjacent to the proposed plot of the new classroom.

GEOLOGY

Published Geology

Reference to the BGS 1:50,000 scale map, Sheet No.144, Spalding, Solid and Drift edition, dated 1992, and other published geological information on the area indicates that the site is underlain by Quaternary age Superficial geology, Tidal Flat Deposits (Terrington Beds) overlying Bedrock geology, Oxford Clay Formation.

The BGS maps notes that the area is past the probable former Saxon coastline and was later marshland following a series of reclamations between the 14th and 19th century.

Made Ground

Medieval saltern silt mounds (from salt production) are recorded on the Spalding Golf Course some 670m to the west.

Superficial Deposits

Tidal Flat Deposits are generally represented by unconsolidated, silty clay and sandy silt with layers of peat, sand and a basal gravel. Based on the nearby publicly available boreholes, the deposit is anticipated to be some 19m thick beneath the site.

Bedrock

The Oxford Clay Formation is generally represented by pale grey, green grey and brown grey at depth blocky mudstones becoming fossiliferous, bituminous and calcareous with nodular limestones at depth. Based on the geological cross section, the formation is anticipated to be some 55m thick beneath the site.

Historical Boreholes

The BGS holds records of exploratory holes historically put down during previous investigations. The records of one historical borehole, put down 745m to the west of the site, has been reviewed to aid the preliminary assessment of the ground conditions.

BGS ref: TF22NE48, deep borehole was put down in 1985 and encountered shallow Made Ground overlying Tidal Flat Deposits comprised of soft and firm silt down to 5.50m depth, above very loose to medium dense sand with occasional shell fragments down to 18.50m depth, overlying a bed of gravel. The Oxford Clay Formation was encountered from 19.10m comprised of stiff, grey, clays with chalk and flint of the Oxford Clay Formation down to base of the borehole, >20.00m depth. Blowing sands were also noted between 5.00m and 14.20m depth.

Other boreholes close to the above borehole (BGS ref: TF22NE35 and TF22NE39, 740m and 710m west) noted adverse hydrostatic conditions between 12.65m to 17.00m and below 18.50m.

Groundwater was recorded in three boreholes between 4.00 and 6.00m depth.

INITIAL CONCEPTUAL SITE MODEL

The previously undertaken Desk Study reference 25.09.007 prepared by ListersGeo identified limited potential contamination sources on the site including Made Ground and asbestos associated with historical and current site use, and limited hydrocarbon contamination associated with the car park. However, such sources are away from the proposed development area. Based upon the findings of the Conceptual Site Model (CSM), it is considered of low likelihood that soils below the proposed development area itself may be contaminated.

If present, the potential identified contaminants may pose a risk to human health via direct contact, ingestion or inhalation.

The earliest records the site has been part of a school playing field to the present day. As such contamination associated with the historical and current use, if any, is considered to be localised and at low concentrations.

Contamination associated with vehicle parking is considered to be at low concentrations and localised to the car park. Furthermore, the car park in the southern area of the site is surfaced with hardstanding and the impacts to soils beneath are likely to be low, and unlikely to impact the area of proposed development to the north.

Both the superficial and bedrock aquifers are classified as unproductive aquifers, there are also no known groundwater abstraction licenses within 1km of the site, as such the unproductive aquifers are not considered to be sensitive receptors and are not considered further.

Due to the presence of potentially gassing organic peat soils within the Tidal Flat Deposits, it is considered that gas monitoring is required at this site, to confirm the presence/absence of ground gases.

Based on the desk study research, the following potentially-complete pollutant linkages have been assessed and in accordance with CIRIA C552, a consequence and probability rating has been applied to each potential contamination source to create an overall risk rating. The definitions and methodology are presented in Appendix D and the results are presented in the following table:

INITIAL CONCEPTUAL SITE MODEL

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Potential Sources	Pathway	Potential Receptor	Probability	Consequence	Risk Classification	Explanation
Contaminants within the Made Ground - *heavy metals, PAH, TPH, asbestos*	Ingestion, inhalation and direct skin exposure (dermal contact)	End Users - Staff/Pupil	Low likelihood	Medium	Moderate / Low	Contamination, if any is anticipated to be localised at low concentrations. Nominal ground investigation should be carried out to confirm this and reduce risk to **LOW.**
		Nearby Residents	Unlikely	Medium		
		Construction Workers	Low likelihood	Medium	Moderate / Low	Contamination is expected to be at low concentrations. Suitable PPE will be used along with appropriate construction risk assessments - this will render the risk to **LOW** or **VERY LOW**.
		Maintenance Workers	Low likelihood	Medium	Moderate / Low	Maintenance workers may be exposed to ground contamination in a similar manner to development workers but it cannot be guaranteed that appropriate PPE and working practices will be adopted but exposed is likely to be less frequent.
	Migration through unsaturated zone, groundwater, drains or service runs	Drain - N River Glen 10m S	Low likelihood	Mild	Very Low	It is considered that the contamination associated with the site is generally localised, immobile or at low concentrations and unlikely that significant site-derived contaminated groundwater would be present and migrate to the nearby surface water or run off into the drain or River Glen.
	Surface run off		Low likelihood	Mild	Very Low	
	Direct contact	Substructures Water supply pipes	Low likelihood	Mild		The Oxford Clay Formation is known to potentially contain sulphates at concentrations that may accelerate the degradation of buried concrete but anticipated depth to bedrock indicates that foundations are unlikely to extend this far. Limited contamination which may impact pipes is anticipated.
Ground gas in organic rich soils - *Carbon dioxide or methane*	Inhalation	End Users – Residents	Low likelihood	Mild	Moderate / Low	Gas generation is thought to be limited, however nominal investigation is recommended to establish if ground gas is present on site. If organic soils or a significant thickness of Made Ground are present then further testing, monitoring or gas protection measures may be required.
		Construction Workers	Unlikely	Mild	Very Low	
		Maintenance Workers	Unlikely	Mild	Very Low	
	Accumulation in building	On-site buildings	Low likelihood	Severe	Moderate	

INITIAL GEOTECHNICAL CONCEPTUAL SITE MODEL

Although no formal geotechnical desk study or recommendations form part of the scope of the previous geoenvironmental report the following geotechnical model has been derived. If new foundations are to be constructed, then a geotechnical assessment is recommended to assist with foundation design (as undertaken as part of this investigation). Particularly due to the presence of nearby trees, potentially shrinkable soils and potentially deep low strength, highly compressible soils down to some 19m depth.

The anticipated geology on site is likely to comprise a surface veneer of shallow Topsoil/Made Ground overlying mixed fine and coarse-grained soils (fine-grained soils may be potentially shrinkable soils) and potentially deep low strength, highly compressible soils of the Tidal Flat Deposits which in turn overlies fine-grained soils of the Oxford Clay Formation.

Based on the nearby publicly available boreholes, groundwater is anticipated to be between 4.00m and 6.00m depth.

Blowing sands may occur within coarse-grained soils within the Tidal Flat Deposits.

The presence of mature trees along the eastern site boundary and directly southwest of the proposed development may pose a risk of causing seasonal desiccation should significant fine-grained soils with volume change potential be encountered within the influencing zone of the trees.

Due to the presence of deep low strength, compressible soils, potentially shallow groundwater and blowing/running sands, shrinkable soils and the presence of trees, traditional shallow foundations are unlikely to be suitable for the proposed development. Alternative foundations, such as ground improvement and or screw/micro piled raft foundations or traditional piled foundations.

Tidal Flat Deposit are not typically sulphate bearing strata, however, the Oxford Clay Formation is typically a sulphate bearing strata.

At this stage, therefore, the main potential geotechnical hazards for the site are considered to be,

- Made Ground
- Low strength compressible soils
- Soil desiccation due to vegetation influence
- Variable fine and coarse-grained soils with the potential for blowing sands and running sands and potential for instability within excavations

Intrusive investigations are recommended to address these issues and establish any potential problems for foundations and the general development of the site.

EXPLORATION AND TESTING

As part of the Phase 2 intrusive investigation, a total of two exploratory holes were formed at the site. The works comprised:

- Two continuous tube sampler boreholes (CT01 and CT02)
- In-situ testing (including standard penetration tests, super heavy dynamic probe tests and soil permeability tests)
- Installation of a gas and groundwater monitoring well (CT02)
- One gas and groundwater monitoring visit
- Geotechnical laboratory testing
- Chemical laboratory testing

The exploratory holes were formed on the 30th October 2025. The monitoring visit was carried out on the 11th November 2025.

Co-ordinates of the boreholes and trial pits were approximated on the basis of field measurements and public-domain GIS data, extracted from freely available georeferenced on-line information and aerial imagery.

Ground levels were approximated using the provided survey drawing, Oakley Building Surveyors Drawing No. 5859-01, titled 'LAND SURVEY', dated October 2024.

The positions of all exploratory holes undertaken at the site as part of this investigation can be seen on the Exploratory Hole Location Plan in Appendix A. The logs, and field test and monitoring results are provided in Appendix B and the results of the laboratory testing are provided in Appendix C.

Engineering conclusions given in this report are based on data obtained from these sources, but it should be noted that variations, which affect these conclusions, may inevitably occur between and beyond the test locations. Also, water levels may vary seasonally and with other factors.

SAMPLING STRATEGY

The investigation was undertaken in accordance with the scope of works agreed with the client's structural engineer, Hawker Construction Ltd. The positions of the exploratory holes were selected by ListersGeo to provide information below the footprint of the proposed building.

METHODOLOGY

Health and Safety

Prior to commencement of boring and testing, to minimise the dangers from/to buried services, the proposed locations were scanned using a Cable Avoidance Tool. At the borehole locations, a service avoidance pit was dug, using insulated hand tools, to a depth of around 1.2m below ground level (bgl). No buried services were encountered in the locations of the exploratory holes.

Exploratory Holes

Continuous tube sample boreholes CT01 and CT02, were put down using a Nordmeyer GEOTOOL GTR FSX rig to a maximum depth of 8.45m, where due to the presence of blowing sands, advancing the borehole was difficult. Boreholes were advanced using a plastic lined steel tube sampling system, driven into the ground by a top drive percussive hammer. A near continuous 85mm to 65mm diameter core sample was recovered for subsequent examination, sub-sampling and laboratory testing. Standard Penetration Tests (SPTs) were taken at 1.0m intervals and the energy ratio for the hammer used for these SPT tests was 81%.

Dynamic probe tests, DP01 and DP02 were performed (using the 'Super Heavy B' specification) adjacent to the positions of the correspondingly numbered continuous tube boreholes to provide a relative penetration resistance profile of the ground. Conversions to SPT '*N* ' has been applied to the results using Ground Engineering Technical Note March 2007: Equivalence of DPSH and SPT data and Huntley 1990

Correction to the field 'N' values (to 'N_{60}' and, in sand, to '$(N_1)_{60}$' values) for the effects of energy delivery and (in where in sand) overburden pressure and rod lengths have been applied to the SPT (Standard Penetration Test) results from this investigation, in line with the recommendations given in BS EN ISO 22476-3, 2005, National Annex A.

On completion the borehole CT01 was backfilled with arisings, ensuring that excavated material was replaced in the same order as it had been removed up to approximately 8.45m depth below the existing ground level.

Installations

On completion of the boring, borehole CT02 was utilised for the installation of a 50mm diameter slotted uPVC standpipe from the base of the borehole up to within 1.00m below existing ground level. From 1.00m depth up to ground level a plain pipe was added. The slotted section of the standpipe was surrounded with pea gravel, while expansive bentonite clay was added around the plain pipe and below the slotted section to seal the borehole. The standpipe was finished with a rubber bung and gas tap and protected with a stopcock cover, which was then concreted flush with ground level.

In-situ Testing

Permeability testing was undertaken in the standpipes in general accordance with BS22282-1:2012, Geotechnical investigation and testing, Geohydraulic testing, General Rules.

Monitoring and Sampling

Ground gas monitoring was carried out in the monitoring wells using a calibrated Geotech GA 5000 gas analyser. Groundwater levels were monitored using a standard Geotech dip meter.

GROUND CONDITIONS

The intrusive investigation revealed that the general succession of strata was as follows: a layer of Topsoil overlying the Tidal Flat Deposits to the full depth of the investigation at 8.45m.

The general succession of strata revealed by the fieldwork is summarised below, followed by further details of each:

Stratum	Locations encountered	Stratum			Comments
		Top (m)	Base (m)	Thickness (m)	
Topsoil	All	GL	0.30		-
Tidal Flat Deposits	All	0.30	>3.45 & >8.45	-	-

TOPSOIL

Topsoil was encountered at both locations of the site from ground level down to 0.30m depth.

The Topsoil comprised, in general, grass overlying, dark brown, silty, clay.

Rare fragments of brick were observed in samples of Topsoil recovered from CT01.

(It should be noted that use of the term, Topsoil, is in accordance with BS 5930 alone and does not imply compliance of these horizons with any other standard).

TIDAL FLAT DEPOSITS

Tidal Flat Deposits were encountered at both of the locations below Topsoil, from 0.30m depth, down to the base of the boreholes at a maximum depth of 8.45m depth.

Tidal Flat Deposits comprised, in general, a variable mixture of very soft, brown, slightly sandy and sandy, silt and clay, overlying very loose becoming dense with depth, brown, clayey, sand.

Blowing sands were encountered below 6.00m depth, blowing sands is typically caused by liquefaction which indicates the Tidal Flat Deposits are highly sensitive to vibrations, and is therefore considered likely that running sands may also be present within the coarse-grained (sand) Tidal Flat Deposit soils.

The results of the field strength tests, and other relevant data, are summarised below:

Parameter	Range	Comments
SPT 'N_{60}' value	4 & 5	Tentatively equivalent to undrained shear strengths of 18kPa and 23kPa (using Stroud, f_1, conversion factor = 4.5). Very Low and Low strength (BS 5930-2015, Table 19)
SPT '$(N_1)_{60}$' value	6 to 20	Very Loose to Medium Dense (BS 5930-2015, Table 10)
SHDP Equivalent SPT 'N' value	0 (4) to 8	Tentatively equivalent to undrained shear strengths of between 0kPa (18kPa) and 36kPa (using Stroud, f_1, conversion factor = 4.5). Extremely Low to Low strength (BS 5930-2015, Table 9)

Parameter	Range	Comments
SHDP Equivalent SPT '*N*' value	4 to 42	Very Loose to Dense (BS 5930-2015, Table 10)

SPT testing at and below 6.00m depth was comparably lower when compared to the dynamic probe testing at similar depths. A possible reason for this is that the SPT testing was carried out after each 1.00m run of the continuous sampled boreholes, as such where blowing sands are encountered, the material encountered in the boreholes are blown back up the borehole, essentially loosening the material due to a lose of pore water pressure where the test is undertaken. Whereas the dynamic probe testing is a continuous in-situ test which limits the effects of blowing sands. As such, the SPT results at and below 6.00m depth may not be representative of the density of the in-situ material and care must be taken when using the SPT results.

Laboratory testing revealed the following:

Parameter	Range	Comments
Water Content (%)	10 to 36	-
Liquid Limit (%)	31 to 35	Frost susceptible SILT of Low Plasticity (BS5930 Casagrande)
Plastic Limit (%)	24 to 27	
Plasticity Index (%)	4 to 11	
Modified Plasticity Index (%)	4 to 11	Non-shrinkable/Shrinkable soil of Low Volume-Change Potential (NHBC Standards)
Portion <63mm and >2mm (%)	0	Gravel fraction
Portion <2mm and >63µm (%)	48.3 to 87.5	Sand fraction
Retained on 425µm sieve (%)	0 & 1	BS1377 'coarse soil' fraction
Passing 63µm sieve (%)	18 to 81	Fines (silt/clay) fraction
Loss-on-ignition (%)	3.5	At 450°C

GROUNDWATER

Groundwater was encountered as medium inflows in both of the exploratory holes during the fieldwork. The average depth of standing groundwater after 15 minutes monitoring was approximately 1.90m and 2.00m below existing ground level within the Tidal Flat Deposits.

One round of monitoring was carried out on the 11th November 2025 as part of the project, which has revealed a standing groundwater level of 1.29m below existing ground level in CT02. It should be noted that seasonal groundwater monitoring has not been undertaken not monitoring at different times of day to see if there is any influence from tides.

The water levels encountered during the investigation could potentially be caused by the vibrations from the drilling activities, inducing liquefaction within the Tidal Flat Deposits. As such, groundwater could potentially be at deeper depths. However, based on the site location and elevation, a shallow groundwater table is anticipated.

OBSERVED SOIL CONTAMINATION

No visual or olfactory signs of contamination were noted during the fieldwork.

PERMEABILITY TESTING

Rising head permeability testing was undertaken in CT02 on the 30th October 2025, in general accordance with BS22282-1:2012. The details of the tests and full results are provided in Appendix B.

The testing was undertaken in the Tidal Flat Deposit soils.

The results of the permeability testing indicate that the beneath the site has an inflow permeability in the order of $6.3x10^{-4}$m/s.

Well	Response Zone Stratum Tested	Permeability Coefficient *k* (m/s)		
		Test 1	Test 2	Test 3
CT02	Tidal Flat Deposits	$8.0x10^{-4}$	$8.0x10^{-4}$	$6.3x10^{-4}$

GROUND GAS MONITORING

Ground gas monitoring was carried out in the monitoring well installed in CT02 as a part of this investigation, on one occasion during a period of variable pressure (+/-3mB).

The response zones of the standpipes are detailed below:

Well	Response Zone (m)	Stratum	Comments
CT02	1.00 to 3.00	Tidal Flat Deposits	Silty at the base of the standpipe

The response zones of the monitoring wells targeted the permeable silt and sands.

The results of the monitoring is summarised in the table below:

Parameter	Range	Comments
Oxygen (%v/v)	20.2	Normal ranges for non-gassing ground
Carbon Dioxide (%v/v)	0.4	
Methane (%v/v)	<0.1	
Flow rate (l/h)	0.9	

CONCRETE AGGRESSION TEST RESULTS

The results of laboratory concrete aggression tests on selected samples of soil are summarised below:

Stratum	Water-soluble Sulphate SO_4 (mg/l)	pH (pH units)	Number tested
Topsoil	12 and 12	8.1	2
Tidal Flat Deposits	28 to 230	7.6 to 8.0	10

GROUND CONTAMINATION ASSESSMENT

The contamination risk assessment has been undertaken in line with the EA's online guidance Land Contamination: Risk Management (LCRM) in order to validate the Preliminary Risk Assessment (PRA) using Generic Quantitative Risk Assessment (GQRA), followed by Detailed Quantitative Risk Assessment (DQRA) if required.

SOIL TESTING

Two samples of Topsoil and two samples of the natural soils collected on site during this investigation were tested for a range of constituents of potential concern (CoPC).

The suite of testing carried out on the samples was decided upon following consultation of R&D CLR Publications, published as part of the Contaminated Land Exposure Assessment (CLEA), a joint venture between the Department for Environment, Food and Rural Affairs (DEFRA) and the EA.

The test suite included:

Group	Details
Asbestos	Screening for ACMs and fibres with the naked eye and microscopy
Inorganic substances	Arsenic, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc Sulphates
Organic substances	16 (EPA) speciated polycyclic aromatic hydrocarbons (PAH) Total petroleum hydrocarbons (TPH) with four band split
Other	pH Total organic carbon (TOC)

Unless explicitly stated on the laboratory report, the soil samples were tested to obtain 'Total' values within the soil. The results of the chemical tests from this investigation are included in Appendix C.

In addition, a combined sample of natural soils from CT01 at 0.50m was screened in line with the Waste Acceptance Criteria (WAC). The total soil results from this testing, which include PAHs, petroleum hydrocarbons, BTEX and polychlorinated biphenyls (PCBs), have also been considered in the ground contamination assessment. The results of the WAC testing are included in Appendix C.

RISK ASSESSMENT GUIDELINES – HUMAN HEALTH

The human health risk assessment has been undertaken using the guidance provided in the EA's LCRM guidance and the CLEA guidelines.

This assesses risks associated with the ingestion, dermal contact, and vapour inhalation pathways related to contaminated soils and groundwater. Risks associated with the inhalation of Ground Gas, for example that resulting from landfill, is not addressed by LCRM. The assessment for ground gases has been undertaken separately in the Ground Gas Risk Assessment section of this report.

Human health assessment criteria used are based upon the proposed final land use of the site. As the site is to be redeveloped to accommodate a primary school classroom, the most conservative Generic Assessment Criteria (GACs) for the standard land-use, 'Allotment' have been used.

Consideration has also been given to potential risks to groundworkers coming into contact with the soil during demolition or construction phases.

The results of the soil samples tested have been compared to the following published assessment criteria:

Category 4 Screening Levels (C4SLs)

Published in March 2014 by DEFRA, a limited number of generic Category 4 Screening Levels (C4SLs) were produced to support the revised Statutory Guidance to support Part 2A of the Environmental Protection Act 1990, which was published in April 2012. This Guidance introduced a new four-category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health, where Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is acceptably low.

Further C4SLs have been and are being produced by CL:AIRE, with support from SoBRA and SAGTA, for a limited number of volatile organic compounds, as time allows.

Suitable 4 Use Levels (S4ULs)

To supplement the small number of C4SL, a set of Suitable for Use Levels (S4UL) were produced, in 2015, by Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH), using the EA's Contaminated Land Exposure Assessment (CLEA) software, version 1.06 (2009), and the revised assumptions used in deriving the C4SL. The S4UL are more conservative than the C4SL and are derived to represent the minimal levels of risk to human health as described in the EA's SR2 guidance, with the intention of being 'suitable for use' under planning.

Data Sources

Where chemical specific data has been used in the above assessments, data has been sourced from available TOX reports, published by DEFRA, The Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) literature and toxicological and physical data obtained from EA Publication, 'Human Health Toxicological Assessment of Contaminants in Soil', August 2008.

RISK ASSESSMENT GUIDELINES – CONTROLLED WATERS

The procedures set out in EA's RTM *Hydrogeological risk assessment for contaminated land* (2006), have been followed.

RESULTS OF ASBESTOS SCREENING

Screening for the presence of asbestos did not reveal any asbestos containing material (ACM) or fibres in the three samples of soils tested.

RESULTS OF TOTAL SOIL TESTS

Results of the total soil testing have been compared to relevant published GAC as discussed above. For S4ULs, a range of values have been published for the organic contaminants based on the soil's organic matter content.

The soil testing indicates that the soils have a total organic carbon (TOC) content of between 1.1% and 2.6%, which is approximately between 1.9% and 4.5% soil organic matter (SOM). Therefore, the more conservative S4ULs for 1% SOM have been referred to for the organic contaminants.

Of the remaining determinands tested for, none recorded values higher than their relevant GAC for human health for an allotment setting.

The GACs are conservative screening criteria and used initially to determine whether or not a site may pose an unacceptable risk to human health and whether further work or assessment may be required. An exceedance of a GAC does not mean that remediation is required.

Inorganic Substances

Of all of the inorganic substances tested no significantly elevated concentrations were recorded in comparison to typically naturally occurring or urban background levels; and no values were recorded in excess of the referenced GACs.

Petroleum Hydrocarbons

None of the four samples tested recorded a total TPH concentration above the limit of detection of 10mg/kg.

Polycyclic Aromatic Hydrocarbons (PAH)

Three of the four samples recorded a total (of 16) PAHs concentration above the limit of detection at 2.0mg/kg; However, the individual PAH concentrations were significantly below the referenced GACs.

HUMAN HEALTH RISK ASSESSMENT

The following quantitative risk assessment has been carried out using the source-pathway-receptor principle. Potential sources of contamination identified in the Conceptual Site Model (CSM) have been assessed using the CLEA Guidelines. This takes into account the fact that a complete pathway must exist between a potential source of contamination and a potential receptor for there to be considered a risk.

The potential human receptors evaluated for their individual risk are:

Long-Term Exposure

- End users of the site - the future staff and pupils
- Nearby residents

The critical receptor is a child between the age of 4 to 11.

Human Health – Short Term Exposure

- Construction workers (during redevelopment)
- Existing Users (staff and pupils)
- General Public (during redevelopment)
- Maintenance Workers

The critical receptor is a child between the age of 4 to 11.

SOIL CONTAMINATION RISK

The qualitative preliminary risk assessment (PRA) identified a limited number of potential sources of contamination at the site that were generally away from the proposed development area. Following the intrusive investigation and contamination testing the CSM has thus been reassessed.

None of the soil contamination tests carried out as part of this investigation revealed elevated concentrations of contaminants in the soil when compared with the relevant GACs. As such there is considered to be no significant risk of significant harm to the above referenced long term exposure receptors.

Asbestos

Although no asbestos was identified in the soils at the site, the presence of asbestos containing material (ACM) and fibres within Made Ground (if present) at any site cannot be ruled out. Groundworkers should be made aware of potential risks of asbestos during the groundworks.

Asbestos in soils is not normally hazardous to humans unless it is disturbed and fibres become airborne and can be inhaled. Asbestos is most frequently encountered bonded in cement in fragments of corrugated roofing sheets, in tiles or in insulation materials. Any groundworks involving asbestos needs to be appropriately controlled.

CONSTRUCTION WORKERS

For construction workers and maintenance workers that are exposed to the ground, there is a short-term exposure risk (at each site they attend, which contributes to an overall lifetime exposure risk) and the pathway of primary concern is 'direct soil ingestion'.

Protective measures that are different to those taken to protect the long-term exposure group (such as end-users of the site) are, therefore, required and these are outlined in the Remediation section, below.

Demolition and redevelopment activities have the potential to create short-term pollutant linkages to the general public. These risks should be managed by means of the Construction Phase (Health & Safety) Plan.

To reduce the risk to as low as reasonably practicable for the construction workers it is recommended that appropriate health and safety measures be implemented along with the use of Personal Protective Equipment (PPE). All personnel coming into contact with the soil, ground workers in particular, should be instructed to use gloves when on site to avoid dermal contact and restrict inadvertent hand-to-mouth ingestion. Washing facilities should be provided for the site staff to use and should be used prior to eating or smoking. Reference should be made to the HSE Document, "Protection of Workers and the General Public during Development of Contaminated Land".

Although no asbestos was identified in the soils at the site, the presence of ACM and fibres within Made Ground at any site cannot be ruled out. Groundworkers should be made aware of potential risks of asbestos during the groundworks prior to beginning work.

REGULATORY APPROVAL

We recommend that the conclusions of this report are agreed with the relevant Local Authority at the earliest stage, to reduce potential delays to the development.

CONCLUSION

No elevated concentrations of contaminants were recorded by this investigation and whilst there is considered to be a low risk of contamination at this site, some areas of the site have not been investigated.

GROUND GAS RISK ASSESSMENT

The results of the gas monitoring have revealed that low levels of carbon dioxide gas up to 0.4% are being produced in the ground, and methane gas being produced in the ground are less than the detection limits of 0.1%. A flow rate of 0.9/hr was recorded.

The low flow rates show that no significant volumes of gas being produced in the ground. There were no significant thickness of Made Ground and no organic rich soil beneath the site.

GROUND GAS SCREENING VALUES

There were no carbon dioxide levels above 5% and no methane levels above 1%.

This classifies the site as Characteristic Situation 1 using a modified Wilson and Card classification scheme defined in CIRIA C665. In addition, it is understood that the proposed classroom will be raised and hence will have some inbuilt ventilation beneath the floor.

Therefore, for this primary school development it is considered that no gas protection is necessary with regard to methane or carbon dioxide gas however the Local Authority may request additional monitoring.

Radon Gas

The BGS advises that no radon gas protection measures are necessary for buildings without underground rooms at this site.

REGULATORY APPROVAL

The above conclusions regarding ground gases should be agreed with the relevant local Regulatory Authority as soon as possible prior to development.

CONTROLLED WATERS RISK ASSESSMENT

The following Controlled Waters risk assessment has been carried out in accordance with the procedures set out in the EA's RTM *Hydrogeological risk assessment for contaminated land* (2006). Using the source-pathway-receptor principle, this takes into account the fact that a complete pathway must exist between a potential source of contamination and a potential receptor for there to be considered a risk.

The potential Controlled Waters receptors considered during this risk assessment were:

- Drain/ditch, directly north of the site
- The River Glen, 10m to the south of the site

DISCUSSION

No significant thickness of Made Ground or signs of free phase/mobile contamination were noted during the fieldworks. The site was noted to be remote of groundwater abstractions and to be located outside of an SPZ.

The results of the soil testing did not identify any significantly elevated concentrations of organic compounds, PAHs or hydrocarbons in the soils. Furthermore, the fieldworks did not encounter any significant visual or olfactory signs of free phase contamination.

It is therefore considered that the site does not pose a significant risk to controlled waters.

REGULATORY APPROVAL

We recommend that the conclusions of this report are agreed with the relevant Local Authority at the earliest stage, to reduce potential delays to the development.

INFRASTRUCTURE RISK ASSESSMENT

SUBSURFACE CONCRETE

Using the results of the concrete aggression tests, the concrete design mix recommendations for subsurface concrete have been assessed in terms of BRE Special Digest 1.

Based upon the site history, the site may be considered as 'natural ground'.

The groundwater beneath the site should be considered as mobile.

The classification is as follows:

Type of Site	Groundwater	Characteristic Sulphate			Characteristic	
		Soil Soluble (mg/l)	Ground-water (mg/l)	Total Potential (%)	Design Sulphate Class	pH (pH units)
Natural Land	Mobile	230	n/a	n/a	DS-1	7.6

The above assessment provides an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

UNDERGROUND SERVICES

Low levels of heavy metals and PAHs were recorded in the soils at the site. Generally, plastic pipes will not be affected by inorganic contaminants, but they could be affected by organic contaminants and extremes of pH in the soils.

Organic contaminants, such as petroleum or polycyclic aromatic hydrocarbons, may attack plastic pipes and remedial measures may be required. The pathway with the contaminated soils could be removed by sleeving the pipe with another material or by removing the contamination source itself.

It should be noted that the utility companies often have their own local guidelines and standards on levels of shallow soil contamination in the ground that may or may not be acceptable for the installation of below ground services. These standards may be different to those specified for assessing risks to human health and groundwater.

The local requirements should be obtained from the particular service supply company as soon as possible to avoid unexpected delays or additional development costs.

Guidance can be sought from the UK Water Industry Research (UKWIR), 'Guidance for the selection of water supply pipes to be used in brownfield sites', reference 10/WM/03/21, 2010. This document proposes that the assessment of the hazard to potable water supply pipes should be based on the following pathways: contact with migrating groundwater, permeation of vapour, and direct contact with soil.

Approval should be sought for the type of pipes proposed before they are installed.

Additional Mitigation Measures

As the site lies in an area where there are very low strength, highly compressible deposits, mitigation measures should be considered for services runs.

For drainage systems, flexible jointed pipes should be used wherever possible and particular care should be taken for the avoidance of leaks in both water supply and drainage pipe work.

In addition, underground drainage and water pipes should be regularly checked for leaks or damage. Prompt repair of any leaking water pipes, surface water drains or associated underground services should then be undertaken.

REVISED CONCEPTUAL SITE MODEL

Following GQRA, the CSM has been updated and the Relevant Pollutant Linkages (RPLs) are presented in the following table.

Potential Sources	Pathway	Potential Receptor	Probability	Consequence	Risk Classification	Explanation
Contaminants within the Made Ground - *heavy metals, PAH, TPH, asbestos*	Ingestion, inhalation and direct skin exposure (dermal contact)	End Users - Staff/Pupil	Unlikely	Medium		No significant contamination was identified during the fieldwork or from the chemical testing.
		Nearby Residents	Unlikely	Medium		
		Construction Workers	Unlikely	Medium		Exposure to maintenance and construction workers can be mitigated by use of appropriate PPE and maintaining good hygiene levels, reducing risk to **Very Low**.
		Maintenance Workers	Unlikely	Medium		
	Migration through unsaturated zone, groundwater, drains or service runs	Drain - N River Glen 10m S	Unlikely	Mild	Very Low	No significant contamination was identified during the fieldwork or from the chemical testing.
	Surface run off		Unlikely	Mild	Very Low	
	Direct contact	Substructures Water supply pipes	Unlikely	Mild	Very Low	Limited contamination which may impact pipes was identified
Ground gas in organic rich soils - *Carbon dioxide or methane*	Inhalation	End Users – Residents	Unlikely	Mild	Very Low	No organic rich soils or significant thickness of Made Ground were identified, gas monitoring has confirmed non-gassing ground conditions,
		Construction Workers	Unlikely	Mild	Very Low	
		Maintenance Workers	Unlikely	Mild	Very Low	
	Accumulation in building	On-site buildings	Unlikely	Severe	Moderate / Low	

The revised CSM indicates that no remedial measures are required at this site and risks to human health and Controlled Waters are considered to be Very Low/Low.

GEOTECHNICAL ENGINEERING CONCLUSIONS

We understand the proposed development comprises the construction a lightweight, single storey, modular, classroom building and the demolition of an existing wall, adjacent to the proposed development.

If site conditions should be altered significantly, such as changes to existing levels, then this report may require re-evaluation.

REVISED GROUND MODEL

The exploratory work from this investigation has proven the expected general strata sequence comprising Topsoil overlying poor, potentially high compressible and highly sensitive soils to about 5m depth.

The laboratory testing shows the Tidal Flat Deposits to be generally Non-Shrinkable as defined by NHBC Building Standards, Chapter 4.2.

Groundwater was encountered during the fieldworks at 1.90m and 2.00m depth, groundwater monitoring recorded groundwater at a relatively shallow depth of 1.30m within the Tidal Flat Deposits.

As discussed previously, the water levels encountered during the investigation could potentially be caused by the vibrations from the drilling activities, inducing liquefaction within the Tidal Flat Deposits. As such, groundwater could be at deeper depths, notwithstanding this, a design groundwater level of 1.0m should be adopted. However, this may not fully highlight seasonal and tidal fluctuations and hence this may need to be verified by additional monitoring.

The soil sequence comprises extremely low strength silt and clay down to 2.00m depth, overlying very loose and loose sands down to 5.00m depth. Below 5.00m depth the sands were found to be medium dense with blowing sands encountered below 6.00m depth.

Due to the low strength highly compressible soils and shallow groundwater, potential for instability in foundation excavations and running sands etc traditional shallow foundations are therefore not considered appropriate for the proposed development. Therefore, structural loads are considered to need to by-pass these soils to be supported by the medium density or higher Tidal Flat Deposits soils.

For the ground conditions encountered, with groundwater being relatively shallow (1.30m), we consider that a piled raft foundation, using micro/helical screw piles terminating within the medium dense and above (>6.00m) Tidal Flat Deposits, should suit the ground conditions. However, the high groundwater would also make a raft option potentially difficult to construct without suitable dewatering and therefore a specialist should be contacted to discuss possible options as well as further groundwater monitoring to further assess the groundwater levels to assist the design.

Alternatively piled foundations could be considered appropriate to support the main structural loads. Additional deeper intrusive investigation is recommended should piled foundations be considered further, in order to assess the underlying deeper ground conditions and obtain geotechnical parameters to assist the pile design

Bored piles are not considered suitable due to the presence of 'blowing sands', the disturbance of which at the pile toe could compromise the integrity of the of the building's foundations. As such, it is recommended that driven piles be adopted, should the proposed development require piling.

SITE EXCAVATION

Conventional hydraulic plant should be satisfactory for excavating foundation and service trenches within the Tidal Flat Deposits.

In line with HSE guidelines, all excavations requiring personnel access should be adequately supported to avoid the risk of collapse. Consideration should also be given to the stability of open trenches where personnel are working in close proximity.

No machine excavated trial pits were undertaken as part of this investigation, therefore, direct observations of excavation stability could not be made.

Groundwater is expected to be at depths greater than about 1.00m (subject to seasonal and potentially tidal variations) and dewatering will be required for any proposed excavations. Conventional pumping from sumps is unlikely to be successful therefore dewatering is likely to be required by the installation of a well point system. The advice of a specialist dewatering contractor should be obtained. The effects of dewatering on adjacent structures will need to be taken into account as dewatering could result in settlement and induce localised instability. It would be useful to undertake a trial before any final decisions are made. It would be prudent to carry out all ground works in the late summer or autumn when groundwater levels and flows are usually at their lowest.

It would be useful to undertake a trial before any final decisions are made.

Excavations for raft foundations should be inspected by a suitably qualified person to assess the soil and groundwater conditions. If conditions differ from those identified within this report, then further assessment may be required. Any roots, organic matter, 'soft/loose' ground, or otherwise unsuitable material, encountered at founding depth should be removed prior to pouring of concrete.

Consideration should be given to the effects of trees and shrubs on service runs that cross the site. Soil movements brought on by the influence of vegetation can severely disrupt the drain runs and mains services, and measures should be incorporated into the excavations to allow for future ground movements.

Excavations at the site should be designed so as not to undermine existing structures or affect adjacent buildings.

Should any trees be removed from site, care should be taken to ensure the root ball of each tree is completely removed from the ground. Given time, any remnant root fragments may weather down to produce localised areas of soft organic soils which may induce local differential settlements.

Where new foundations are placed over a felled tree, consideration should be given to spanning these features to ensure no soft spots result in localised settlement.

FOUNDATION SOLUTIONS

Piled Raft Foundations

A piled raft foundation could be considered founded within the Tidal Flat Deposits. We consider that micro/helical screw piles, terminating in the medium dense or above Tidal Flat Deposits, should suit the ground conditions. Although a suitable alternative, the noise and vibration issues of conventional driven piles may militate against those.

Screw piles could be preferred for the relative ease and speed of installation and associated reduction in waste disposal costs, although it would be best to check with piling contractors that their particular methods will be protected against corrosion by the shallow groundwater.

However, the high groundwater would also make the raft option potentially difficult to construct without suitable dewatering and therefore a specialist should be contacted to discuss possible options as well as further groundwater monitoring to further assess the groundwater levels to assist the design.

A specialist micro/helical screw piling contractor should be consulted as to the efficiency and suitability of piles installed using their particular systems in these ground conditions, and also their environmental impact with regard to the proximity of surface water courses and residential development.

Pile Foundations

Alternatively, due to the presence of a significant thickness of potentially highly compressible, extremely/very low strength soils, variable soils and the potential for blowing/running sands, a piled foundation solution is recommended. A piled solution would transmit the structural loads down through the extremely/very low strength Tidal Flat Deposits and into more competent Tidal Flat Deposits at depth or Bedrock, the Oxford Clay Formation at depth to obtain shaft friction and end bearing support. Additional deeper intrusive investigations are recommended in order to assess the underlying deeper ground conditions and obtain geotechnical parameters to assist the pile design. Such investigation should assess the strength, composition and structure of the underlying superficial deposits and bedrock beneath. Deep boreholes to some 25m may be required to extend into the bedrock based on the available BGS borehole in the surrounding area. However, it is recommended that the need and scope of any supplementary investigations are confirmed by a piling contractor.

Due to the relatively shallow water table, driven or CFA piles maybe considered the most appropriate. However, driven piles provide the most effective solution for the ground conditions. Bored piles would not be as suited to the ground conditions present due to the risk of 'blowing sands' and disturbance of the sands at the pile toe which could compromise the integrity of the building's foundations.

A specialist piling contractor should be consulted as to the efficiency and suitability of piles installed using their particular systems in these ground conditions, and also their environmental impact with regard to the proximity of surface water courses and residential development.

Considerations

Blowing sands encountered beneath the site presents a risk with piling with regards to the disturbance of sands at the pile toe, which could compromise the integrity of the building's foundations.

Shallow groundwater table should be anticipated, a design groundwater level of 1.0m should be adopted. However, this may not fully highlight seasonal and tidal fluctuations and hence this may need to be verified by additional monitoring.

Due to the significant depths of compressible soils and risks from consolidation of loose Tidal Flat Deposits present beneath the site, consideration will need to be given regarding the potential for differential settlement between the structures and the external surrounding areas.

The loose sensitive sands and high groundwater may pose a necking risk.

There maybe the potential for organic beds at lower depths or in areas not investigated.

Negative skin friction should be considered, where the surface will be surcharged, due to the risk from future consolidation of the compressible Tidal Flat Deposits beneath the site.

The proximity to nearby structures and infrastructure, such as the school building and the effects of piling should be considered prior to the adoption of the preferred piling method.

There may also be buried obstructions associated with the foundations, if any, of the existing playground equipment.

GROUND FLOOR SLABS

A suspended floor slab is recommended for the proposed classroom given the depth/thickness of unsuitable potentially highly compressible Tidal Flat Deposit soils encountered at the site.

Alternatively, a raft could be adopted if the further geotechnical assessment confirms that the total and differential settlements are acceptable.

WORKING PLATFORMS FOR TRACKED PLANT

If construction on the site requires the use of heavy tracked plant then reference will need to be made to the most recent guide for the design of 'Working Platforms for Tracked Plant', 2004, produced by the BRE.

Use of such plant will require construction of either a working platform or an adequate running surface if the subgrade is determined as being already adequate to support the anticipated plant loadings.

Deep extremely low and low strength, very loose and loose Tidal Flat Deposit was encountered down to some 6.00m depth which has the potential to be highly compressible. Consideration will need to be taken regarding these potentially highly compressible soils when designing any platforms.

The following soil characteristics should be used for preliminary Working Platform design:

Anticipated Subgrade Characteristics / Stratum	Typical Depth Range (m)	Soil Type Fine or Coarse	Effective Angle of Shearing Resistance φ'_s (degrees)	Undrained Shear Strength S_u (kPa)	Effective Unit Weight γ'_s (kN/m³)
Tidal Flat Deposits	GL to 2.00	Fine	-	10	19
Tidal Flat Deposits	2.00 to 6.00	Coarse	30	-	19

It should be noted that soft spots and zones of poor subgrade may exist on any site at shallow depth that will have a significant influence on the stability of tracked plant. The location of such features will not readily be determined by a general ground investigation for foundation design and more specific investigation at shallow depth may be required before the design of a working platform can be completed.

The advice of a specialist contractor should be sought to determine the most suitable size and thickness of platform required for their specific plant. This will take into account the size of the plant and anticipated loadings imposed on the working platform.

INFILTRATION MEASURES

Appropriately designed sustainable drainage systems (SuDS) are more sustainable than using piped drainage to local sewer systems. However, infiltration measures close to buildings may result in undermining of foundations and softening of soils leading to instability and should be located at suitable distances from foundations and infrastructure.

Consideration must be given to the effects on slopes, flooding and mobilisation of contaminants and the potential for future rises in groundwater levels.

Test Results

The results of the borehole infiltration testing indicate soils with a permeability in the region of 6.3×10^{-4}m/s however this is based on an inflow/rising head rate and not a discharge rate.

Therefore, due to the high groundwater table (1.30m) and the potential for that water level to be seasonally higher and potentially linked to the tide, alternative means of surface water drainage will be required.

DISPOSAL OF ARISINGS

Site excavations, such as for foundations and services trenches are likely to produce arisings, some of which may be able to be re-used on-site and some of which will be surplus to requirements. The options for disposal of these arisings are discussed below:

RE-USE OF MATERIAL ON SITE

Currently, if surplus arisings are 'fit for re-use' on the site and have not been treated, their re-use is allowed within the planning law. If the arisings need treating prior to re-use, exemptions can be sought from the EA to allow this activity.

A recent voluntary code of practice published by CL:AIRE, in conjunction with the EA, (the Definition of Waste: Development Industry Code of Practice, Version 2) endorses the re-use of arisings on and off the site of origin without the need for exemptions from the EA, dependent on whether it is "fit for purpose". It also supports the use of "Hub and Cluster" sites (to enable surplus soil to be used on agreed sites in the local vicinity, dependent on the soil being 'fit for purpose').

The use of a Materials Management Plan (MMP) during the earthworks phase will help to avoid paying tax on soil movements that might otherwise attract tax, if they are construed by the HMRC as being waste without the relevant documentation to prove otherwise.

The existing Topsoil and Tidal Flat deposits are considered suitable for re-use on site, negating the need to remove or dispose of this soil off site.

Soils arising from cut and fill processes and from foundation and services trenches may be suitable for re-use on site, for engineering purposes, if required. Advice can be obtained from NHBC Standards Chapter 4.6 and the Manual of Contract Documents for Highways Works, Volume 1 Specification for Highway Works, Series 600 for Earthworks. Engineered Fill should be placed in accordance with a suitable Earthworks Specification.

WASTE CLASSIFICATION

Under current waste management legislation, arisings that are surplus to requirements will be classified as waste and need disposing off-site. Records must be kept of where the waste is taken upon leaving site and its final destination.

The classification is a twofold process using the soil chemical testing results and the European Waste Catalogue for off-site disposal, followed by testing under the Waste Acceptance Criteria (WAC) of the Landfill Directive specifically for landfill disposal.

EUROPEAN WASTE CATALOGUE DETERMINATION

Any soil classified as waste requires classification of the chemical constituents prior to leaving site in accordance with the European Waste Catalogue. Soils containing asbestos fragments or fibres will be classified as a mixed waste unless the asbestos can be separated.

Soils

The 'Total' soil contamination test results from this investigation, excluding asbestos, have been used in conjunction with the HazWasteOnline spreadsheets and the Technical Guidance WM3 published by the EA.

Two samples of Topsoil and two samples of the natural were included in the assessment.

All of the soil has been classified as Non-hazardous waste.

The assessment report is provided in Appendix F. This assessment does not take into account the presence of asbestos.

Asbestos

No obvious visual evidence of asbestos containing material (ACM) was noted in the soils during the fieldwork.

No ACM or asbestos fibres were identified at the chemical testing laboratory.

If encountered then, Technical Guidance WM3 states that 'if the waste contains fibres that are free and dispersed then the waste will be hazardous if the waste as a whole contains 0.1% w/w or more asbestos'. It also states that 'where the waste contains identifiable pieces of asbestos (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then the waste is hazardous if the concentration of asbestos in the pieces alone is 0.1% or more'.

Asbestos cement roofing sheet typically contains 10-15% asbestos, which is above the hazardous waste limit of 0.1%.

In soils where asbestos pieces visible by the naked eye are encountered, this soil is considered as mixed waste and must be separated whenever possible and each separate waste stream classified accordingly. Any works involving or potentially involving asbestos must be undertaken by suitably trained groundworkers.

WASTE ACCEPTANCE CRITERIA (WAC) TESTING RESULTS

If it is decided that the surplus arisings will be disposed of at a landfill facility, the implementation of the Landfill Directive means that the waste soil requires testing under the Waste Acceptance Criteria (WAC) to determine whether it should be destined for an Inert, Non-hazardous, Stable non-reactive hazardous, or Hazardous landfill, or whether an alternative disposal method must be sought.

WAC testing has been carried out on one representative samples of the natural soil collected from 0.50m depth in CT01. The laboratory testing results are presented in Appendix C.

Sample CT01 at 0.50m was initially classified as Non-hazardous waste and the WAC testing indicates that the soil passes Inert criteria.

OVERALL WASTE CLASSIFICATION

From the results of the HazWasteOnline spreadsheets and the WAC testing, currently, the waste soil on this site is classified as follows:

Waste Stream	EWC Classification	WAC for Landfill Disposal	Comments
Topsoil	Non-hazardous	Not assessed	Organic soils (generally do not pass the Inert criteria)
Tidal Flat Deposits comprising brown, sandy, silt and slightly sandy clay.	Inert	Inert	-
Tidal Flat Deposits comprising brown, clayey, sand	Inert by default		

Different categories of waste soils must not be mixed. The action of mixing hazardous waste with non-hazardous waste to dilute hazardous concentrations or to dispose of one waste type as/with another is illegal.

If encountered then pieces of ACM should be segregated and disposed of as Hazardous waste unless gravimetric testing indicates that the concentrations of asbestos fibres in the pieces is less than 0.1%.

Analytical results relevant to the materials being disposed of should be provided to the waste management contractors and landfill operators to confirm whether it meets their license agreements and to confirm tipping costs.

Should any soils be encountered that differ from those encountered during this investigation, further testing and waste classification of those soils will be required.

With regard to European Decision 1999/31/EC, EWC 17 05 04 'Stone and soils from uncontaminated sites, excluding topsoil and peat' should be classified as inert. Furthermore, in accordance with the Landfill Directive, uncontaminated soil and stones, including naturally occurring sands and clays, may be classified as inert without testing, provided that it is not topsoil or peat and excludes soil from contaminated sites. Inert waste

should not undergo change, will not burn, react, biodegrade or adversely affect human health or the environment. It should not contain metals, plastics or asbestos.

Alternatively, the soil could be re-used on site for landscaping purposes, dependent on the agreement of the Local Authority.

It should be noted that in May/June 2012, HMRC issued Briefs 15/12 and 18/12 clarifying how construction spoil and excess soils will be assessed for landfill tax purposes. Detailed accurate descriptions of waste are required for all wastes to support the landfill tax assessment. Uncontaminated naturally occurring soils will remain inert by default and eligible for the lower rate of landfill tax. Similarly, 'reworked soils' and demolition 'stone' comprising ONLY materials listed in the Schedule of the Landfill Tax (Qualifying Material) Order 2011 (SI 2011/1017) will also be eligible for the lower rate of landfill tax.

LIMITATIONS AND RECOMMENDATIONS FOR FURTHER WORK

The ground is seldom homogeneous and variations, which affect our conclusions, may inevitably occur between and beyond the test locations. The risk of significant variations to our Ground Model is considered to be low however should ground conditions vary noticeably from our Ground Model, then we recommend further assessment by a suitably qualified person.

Environmental

No elevated concentrations of contaminants were recorded by this investigation and whilst there is considered to be a low risk of contamination at this site, some areas of the site have not been investigated.

Geotechnical

Due to the presence of very low strength, highly compressible soils, shallow groundwater and blowing sands, and the proximity of the existing school building and the proposed development. A specialist piling contractor should be consulted as to the efficiency and suitability of piles installed using their particular systems in these ground conditions, and also their environmental impact with regard to the proximity of surface water courses and residential development.

Should piled foundations be considered further, we recommend supplementary boreholes using cable percussive techniques in order to aid a piled foundation solution at the site.

The shallow water levels encountered during the investigation could potentially be caused by the vibrations from the drilling activities, inducing liquefaction within the Tidal Flat Deposits. As such, groundwater could be at deeper depths. However, this may not fully highlight seasonal and tidal fluctuations and hence this may need to be verified by additional monitoring.

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APPENDIX A
PLANS & PHOTOGRAPHS



LISTERS GEO

Geotechnical and Geoenvironmental Consultants

Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Site Location Plan

Key

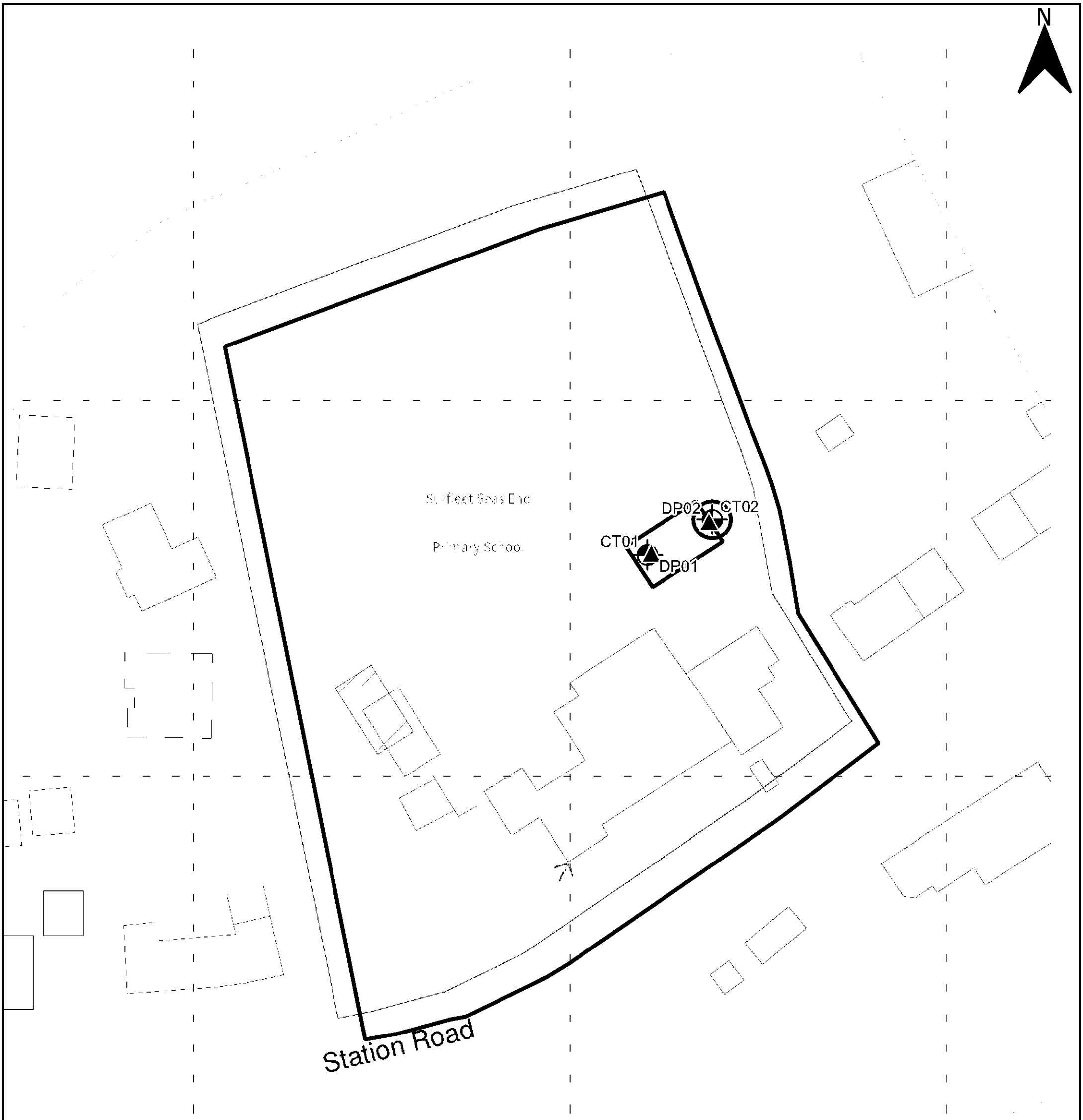
Site Boundary

Approximate Site Location

Site: Surfleet Primary School, Station Road, Surfleet, Spalding, Lincolnshire, PE11 4DB

Reproduced from Ordnance Survey mapping with the permission of the Controller of His Majesty's Stationery Office. Crown Copyright reserved (Licence No: 100006010)

Scale: NTS	Job Number: 25.09.007a	Drawn By: YT



Key

- Site Boundary
- Proposed Development Footprint

Exploratory Holes

- Continuous Tube Sampler Borehole
- Monitoring Well
- Super Heavy Dynamic Probe

Extract from Oakley Building Surveyors Drawing No. 5859-01, titled 'LAND SURVEY', dated Oct 24

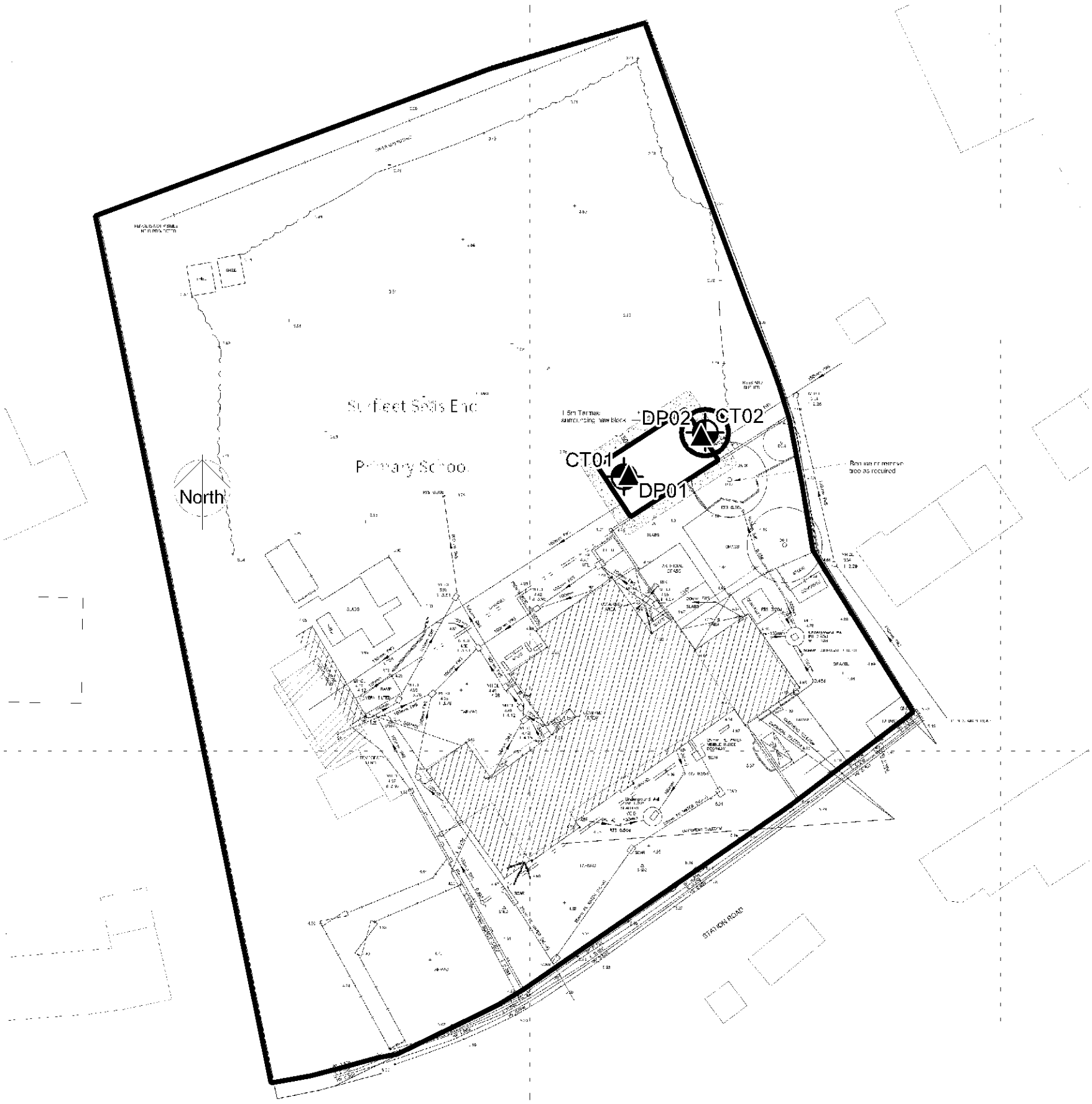
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Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Exploratory Hole Location Plan - Existing Site Layout

Site: Surfleet Primary School, Station Road, Surfleet, Spalding, Lincolnshire, PE11 4DB

Scale: 1:500	Job Number: 25.09.007a	Drawn By: YT



Key

- Site Boundary
- Proposed Development Footprint

Exploratory Holes

- Continuous Tube Sampler Borehole
- Monitoring Well
- Super Heavy Dynamic Probe

Extract from Surveyors to Education, drawing No. CIF-S2e-XX-XX-D-A-0100, titled 'Block Replacement', dated 06/11/2024

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Geotechnical and Geoenvironmental Consultants

Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Exploratory Hole Location Plan - Proposed Site Layout

Site: Surfleet Primary School, Station Road, Surfleet, Spalding, Lincolnshire, PE11 4DB

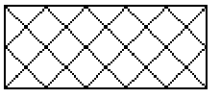
Scale: 1:500	Job Number: 25.09.007	Drawn By: YT

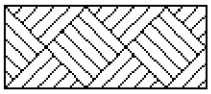
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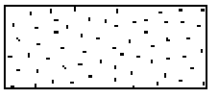
APPENDIX B
FIELDWORK AND TESTING

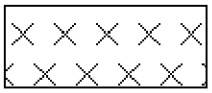
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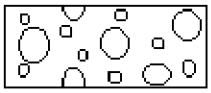
LEGEND - Soils

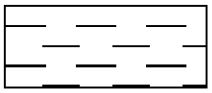

Made Ground

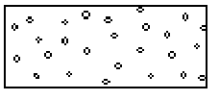

Topsoil

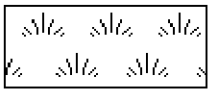

Sand


Silt

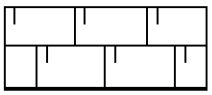

Boulders and Cobbles


Clay

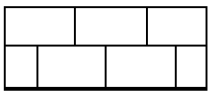

Gravel

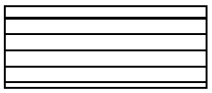

Peat

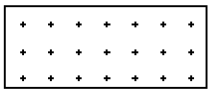
LEGEND - Rocks (Sedimentary)


Chalk


Siltstone


Limestone


Mudstone


Sandstone


Coal


Conglomerate


Breccia

LOG ABREVIATIONS

W	Water Sample	▽	Water Strike
B	Bulk Sample	▼	Water (Standing Level)
D	Disturbed Sample	PP	Pocket Penetrometer
J	Jar Sample	HV	Hand Vane
U	Undisturbed Sample	SPT	Standard Penetration Test
(No. of blows shown in brackets for U100 samples)		CPT	Cone Penetration Test
WAC	Waste Acceptance Criteria Sample	CBR	California Bearing Ratio
		*	Extrapolated Value

Pocket penetrometer testing provides values of unconfined compressive strength. The results have been converted to an approximate equivalent shear strength which should be used with due circumspection. As the pocket penetrometer tends to overestimate shear strength, we have used an appropriate reduction factor.

LOG KEY

LISTERS GEO
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Continuous Tube Sampler Log

Borehole No. CT 01

Project Location: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Co-ords: 525810E - 328579N

Level: 3.92 mAOD

Dates: 30/10/2025

Project Number: 25.09.007a

Logged By: Yuki Tse to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Result				
					0.30	3.62		TOPSOIL Grass overlying dark brown silty CLAY with rare fragments of brick.
		0.50	D					TIDAL FLAT DEPOSITS Very soft brown slightly sandy SILT.
		1.00	D					
		1.20	SPT(S)	N=3 (2/0,1,1,1)				
		1.50	D					
	▼	2.00	D		2.00	1.92		
		2.00	SPT(S)	N=3 (1/1,1,0,1)				TIDAL FLAT DEPOSITS Very loose brown very clayey SAND with rare thin laminations of dark grey sand.
		2.50	D					
		3.00	SPT(S)	N=4 (2/1,1,1,1)				
		3.50	D					
		4.00	SPT(S)	N=6 (2/1,1,2,2)				*...becoming loose and clayey below 4.00m.*
		4.50	D					
		5.00	SPT(S)	N=10 (3/2,2,3,3)	5.00	-1.08		TIDAL FLAT DEPOSITS Medium dense brown silty SAND.
		5.50	D					
		6.00	SPT(S)	N=17 (4/3,4,5,5)				
		6.50	D					
		7.00	SPT(S)	N=18 (6/4,4,5,5)				

Borehole Diameter: 87mm to 67mm

Groundwater: 1.90m

Instrumentation: Backfilled with arisings

Remarks: Inspection pit excavated to 1.20m. Blowing sands encountered below 6.00m. Borehole terminated at 8.45m due to blowing sands, blowing material back up to 6.00m. Casing extended to 6.00m depth

QMS ISO 9001 REGISTERED FIRM

AGS Association of Geotechnical & Geoenvironmental Specialists

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Continuous Tube Sampler Log

Borehole No. CT 01

Project Location: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Co-ords: 525810E - 328579N

Level: 3.92 mAOD

Dates: 30/10/2025

Project Number: 25.09.007a

Logged By: Yuki Tse to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Result				
		7.50	D					TIDAL FLAT DEPOSITS Medium dense brown silty SAND.
		8.00	SPT(S)	N=19 (7/4,4,5,6)				
					8.45	-4.53		End of Borehole at 8.45m

8 9 10 11 12 13 14

Borehole Diameter: 87mm to 67mm

Groundwater: 1.90m

Instrumentation: Backfilled with arisings

Remarks: Inspection pit excavated to 1.20m. Blowing sands encountered below 6.00m. Borehole terminated at 8.45m due to blowing sands, blowing material back up to 6.00m. Casing extended to 6.00m depth

QMS ISO 9001 REGISTERED FIRM

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Continuous Tube Sampler Log

Borehole No. CT 02

Project Location: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Co-ords: 525819E - 328584N

Level: 3.91 mAOD

Dates: 30/10/2025

Project Number: 25.09.007a

Logged By: Yuki Tse to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Result	Depth (m)	Level (m)	Legend	Stratum Description
					0.30	3.61		TOPSOIL Grass overlying dark brown silty CLAY.
		0.50	D					TIDAL FLAT DEPOSITS Very soft brown sandy SILT.
		1.20	SPT(S)	N=4 (2/1,1,1,1)				
		1.50	D		1.50	2.41		TIDAL FLAT DEPOSITS Very soft brown slightly sandy CLAY.
	▼	2.00	SPT(S)	N=8 (4/2,2,2,2)	2.00	1.91		TIDAL FLAT DEPOSITS Loose brown clayey SAND with rare thin laminations of dark grey sand.
		2.50	D					
		3.00	SPT(S)	N=5 (4/2,1,1,1)				
					3.45	0.46		End of Borehole at 3.45m

1 2 3 4

Borehole Diameter: 87mm

Groundwater: 2.00m

Instrumentation: Monitoring well installed to 3.00m.

Remarks: Inspection pit excavated to 1.20m. Casing extended to 3.00m depth

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Test Location	Depth at Start of Test (m)	Spoon or Cone	Blows per 75mm Penetration (unless otherwise stated)				Field 'N' Value	'N_{60}' Value	Stratum
CT 01	1.20	S	0	1	1	1	3	4	TFD
	2.00	S	1	1	0	1	3	6	
	3.00	S	1	1	1	1	4	7	
	4.00	S	1	1	2	2	6	9	
	5.00	S	2	2	3	3	10	13	
	6.00	S	3	4	5	5	17	20	
	7.00	S	4	4	5	5	18	20	
	8.00	S	4	4	5	6	19	20	
CT 02	1.20	S	1	1	1	1	4	5	TFD
	2.00	S	2	2	2	2	8	16	
	3.00	S	2	1	1	1	5	8	

Key: TFD = TIDAL FLAT DEPOSITS

* = N-value extrapolated in accordance with CIRIA R143.
Corrections in accordance with BS EN ISO 22476-3, 2005, National Annex A: using Energy Ratios (81% [CT01 & CT02]) from current equipment calibrations

STANDARD PENETRATION TEST SUMMARY

Report:
25.09.007a
Sheet 1 of 1

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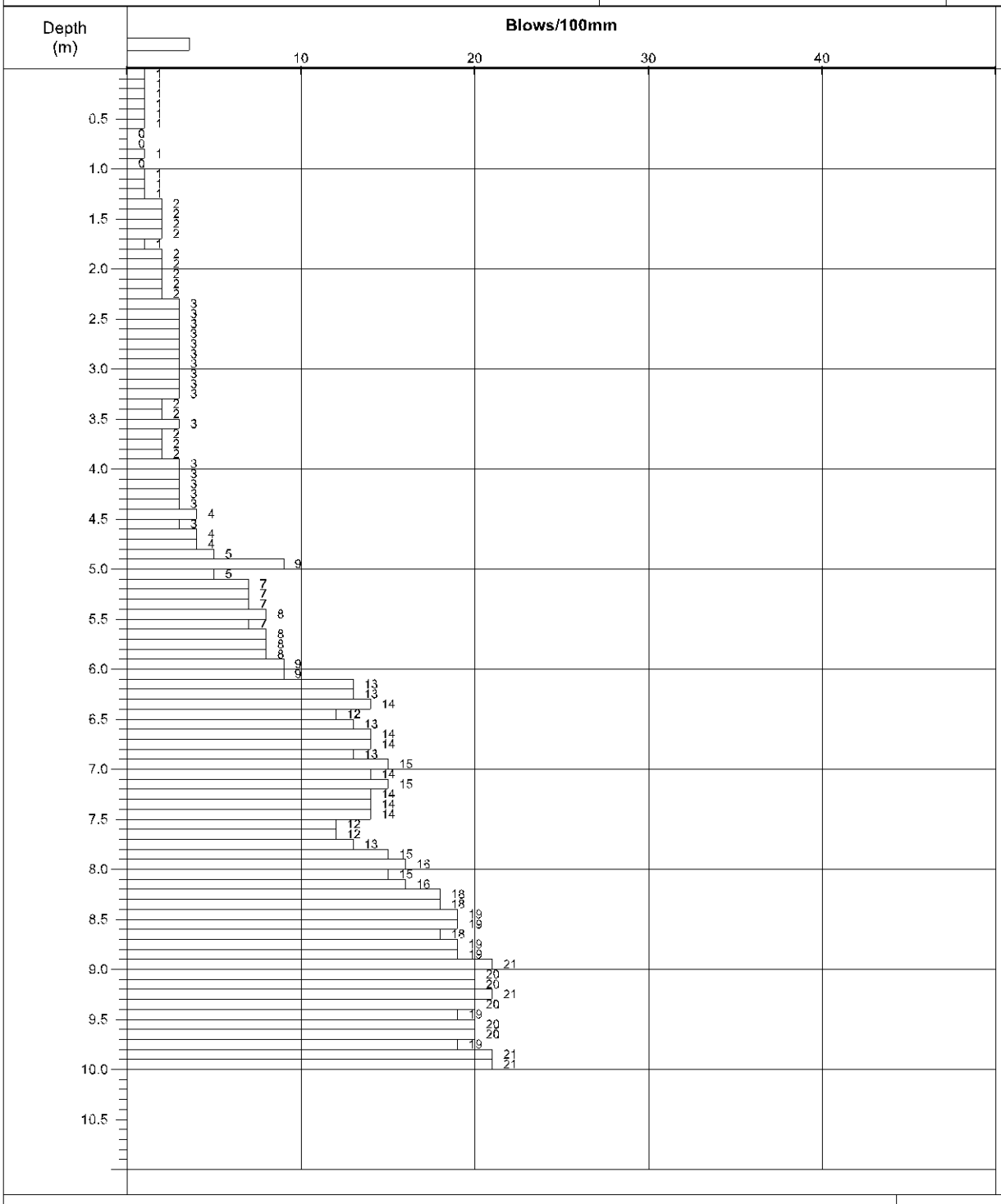
Super Heavy Dynamic Probe

Borehole No.
DP01

Project Location: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Co-ords: 525811E - 328580N
Level: 3.92 mAOD
Dates: 30/10/2025

Project Number: 25.09.007a
Test Type: SHDP - B



Hammer Weight: 63.5kgs **Fall Height:** 0.75m **Cone Area:** 20cm²

Remarks: For soil description refer to CT01

* = settled under own weight

ISO 9001 REGISTERED FIRM

AGS Association of Geotechnical & Geoenvironmental Specialists

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Geotechnical and Geoenvironmental Consultants

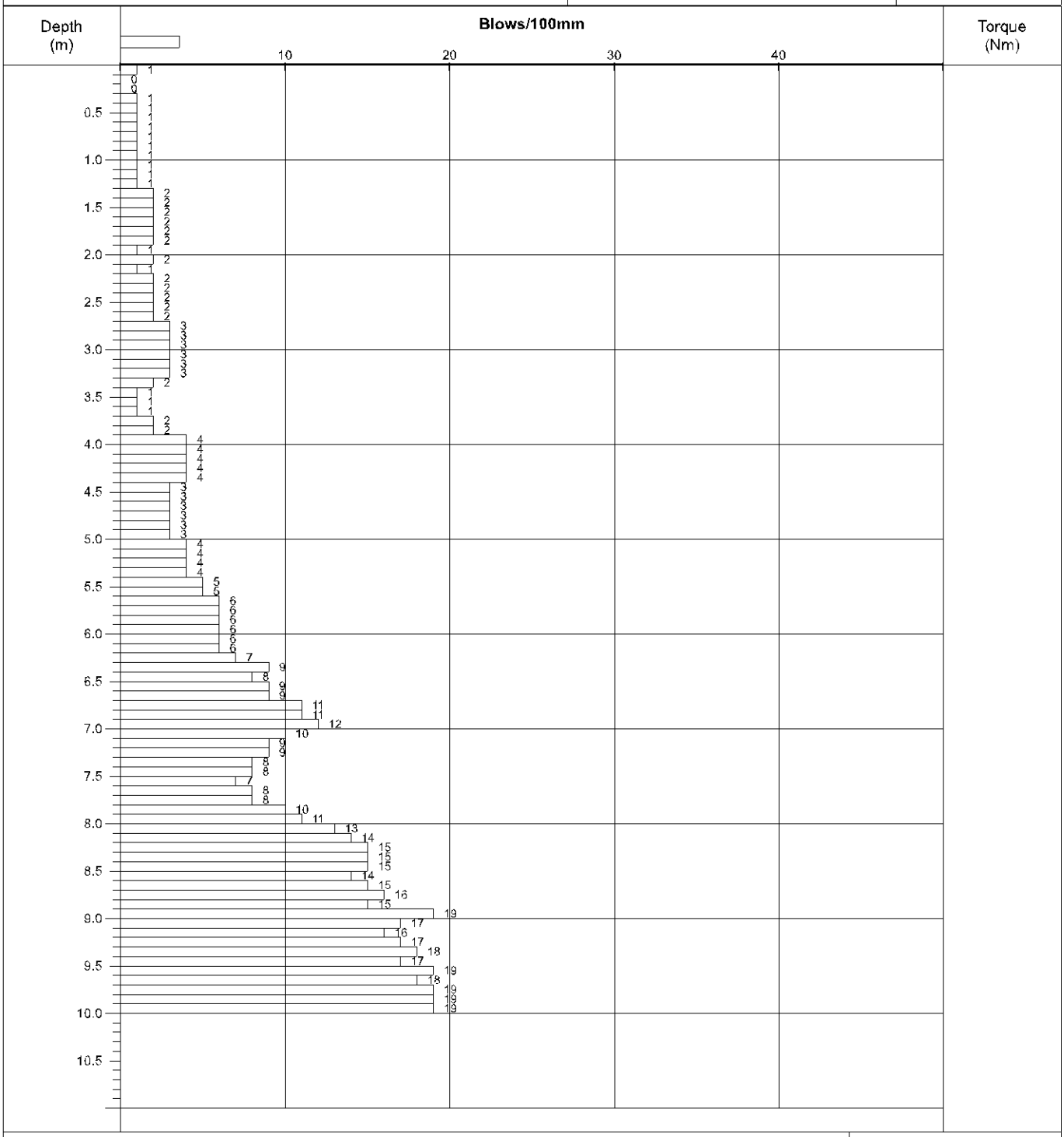
Super Heavy Dynamic Probe

Borehole No.
DP02

Project Location: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Co-ords: 525818E - 328584N
Level: 3.91 mAOD
Dates: 30/10/2025

Project Number: 25.09.007a
Test Type: SHDP - B



Hammer Weight: 63.5kgs **Fall Height:** 0.75m **Cone Area:** 20cm²

Remarks: For soil description refer to CT02

* = settled under own weight

ISO 9001 REGISTERED FIRM

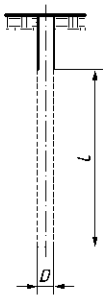
AGS Association of Geotechnical & Geoenvironmental Specialists

LISTERS GEO
Geotechnical and Geoenvironmental Consultants

Report No: 25.09.007a
Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Details

Borehole Number		CT02	
Test Number		1	
Depth to base of test section	*[a]*	2.30	**m below GL**
Depth to watertable	*[b]*	1.60	**m below GL**
Height of measurement point	*[c]*	0.00	**m above GL**
Depth of casing	*[d]*	1.00	**m below GL**
Test section length	*[L]*	1.30	**m** *[a] - [d]*
Diameter of the test section	*[D]*	0.087	**m**
Shape Factor	*[F]*	2.40	**Cylindrical cavity with L/D > 10**
Technician		YT	
Date of test		30/10/2025	



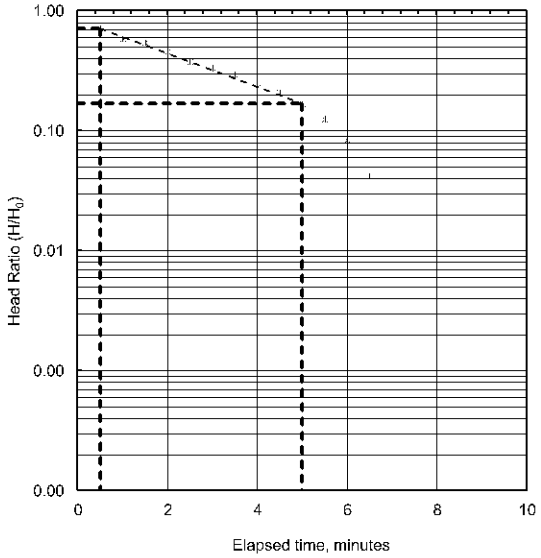
Description of test stratum/strata

0.30m to 1.50m: Very soft brown sandy SILT (TIDAL FLAT DEPOSITS)
1.50m to 2.00m: Very soft brown slightly sandy CLAY (TIDAL FLAT DEPOSITS)
2.00m to 3.45m: Loose brown clayey SAND with rare thin laminations of dark grey sand. (TIDAL FLAT DEPOSITS)

Test Record

Elapsed Time	Depth to Water	Head of water	H/H_0
min	m	m	
0.00	1.84	-0.24	1.00
0.50	1.77	-0.17	0.71
1.00	1.74	-0.14	0.58
1.50	1.73	-0.13	0.54
2.00	1.71	-0.11	0.46
2.50	1.69	-0.09	0.37
3.00	1.68	-0.08	0.33
3.50	1.67	-0.07	0.29
4.00	1.66	-0.06	0.25
4.50	1.65	-0.05	0.21
5.00	1.64	-0.04	0.17
5.50	1.63	-0.03	0.12
6.00	1.62	-0.02	0.08
6.50	1.61	-0.01	0.04
7.00	1.60	0.00	0.00

Plot of head ratio against elapsed time



Calculation and Result (using the velocity graph method)

$$k = \frac{\alpha \cdot S}{F}$$

Head Ratio/Time slope gradient, α =	0.322	
Test section cross-sectional area, S =	0.0059447	m^2
Permeability coefficient, k =	**8.0×10^{-4}**	**m/s**

Remarks:

IN-SITU WATER PERMEABILITY TEST

BS EN ISO 22282-1:2012 : Variable (Rising) Head

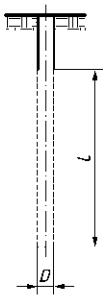
Report No.: 25.09.007a

LISTERS GEO
Geotechnical and Geoenvironmental Consultants

Report No: 25.09.007a
Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Details

Borehole Number		CT02	
Test Number		2	
Depth to base of test section	*[a]*	2.30	**m below GL**
Depth to watertable	*[b]*	1.60	**m below GL**
Height of measurement point	*[c]*	0.00	**m above GL**
Depth of casing	*[d]*	1.00	**m below GL**
Test section length	*[L]*	1.30	**m** *[a] - [d]*
Diameter of the test section	*[D]*	0.087	**m**
Shape Factor	*[F]*	2.40	**Cylindrical cavity with L/D > 10**
Technician		YT	
Date of test		30/10/2025	



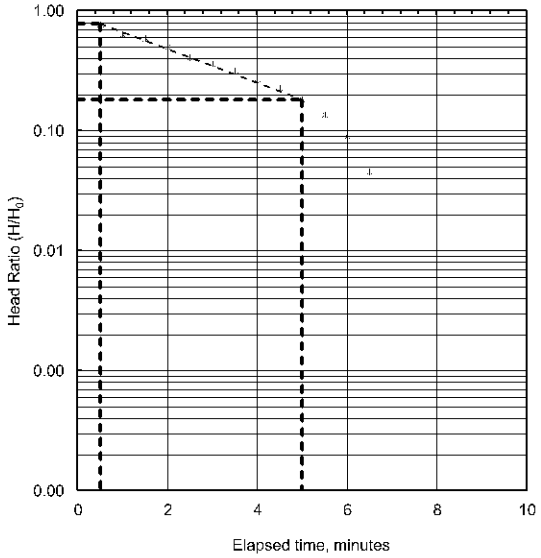
Description of test stratum/strata

0.30m to 1.50m: Very soft brown sandy SILT (TIDAL FLAT DEPOSITS)
1.50m to 2.00m: Very soft brown slightly sandy CLAY (TIDAL FLAT DEPOSITS)
2.00m to 3.45m: Loose brown clayey SAND with rare thin laminations of dark grey sand. (TIDAL FLAT DEPOSITS)

Test Record

Elapsed Time	Depth to Water	Head of water	H/H_0
min	m	m	
0.00	1.82	-0.22	1.00
0.50	1.77	-0.17	0.77
1.00	1.74	-0.14	0.64
1.50	1.73	-0.13	0.59
2.00	1.71	-0.11	0.50
2.50	1.69	-0.09	0.41
3.00	1.68	-0.08	0.36
3.50	1.67	-0.07	0.32
4.00	1.66	-0.06	0.27
4.50	1.65	-0.05	0.23
5.00	1.64	-0.04	0.18
5.50	1.63	-0.03	0.14
6.00	1.62	-0.02	0.09
6.50	1.61	-0.01	0.05
7.00	1.60	0.00	0.00

Plot of head ratio against elapsed time



Calculation and Result (using the velocity graph method)

$$k = \frac{\alpha \cdot S}{F}$$

Head Ratio/Time slope gradient, α =	0.322	
Test section cross-sectional area, S =	0.0059447	m^2
Permeability coefficient, k =	**8.0×10^{-4}**	**m/s**

Remarks:

IN-SITU WATER PERMEABILITY TEST

BS EN ISO 22282-1:2012 : Variable (Rising) Head

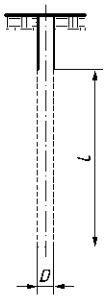
Report No.: 25.09.007a

LISTERS GEO
Geotechnical and Geoenvironmental Consultants

Report No: 25.09.007a
Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Details

Borehole Number		CT02	
Test Number		3	
Depth to base of test section	*[a]*	3.00	**m below GL**
Depth to watertable	*[b]*	1.60	**m below GL**
Height of measurement point	*[c]*	0.00	**m above GL**
Depth of casing	*[d]*	1.00	**m below GL**
Test section length	*[L]*	2.00	**m** *[a] - [d]*
Diameter of the test section	*[D]*	0.087	**m**
Shape Factor	*[F]*	3.28	**Cylindrical cavity with L/D > 10**
Technician		YT	
Date of test		30/10/2025	



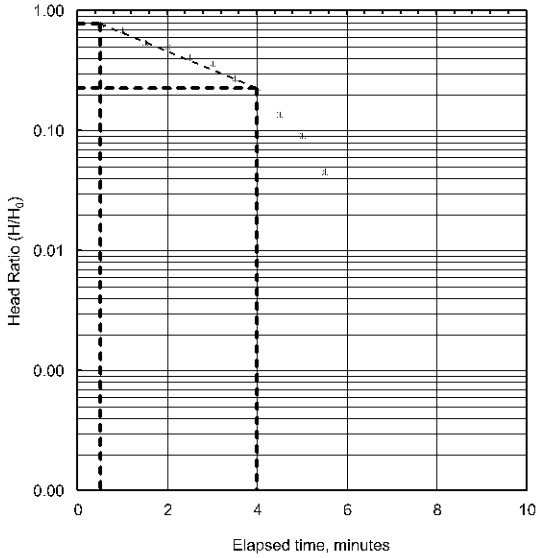
Description of test stratum/strata

0.30m to 1.50m: Very soft brown sandy SILT (TIDAL FLAT DEPOSITS)
1.50m to 2.00m: Very soft brown slightly sandy CLAY (TIDAL FLAT DEPOSITS)
2.00m to 3.45m: Loose brown clayey SAND with rare thin laminations of dark grey sand. (TIDAL FLAT DEPOSITS)

Test Record

Elapsed Time	Depth to Water	Head of water	H/H_0
min	m	m	
0.00	1.82	-0.22	1.00
0.50	1.77	-0.17	0.77
1.00	1.75	-0.15	0.68
1.50	1.72	-0.12	0.55
2.00	1.71	-0.11	0.50
2.50	1.69	-0.09	0.41
3.00	1.68	-0.08	0.36
3.50	1.66	-0.06	0.27
4.00	1.65	-0.05	0.23
4.50	1.63	-0.03	0.14
5.00	1.62	-0.02	0.09
5.50	1.61	-0.01	0.05
6.00	1.60	0.00	0.00

Plot of head ratio against elapsed time



Calculation and Result (using the velocity graph method)

$$k = \frac{\alpha \cdot S}{F}$$

Head Ratio/Time slope gradient, α =	0.350	
Test section cross-sectional area, S =	0.0059447	m^2
Permeability coefficient, k =	**6.3×10^{-4}**	**m/s**

Remarks:

IN-SITU WATER PERMEABILITY TEST

BS EN ISO 22282-1:2012 : Variable (Rising) Head

Report No.: 25.09.007a

LISTERS GEO
Geotechnical and Geoenvironmental Consultants

Project:	Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Date:	11/11/2025	**Ambient air temperature (°C):**	14
Time:	10:36	**Barometric pressure (mB):**	1002
Recorded by:	PH	**Barometric trend:**	Variable (+/-3mB) in previous 24hr
Equipment:	Geotech GA5000 gas monitor and dip-meter	**Weather conditions:**	Cloudy

Groundwater monitoring

Hole ID	Ground level (mAOD)	Water depth (m)	Water level (mAOD)	Depth of pipe base (m)	Remarks
CT02	+3.91	1.29	+2.62	2.00	Silty at base

Gas monitoring

Hole ID	Methane CH_4 (%v/v)	Carbon Dioxide CO_2 (%v/v)	Oxygen O_2 (%v/v)	Flow Rate (l/h)	Well Pressure (mBar)		Remarks
CT02	<0.1	0.4	20.2	0.9	0.02		

Note: See Exploratory Hole log for well details

SUMMARY OF GAS & GROUNDWATER MONITORING - 11.Nov.25	**Report No.** 25.09.007a

LISTERS GEO
Geotechnical and Geoenvironmental Consultants

APPENDIX C
LABORATORY TEST REPORTS

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone:- 01327 860947/860060 Email: lab@listersgeotechnics.co.uk

PROJECT INFORMATION		SAMPLE INFORMATION		
Site Location:-	Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB	**Laboratory Tests Undertaken:-**		
		TEST TYPE	**TEST METHOD**	**TESTED**
		Natural Moisture Contents (MC%)	(BS 1377:Part 2:1990 Clause 3.2)	✓
		Liquid Limits (%)	(BS 1377:Part 2:1990 Clause 4.3)	✓
		Plastic Limits (%)	(BS 1377:Part 2:1990 Clause 5.3)	✓
		Plasticity Index (%)	(BS 1377:Part 2:1990 Clause 5.4)	✓
		Saturated Moisture Content (%)	(BS1377 : Part 2 : 1990, clause 3.3)	
		PSD - Wet Sieving	(BS 1377:Part 2:1990 Clause 9.2)	✓
Client Reference:-		Engineering Sample Descriptions	(BS 5930 : Section 6)	
		Passing 425/63 (μm)	-	✓
		Hydrometer	(BS 1377:Part 2:1990 Clause 9.5)	
Date Samples Received:-	31 October 2025	Loss on Ignition (%)	-	
Date Testing Completed:-	20 November 2025	Soil Suctions (kPa)	BRE Digest IP 4/93, 1993	
		Bulk Density (Mg/m^3)	(BS 1377:Part 2:1990 Clause 7.2)	
		Strength Tests	(BS 1377:Part 7:1990 Clause 8 & 9)	
		Soluble Sulphate Content (SO_4g/l)	(BS 1377:Part 3:1990 Clause 5.3)	✓
		pH value	(BS 1377:Part 3:1990 Clause 9.4)	✓
		California Bearing Ratios (CBR)	(BS 1377:Part 4:1990 Clause 7)	
		Compaction Tests	(BS 1377:Part 4:1990 Clauses 3.0-3.6)	
The results relate only to the samples tested				

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Laboratory testing in accord with BS EN ISO/IEC 17025-2000 and Quality Management in accord with ISO 9001

Signed on behalf of GroundTech Laboratories:-_____ **Technical Signatory**

Quality Assured to ISO 9001

GEOTECHNICAL LABORATORY TEST RESULTS

Report No: 25.09.007a

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone: 01327 860947/860060 Fax: 01327 860430 Email: groundtech@listersgeotechnics.co.uk

Quality Assured to ISO 9001

SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS	
Test Location	Sample Type	Sample Depth -m	Test Type	WC %	LL %	PL %	PI %	Passing 425 µm %	Modified PI %	Class	Passing 63 µm %	WC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m³	Test Type	Cell Pressure kN/m²	Deviator Stress kN/m²	Apparent Cohesion kN/m²	ϕ	pH Value	Soluble Sulphate Content SO4 g/l
CT 01	D	0.50	PI/63	20	32	25	7	100	7	ML	74	0.63	27	-0.71									7.7	0.17
	D	1.00	PI/63	31	33	24	9	99	9	ML	81	0.94	26	0.78									7.6	0.23
	D	1.50	PSD	25																				
	D	2.00	PI/63	32	33	NP		100			24	0.97												
	D	2.50	PSD	30																			8.0	0.06
	D	3.50	PSD	36																			7.9	0.04
	D	4.50	PSD	26																				
	D	5.50	PI/63	23	32	NP		100			18	0.72											7.9	0.06
	D	6.50	PSD	22																				
	D	7.50	PSD	23																			8.0	0.12
CT 02	D	0.50	PI/63	10	31	27	4	99	4	ML	64	0.32	29	-4.25										
	D	1.50	PI/63	28	35	24	11	99	11	CL	72	0.80	26	0.36									7.6	0.15
	D	2.50	PI/63	26	32	NP		100			20	0.81												

Symbols:

U	Undisturbed Sample	R	Remoulded	PI	Plasticity Index	T	Triaxial Undrained	L	100mm specimen
D	Disturbed Sample	63	Passing 63µm	F	Filter Paper Suction Tests	M	Multistage Triaxial	S	38mm specimen
B	Bulk Sample	H	Hydrometer	CC	Continuous Core	HP	Hand Penetrometer		
W	Water Sample	PSD	Wet Sieving			V	Vane Test		

LABORATORY TEST RESULTS

Project Reference
25.09.007a

GroundTech Laboratories

Geotechnical Testing Facility

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Telephone: 01327 860947/860060 Fax: 01327 860430 Email: groundtech@listersgeotechnics.co.uk

Quality Assured ISO 9001

Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Location: CT 01

Sample Depth: 7.50m

Hydrometer No.:

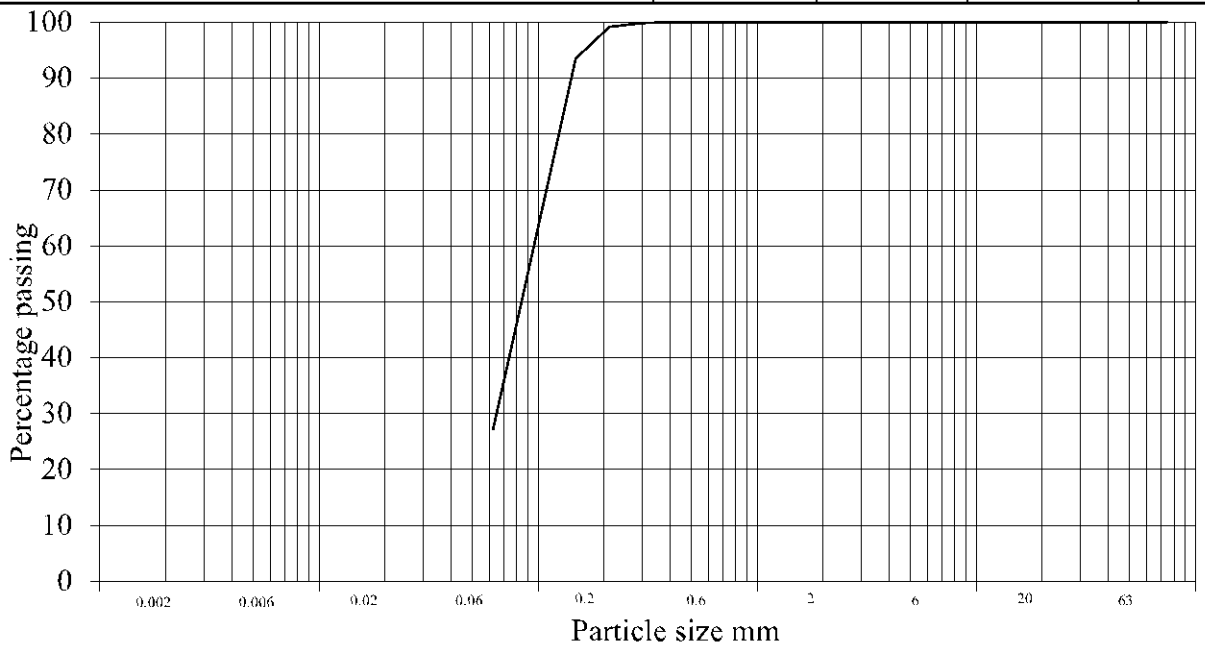
SG Gs:

Water Visc. (N):

Dry Mass of Soil after pretreatment (g):

Test Method: BS 1377 : Part 2 : 1990 : 9.2

BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
75mm	100.00		
63mm	100.00		
50mm	100.00		
37.5mm	100.00		
26.5mm	100.00		
20mm	100.00		
14mm	100.00		
10mm	100.00		
6.3mm	100.00		
5mm	100.00		
3.5mm	100.00		
2mm	100.00		
1.18mm	100.00		
600µm	99.90		
425µm	99.90		
300µm	99.70		
212µm	99.00		
150µm	93.40		
63µm	27.00		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
27%				73%			0%			0%

PARTICLE SIZE DISTRIBUTION

Project Reference
25.09.007a

GroundTech Laboratories

Geotechnical Testing Facility

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Quality Assured ISO 9001

Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Location: CT 01

Sample Depth: 6.50m

Hydrometer No.:

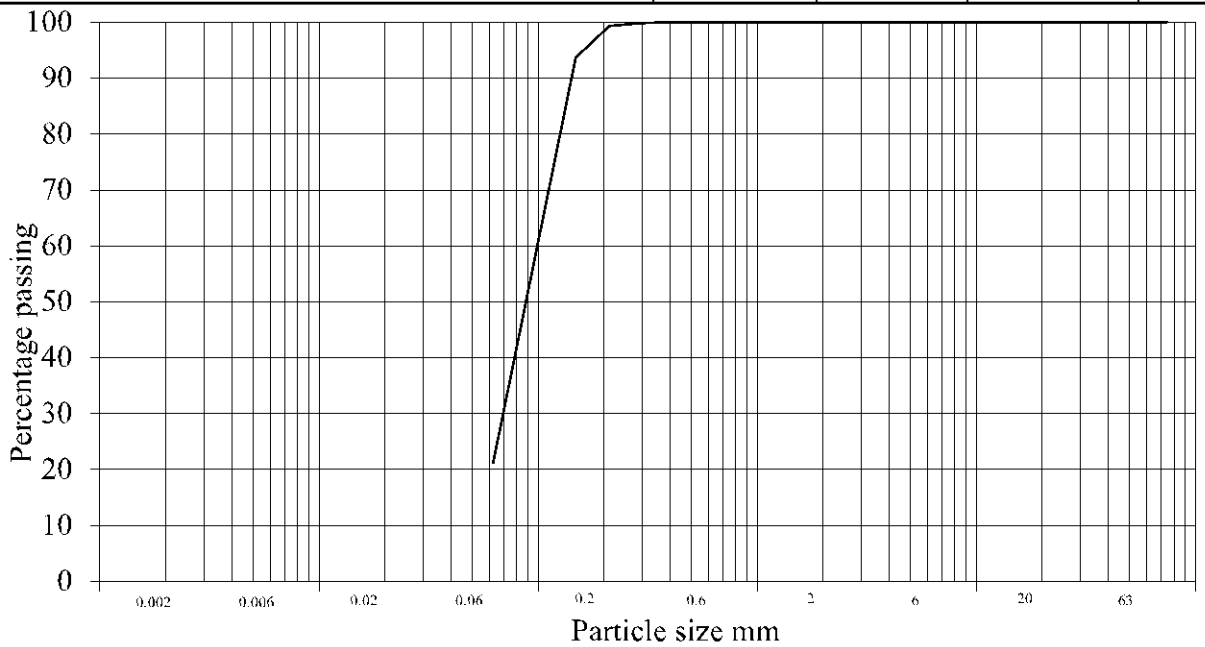
SG Gs:

Water Visc. (N):

Dry Mass of Soil after pretreatment (g):

Test Method: BS 1377 : Part 2 : 1990 : 9.2

BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
75mm	100.00		
63mm	100.00		
50mm	100.00		
37.5mm	100.00		
26.5mm	100.00		
20mm	100.00		
14mm	100.00		
10mm	100.00		
6.3mm	100.00		
5mm	100.00		
3.5mm	100.00		
2mm	100.00		
1.18mm	99.90		
600µm	99.90		
425µm	99.90		
300µm	99.80		
212µm	99.30		
150µm	93.60		
63µm	21.00		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
21%				79%			0%			0%

PARTICLE SIZE DISTRIBUTION

Project Reference
25.09.007a

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Quality Assured ISO 9001

Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Location: CT 01

Sample Depth: 4.50m

Hydrometer No.:

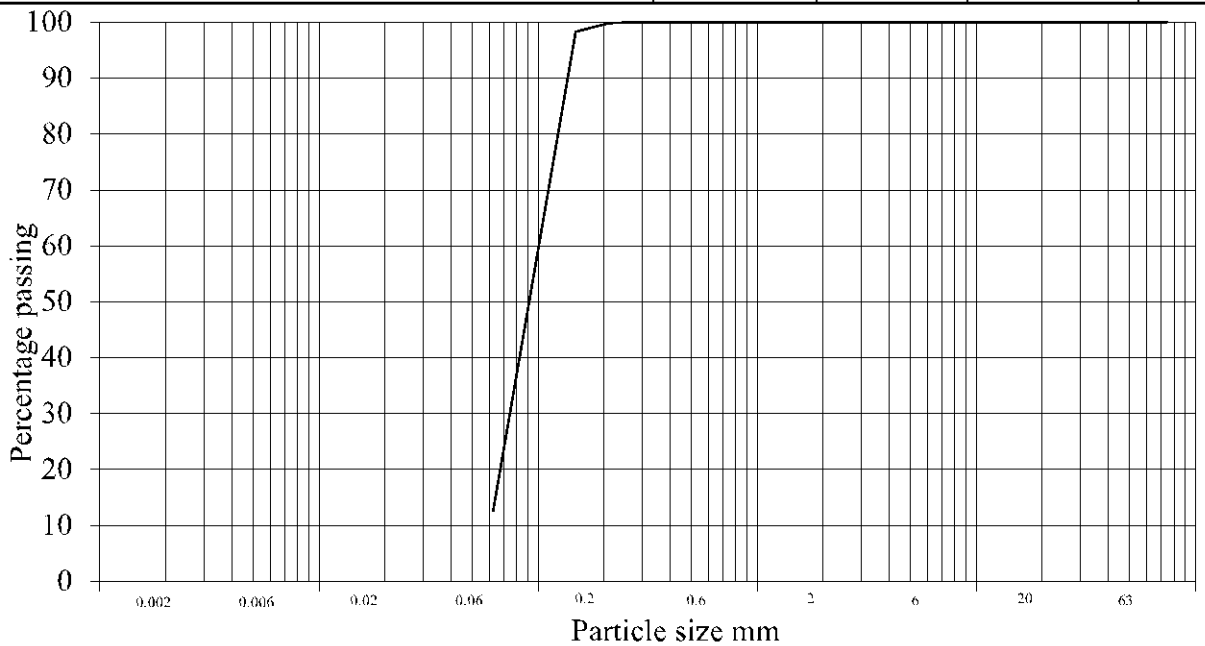
SG Gs:

Water Visc. (N):

Dry Mass of Soil after pretreatment (g):

Test Method: BS 1377 : Part 2 : 1990 : 9.2

BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
75mm	100.00		
63mm	100.00		
50mm	100.00		
37.5mm	100.00		
26.5mm	100.00		
20mm	100.00		
14mm	100.00		
10mm	100.00		
6.3mm	100.00		
5mm	100.00		
3.5mm	100.00		
2mm	100.00		
1.18mm	100.00		
600µm	100.00		
425µm	99.90		
300µm	99.90		
212µm	99.70		
150µm	98.20		
63µm	12.50		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
13%				88%			0%			0%

PARTICLE SIZE DISTRIBUTION

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Quality Assured ISO 9001

Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Location: CT 01

Sample Depth: 3.50m

Hydrometer No.:

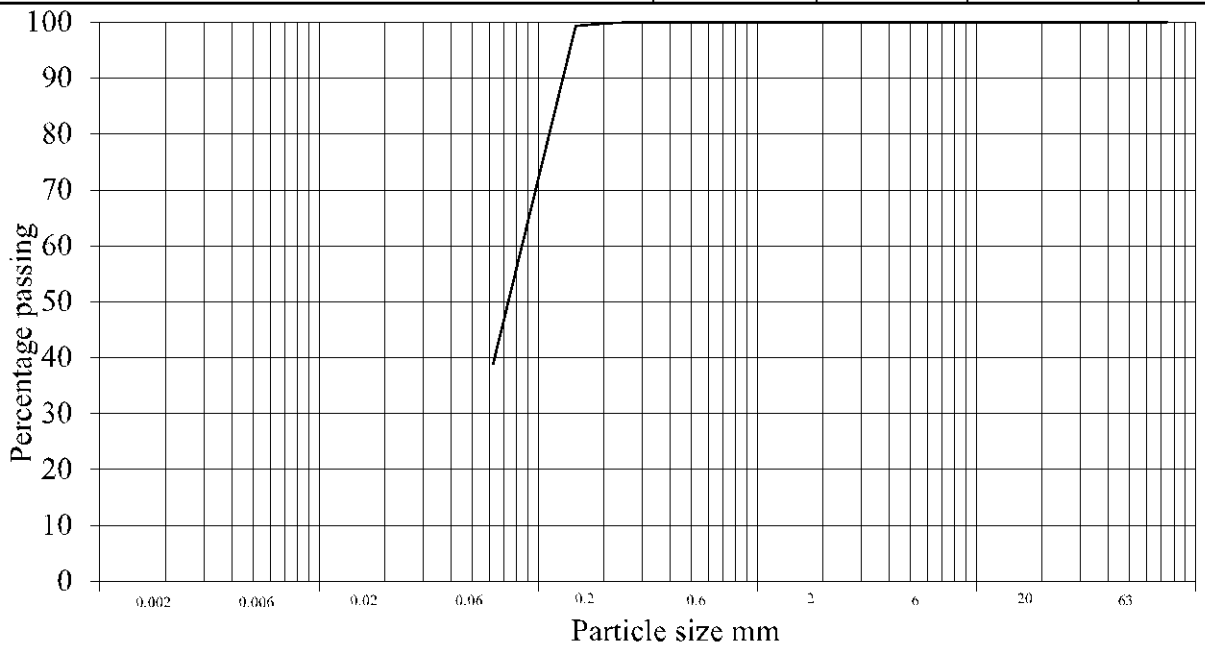
SG Gs:

Water Visc. (N):

Dry Mass of Soil after pretreatment (g):

Test Method: BS 1377 : Part 2 : 1990 : 9.2

BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
75mm	100.00		
63mm	100.00		
50mm	100.00		
37.5mm	100.00		
26.5mm	100.00		
20mm	100.00		
14mm	100.00		
10mm	100.00		
6.3mm	100.00		
5mm	100.00		
3.5mm	100.00		
2mm	100.00		
1.18mm	100.00		
600µm	100.00		
425µm	100.00		
300µm	99.90		
212µm	99.70		
150µm	99.30		
63µm	38.70		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
39%				61%			0%			0%

PARTICLE SIZE DISTRIBUTION

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Quality Assured ISO 9001

Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Location: CT 01

Sample Depth: 2.50m

Hydrometer No.:

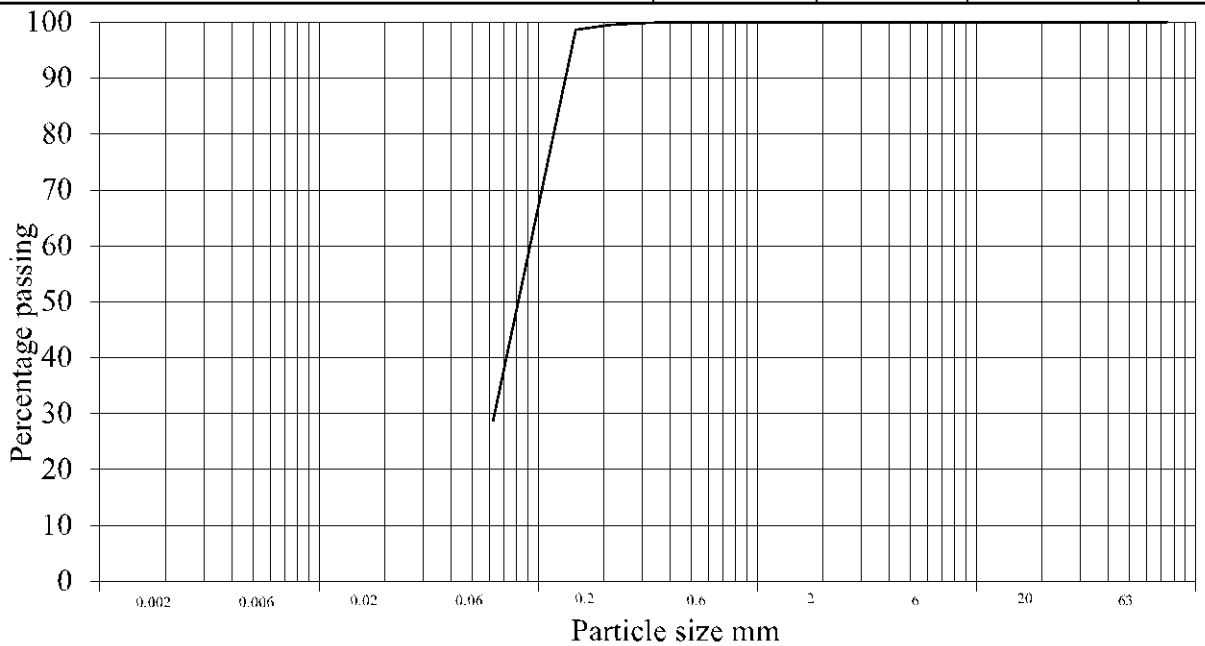
SG Gs:

Water Visc. (N):

Dry Mass of Soil after pretreatment (g):

Test Method: BS 1377 : Part 2 : 1990 : 9.2

BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
75mm	100.00		
63mm	100.00		
50mm	100.00		
37.5mm	100.00		
26.5mm	100.00		
20mm	100.00		
14mm	100.00		
10mm	100.00		
6.3mm	100.00		
5mm	100.00		
3.5mm	100.00		
2mm	100.00		
1.18mm	100.00		
600µm	100.00		
425µm	99.90		
300µm	99.70		
212µm	99.40		
150µm	98.50		
63µm	28.60		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
29%				71%			0%			0%

PARTICLE SIZE DISTRIBUTION

Project Reference
25.09.007a

GroundTech Laboratories

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Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone: 01327 860947/860060 Fax: 01327 860430 Email: groundtech@listersgeotechnics.co.uk

Quality Assured ISO 9001

Site: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Test Location: CT 01

Sample Depth: 1.50m

Hydrometer No.:

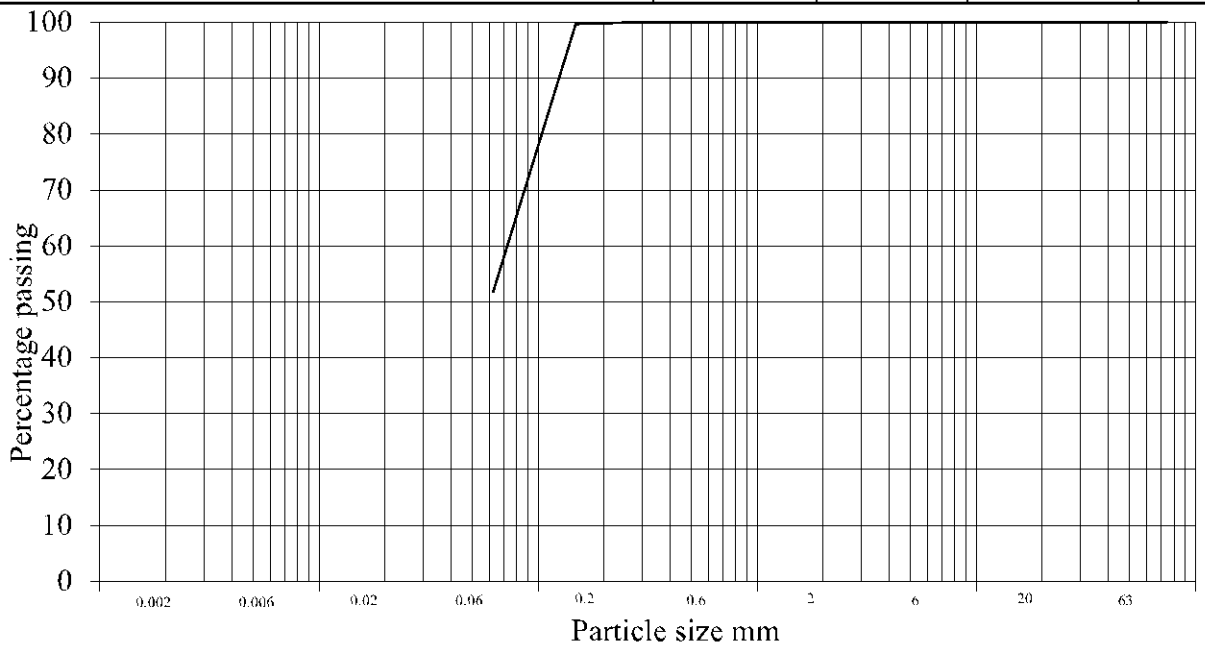
SG Gs:

Water Visc. (N):

Dry Mass of Soil after pretreatment (g):

Test Method: BS 1377 : Part 2 : 1990 : 9.2

BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
75mm	100.00		
63mm	100.00		
50mm	100.00		
37.5mm	100.00		
26.5mm	100.00		
20mm	100.00		
14mm	100.00		
10mm	100.00		
6.3mm	100.00		
5mm	100.00		
3.5mm	100.00		
2mm	100.00		
1.18mm	100.00		
600µm	100.00		
425µm	100.00		
300µm	99.90		
212µm	99.70		
150µm	99.50		
63µm	51.70		

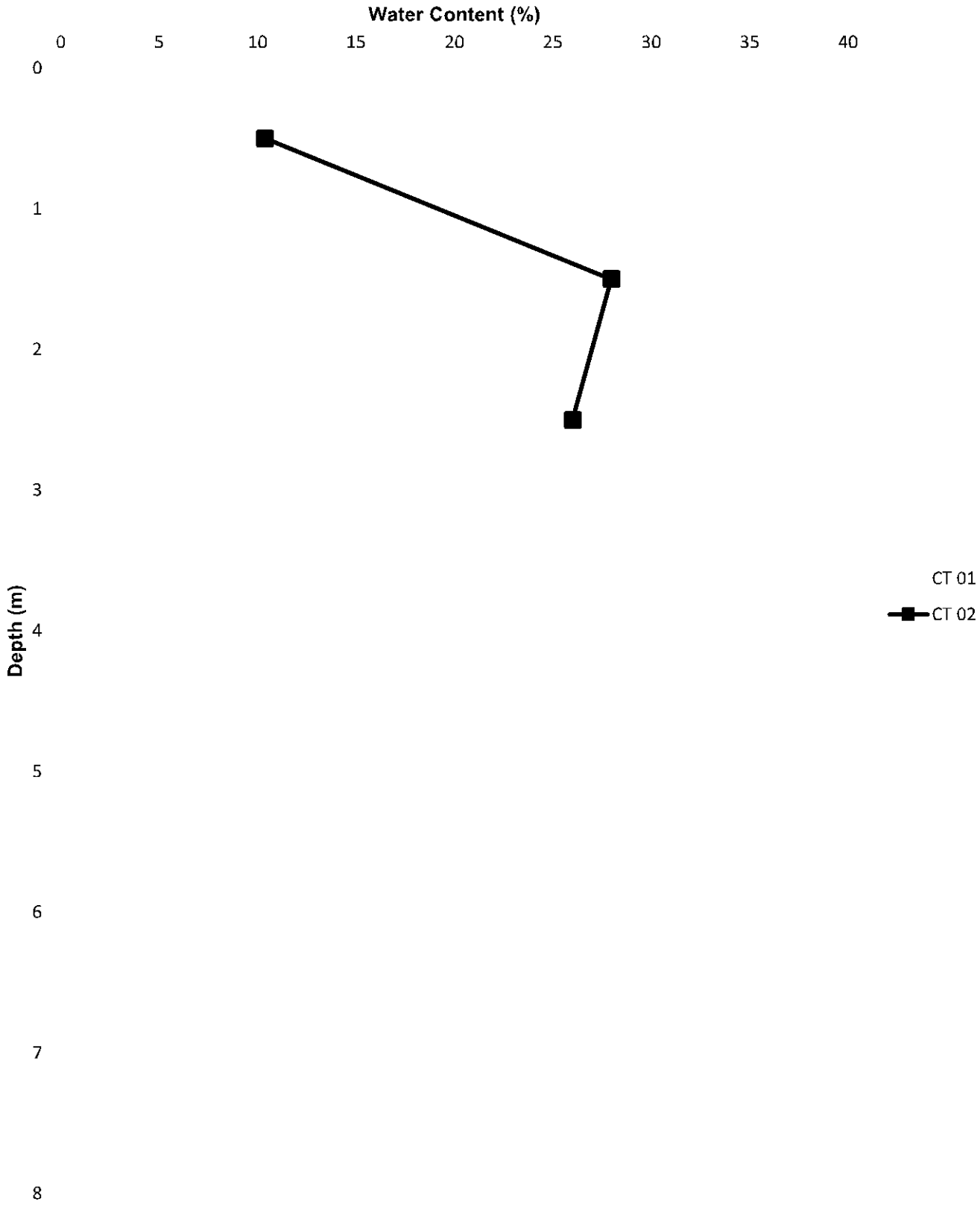


CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
52%				48%			0%			0%

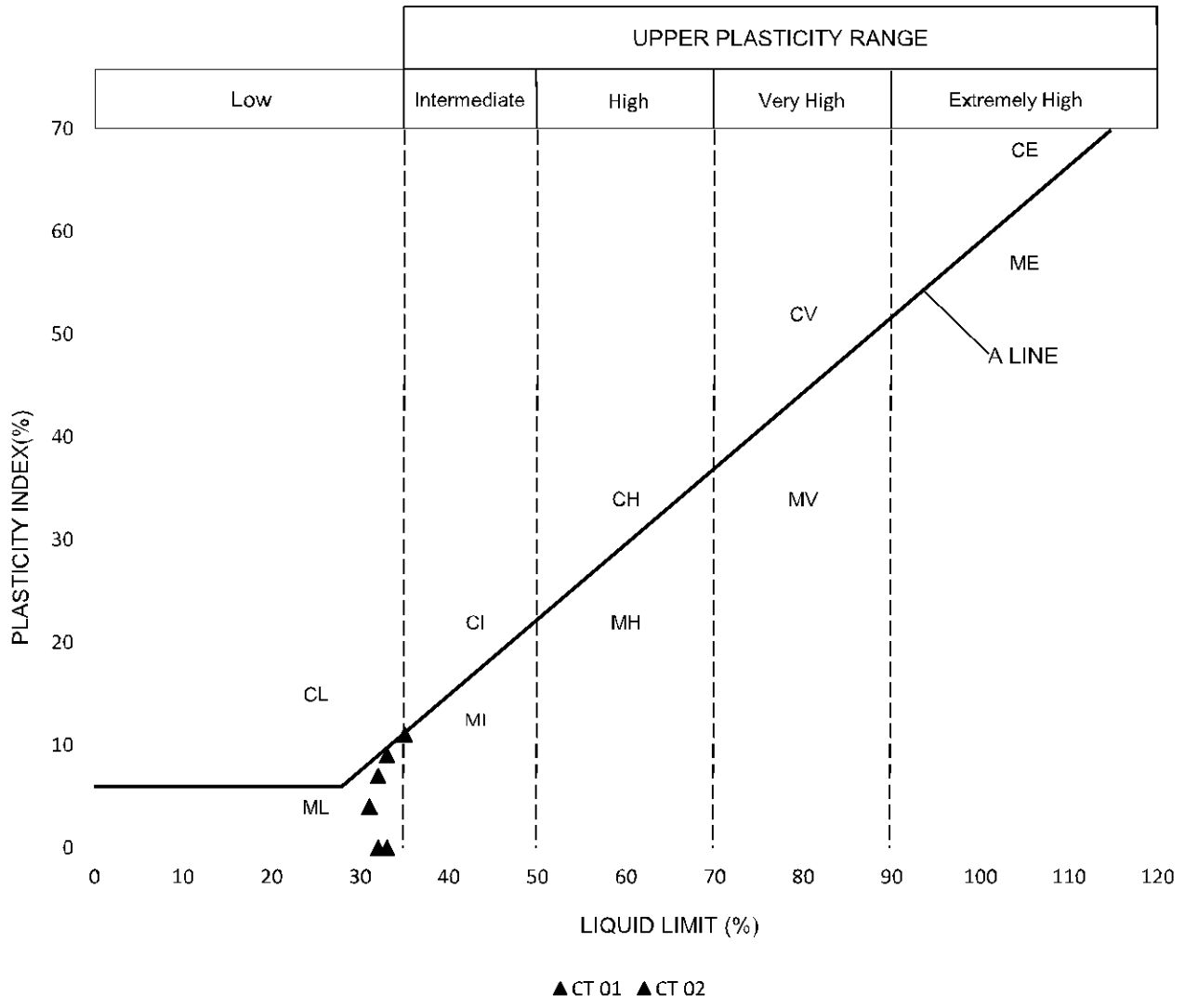
PARTICLE SIZE DISTRIBUTION

Project Reference
25.09.007a

LISTERS GEO
Geotechnical and Geoenvironmental Consultants



WATER CONTENT v DEPTH	Report: 25.09.007a



PLASTICITY CHART

Report:
25.09.007a

UKAS TESTING 4041 MCERTS

■ i2 Analytical

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Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

01923 225404
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Analytical Report Number : 25-060064

Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB	05/11/2025
25 09 007A	05/11/2025
25 09 007A 461	17/11/2025
1	17/11/2025

4 soil samples - 1 leachate sample

Signed:

Joanna Biolik
Senior Reporting Specialist

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
air	- once the analysis is complete

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Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

Analytical Report Number: 25-060064
Project / Site name: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB
Your Order No: 25 09 007A 461

Lab Sample Number				740973	740974	740975	740976
Sample Reference				CT01	CT01	CT02	CT02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				0.20	0.50	0.20	0.50
Date Sampled				Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied

Stone Content	%	0.1	NONE	100	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	18	19	20	9.7
Total mass of sample received	kg	0.1	NONE	0.4	2	0.4	0.4

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	KJK	KJK	KJK	-
Analysis completed	N/A	N/A	N/A	14/11/2025	14/11/2025	17/11/2025	-

pH (L005B)	pH Units	N/A	MCERTS	8.1	7.7	8.1	8.5
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	23	56	25	63
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	11.7	27.7	12.4	31.6
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.2	1.3	2.6	1.1
Loss on Ignition @ 450°C	%	0.2	MCERTS	-	3.5	-	-
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	-	6.3	-	-

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.07	0.08	0.09	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.37	0.21	0.46	0.12
Pyrene	mg/kg	0.05	MCERTS	0.31	0.2	0.39	0.08
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.19	0.13	0.24	0.07
Chrysene	mg/kg	0.05	MCERTS	0.2	0.14	0.24	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.32	0.18	0.36	0.11
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.1	0.08	0.16	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.22	0.13	0.26	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.09	0.09	0.12	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.1	0.1	0.15	< 0.05
Coronene	mg/kg	0.05	NONE	-	< 0.05	-	-

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.97	1.35	2.46	< 0.80
Total WAC-17 PAHs	mg/kg	0.85	NONE	-	1.35	-	-

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Your Order No: 25 09 007A 461

Lab Sample Number				740973	740974	740975	740976
Sample Reference				CT01	CT01	CT02	CT02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				0.20	0.50	0.20	0.50
Date Sampled				Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	11	12	9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	< 1.8	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	21	20	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	14	26	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	28	20	32	19
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	17	16	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	60	54	73	46

TPH (>EC10 - EC12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (>EC12 - EC16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
TPH (>EC16 - EC21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH (>EC21 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10

TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10

Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	-	< 10	-	-

Benzene	µg/kg	5	MCERTS	-	< 5.0	-	-
Toluene	µg/kg	5	MCERTS	-	< 5.0	-	-
Ethylbenzene	µg/kg	5	MCERTS	-	< 5.0	-	-
p & m-Xylene	µg/kg	8	MCERTS	-	< 8.0	-	-
o-Xylene	µg/kg	5	MCERTS	-	< 5.0	-	-

Total BTEX	µg/kg	10	MCERTS	-	< 10	-	-

PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001	-	-

Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 25-060064
Project / Site name: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

Your Order No: 25 09 007A 461

Lab Sample Number	740974
Sample Reference	CT01
Sample Number	None Supplied
Water Matrix	N/A
Depth (m)	0.50
Date Sampled	Deviating
Time Taken	None Supplied

Arsenic	mg/l	0.001	ISO 17025	< 0.00100
Barium	mg/l	0.00005	ISO 17025	0.0143
Cadmium	mg/l	0.0001	ISO 17025	< 0.000100
Chromium	mg/l	0.0004	ISO 17025	< 0.00040
Copper	mg/l	0.0007	ISO 17025	0.026
Mercury	mg/l	0.0005	ISO 17025	< 0.000500
Molybdenum	mg/l	0.0004	ISO 17025	0.00485
Nickel	mg/l	0.0003	ISO 17025	0.00052
Lead	mg/l	0.001	ISO 17025	< 0.0010
Antimony	mg/l	0.0017	ISO 17025	0.0043
Selenium	mg/l	0.004	ISO 17025	0.0042
Zinc	mg/l	0.0004	ISO 17025	0.0051
Chloride	mg/l	0.15	ISO 17025	1.9
Fluoride	mg/l	0.05	ISO 17025	0.38
Sulphate	mg/l	0.045	ISO 17025	2.4
Total dissolved solids	mg/l	6	ISO 17025	56
Total monohydric phenols	mg/l	0.01	ISO 17025	< 0.010
Dissolved organic carbon	mg/l	0.1	NONE	10.8

Arsenic	mg/kg	0.01	NONE	< 0.0100
Barium	mg/kg	0.0005	NONE	0.0986
Cadmium	mg/kg	0.001	NONE	< 0.00100
Chromium	mg/kg	0.004	NONE	< 0.0040
Copper	mg/kg	0.007	NONE	0.18
Mercury	mg/kg	0.005	NONE	< 0.00500
Molybdenum	mg/kg	0.004	NONE	0.0335
Nickel	mg/kg	0.003	NONE	0.0036
Lead	mg/kg	0.01	NONE	< 0.010
Antimony	mg/kg	0.017	NONE	0.03
Selenium	mg/kg	0.04	NONE	< 0.040
Zinc	mg/kg	0.004	NONE	0.035
Chloride	mg/kg	1.5	NONE	13
Fluoride	mg/kg	0.5	NONE	2.6
Sulphate	mg/kg	0.45	NONE	17
Total dissolved solids	mg/kg	60	NONE	390
Total monohydric phenols	mg/kg	0.1	NONE	< 0.10
Dissolved organic carbon	mg/kg	1	NONE	75

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Waste Acceptance Criteria Analytical Results

Report No:	**25-060064**						
					Client:	**Listers Geo**	
Location	**rfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4**						
Lab Reference (Sample Number)	740974				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	sampdatenull				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	CT01						
Depth (m)	0.50						
Solid Waste Analysis							
TOC (%)**	1.3				3%	5%	6%
Loss on Ignition (%) **	3.5				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH 1D CU AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	1.35				100	--	--
pH (units)**	7.7				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	6.3				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0143			0.0986	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.026			0.18	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00485			0.0335	0.5	10	30
Nickel *	0.00052			0.0036	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	0.0043			0.03	0.06	0.7	5
Selenium *	0.0042			< 0.040	0.1	0.5	7
Zinc *	0.0051			0.035	4	50	200
Chloride *	1.9			13	800	15000	25000
Fluoride*	0.38			2.6	10	150	500
Sulphate *	2.4			17	1000	20000	50000
TDS*	56			390	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	10.8			75	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	2						
Dry Matter (%)	81						
Moisture (%)	19						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3. This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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* 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.

740973	CT01	None Supplied	0.2	Brown loam and sand with gravel and vegetation
740974	CT01	None Supplied	0.5	Brown loam and sand with gravel and vegetation
740975	CT02	None Supplied	0.2	Brown loam and sand with gravel and vegetation
740976	CT02	None Supplied	0.5	Brown clay and sand

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Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
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	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
TPH Chromatogram in soil	TPH Chromatogram in soil	In-house method	L064B	D	NONE
Total petroleum hydrocarbons by GC-FID in soil	Determination of total petroleum hydrocarbons in soil by GC-FID	In-house method	L076B	D	MCERTS
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

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Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

One stage WAC 10:1 leachate preparation	One stage batch test at a liquid to solid ratio of 10 L/kg	BS EN 12457-2-2002	L043B	W	ISO 17025
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047-PL	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	MCERTS
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' 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.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container/Insufficient material provided c - Holding time d - Headspace e - Temperature

CT01	N/A	L	740974	ab	Chloride 10:1 WAC	L082B	a
CT01	N/A	L	740974	ab	Dissolved organic carbon 10:1 WAC	L037B	a
CT01	N/A	L	740974	ab	Fluoride 10:1 WAC	L033B	a
CT01	N/A	L	740974	ab	Metals in leachate by ICP-OES	L039B	a
CT01	N/A	L	740974	ab	Monohydric phenols 10:1 WAC	L080-PL	a
CT01	N/A	L	740974	ab	One stage WAC 10:1 leachate preparation	L043B	a
CT01	N/A	L	740974	ab	Total dissolved solids 10:1 WAC	L031B	a
CT01	N/A	L	740974	ab	WAC Leachate 10:1	L043B	a
CT01	N/A	S	740973	a	Asbestos identification in Soil	A001B	a
CT01	N/A	S	740973	a	Asbestos types if id positive	N/A	a
CT01	N/A	S	740973	a	Metals in soil by ICP-OES	L038B	a
CT01	N/A	S	740973	a	Moisture Content	L019B	a
CT01	N/A	S	740973	a	Sample Preparation	L019B	a
CT01	N/A	S	740973	a	Soil Descriptions	L019B	a
CT01	N/A	S	740973	a	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	a
CT01	N/A	S	740973	a	Stones content of soil	L019B	a
CT01	N/A	S	740973	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
CT01	N/A	S	740973	a	TPH Chromatogram in soil	L064B	a
CT01	N/A	S	740973	a	Total organic carbon (Automated) in soil	L009B	a
CT01	N/A	S	740973	a	Total petroleum hydrocarbons by GC-FID in soil	L076B	a
CT01	N/A	S	740973	a	pH at 20°C in soil	L005B	a
CT01	N/A	S	740974	ab	Acid neutralisation capacity of soil	L046B	a
CT01	N/A	S	740974	ab	Asbestos identification in Soil	A001B	a
CT01	N/A	S	740974	ab	Asbestos types if id positive	N/A	a
CT01	N/A	S	740974	ab	BTEX and/or Volatile organic compounds in soil	L073B	ab
CT01	N/A	S	740974	ab	Hexavalent chromium in soil	L080-PL	a
CT01	N/A	S	740974	ab	Loss on ignition of soil @ 450°C	L047-PL	a
CT01	N/A	S	740974	ab	Metals in soil by ICP-OES	L038B	a
CT01	N/A	S	740974	ab	Moisture Content	L019B	a
CT01	N/A	S	740974	ab	PCB's By GC-MS in soil	L027B	a
CT01	N/A	S	740974	ab	Sample Preparation	L019B	a
CT01	N/A	S	740974	ab	Soil Descriptions	L019B	a
CT01	N/A	S	740974	ab	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	a
CT01	N/A	S	740974	ab	Stones content of soil	L019B	a
CT01	N/A	S	740974	ab	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
CT01	N/A	S	740974	ab	TPH Chromatogram in soil	L064B	a
CT01	N/A	S	740974	ab	Total organic carbon (Automated) in soil	L009B	a
CT01	N/A	S	740974	ab	Total petroleum hydrocarbons by GC-FID in soil	L076B	a
CT01	N/A	S	740974	ab	pH at 20°C in soil	L005B	a
CT02	N/A	S	740975	a	Asbestos identification in Soil	A001B	a
CT02	N/A	S	740975	a	Asbestos types if id positive	N/A	a
CT02	N/A	S	740975	a	Metals in soil by ICP-OES	L038B	a
CT02	N/A	S	740975	a	Moisture Content	L019B	a
CT02	N/A	S	740975	a	Sample Preparation	L019B	a
CT02	N/A	S	740975	a	Soil Descriptions	L019B	a
CT02	N/A	S	740975	a	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	a
CT02	N/A	S	740975	a	Stones content of soil	L019B	a
CT02	N/A	S	740975	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
CT02	N/A	S	740975	a	TPH Chromatogram in soil	L064B	a
CT02	N/A	S	740975	a	Total organic carbon (Automated) in soil	L009B	a
CT02	N/A	S	740975	a	Total petroleum hydrocarbons by GC-FID in soil	L076B	a
CT02	N/A	S	740975	a	pH at 20°C in soil	L005B	a
CT02	N/A	S	740976	a	Metals in soil by ICP-OES	L038B	a
CT02	N/A	S	740976	a	Moisture Content	L019B	a
CT02	N/A	S	740976	a	Sample Preparation	L019B	a
CT02	N/A	S	740976	a	Soil Descriptions	L019B	a

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

4041

i2 Analytical

Analytical Report Number : 25-060064

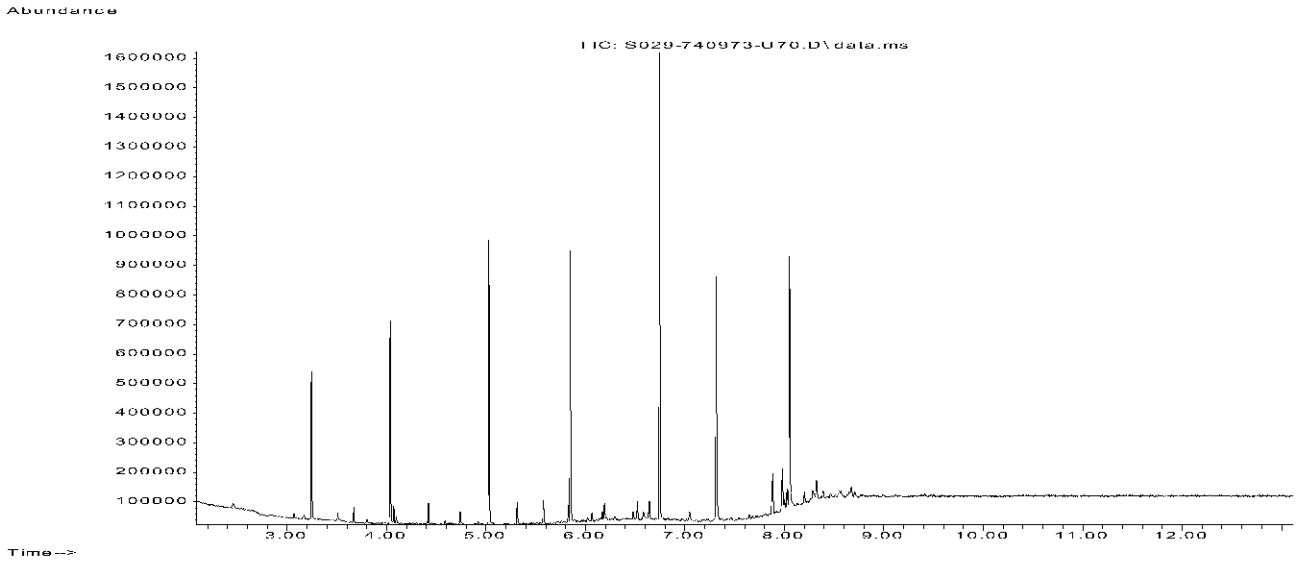
Project / Site name: Surfleet Primary School, Station Road, Spalding, Lincolnshire, PE11 4DB

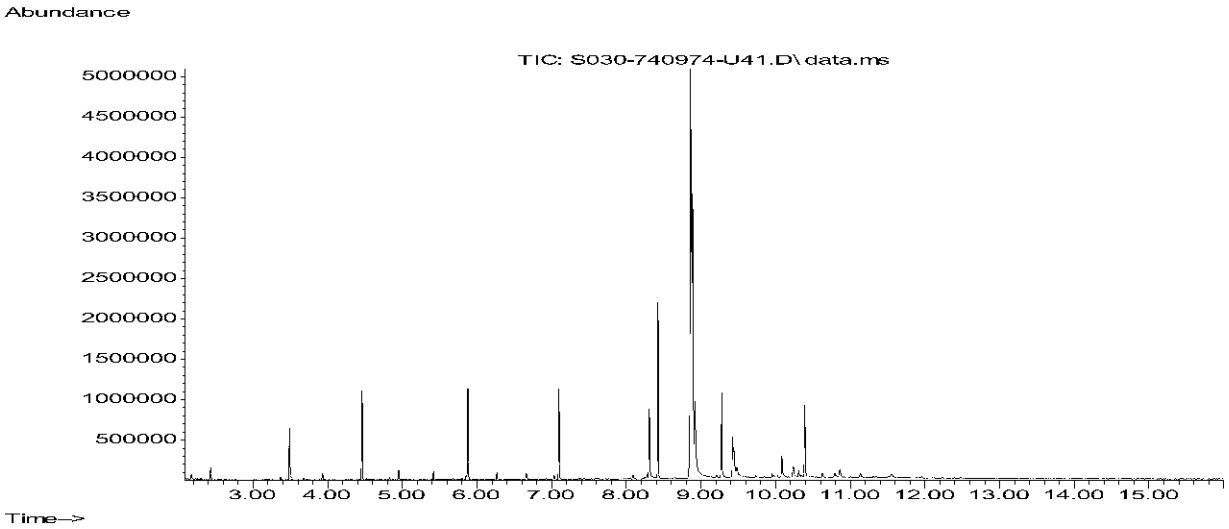
This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

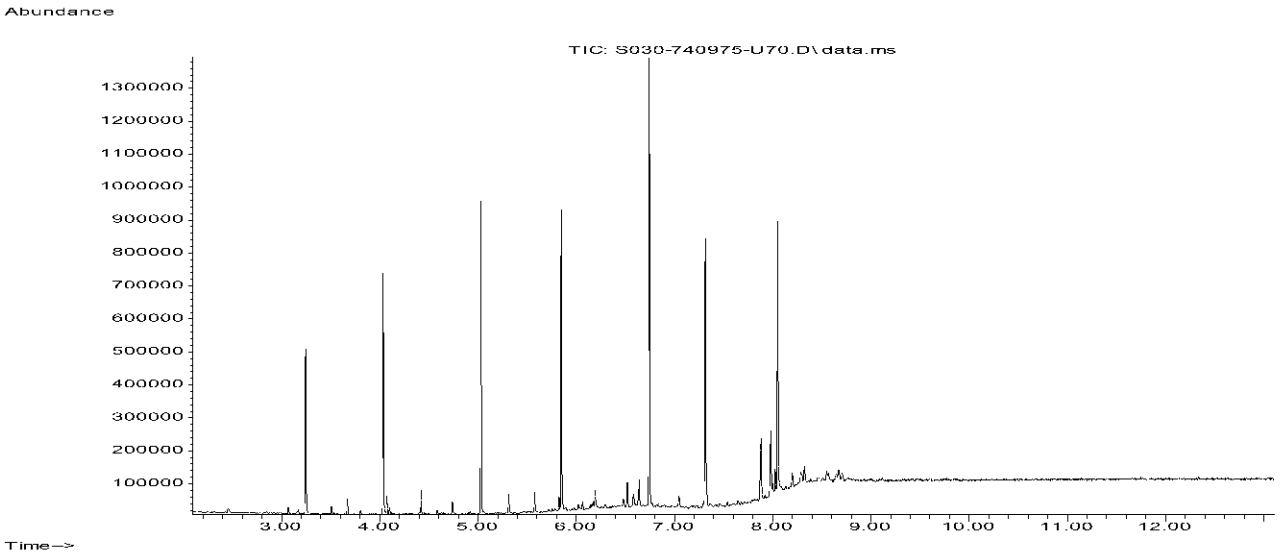
Key: a - No sampling date b - Incorrect container/Insufficient material provided c - Holding time d - Headspace e - Temperature

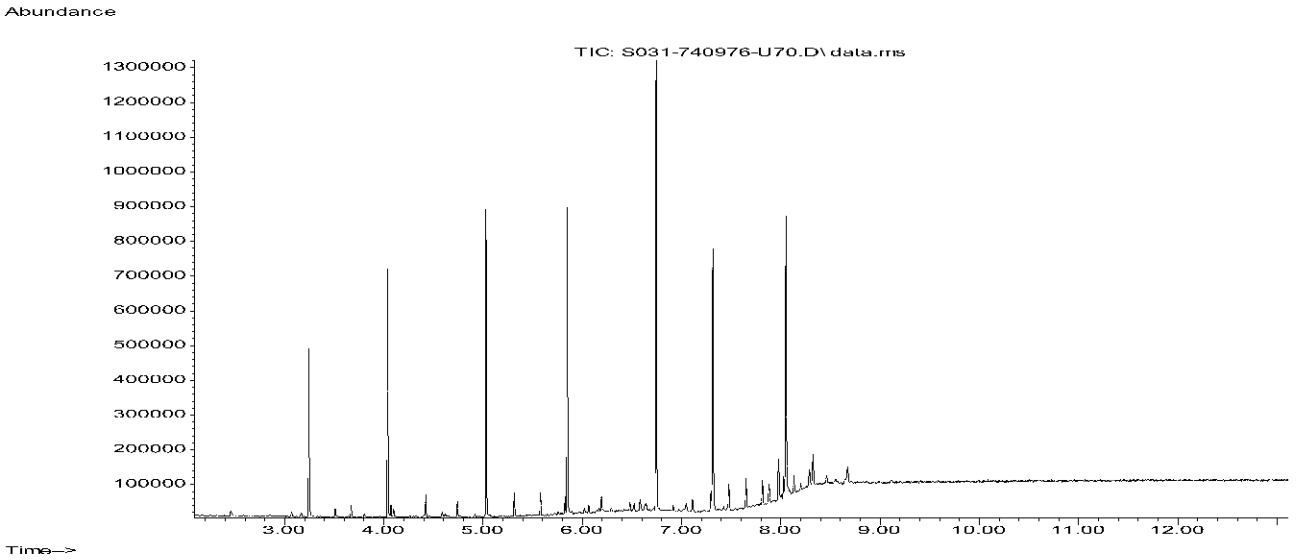
CT02	N/A	S	740976	a	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	a
CT02	N/A	S	740976	a	Stones content of soil	L019B	a
CT02	N/A	S	740976	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
CT02	N/A	S	740976	a	TPH Chromatogram in soil	L064B	a
CT02	N/A	S	740976	a	Total organic carbon (Automated) in soil	L009B	a
CT02	N/A	S	740976	a	Total petroleum hydrocarbons by GC-FID in soil	L076B	a
CT02	N/A	S	740976	a	pH at 20°C in soil	L005B	a

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


Abundance
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1300000
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400000
300000
200000
100000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->


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1500000
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9.00
10.00
11.00
12.00
13.00
14.00
15.00
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7.00
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3.00
4.00
5.00
6.00
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8.00
9.00
10.00
11.00
12.00
Time-->

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APPENDIX D
CONTAMINATION RISK ASSESSMENT

Contaminated Land Risk Assessment – Definition of Methodology

The Contaminated Land Risk Assessment methodology followed in this report is based on Environment Agency's (EA) online guidance, Land Contamination: Risk Management (LCRM), published in June 2019. The new guidance is based upon the principles of the EA's CLR11 guidance, Model procedures for the management of land contamination, published in 2004.

The preliminary Conceptual Site Model (CSM) has been assessed using the methodology set out in CIRIA C552, Contaminated Land Risk Assessment - A Guide to Good Practice, published in 2001, as detailed below.

Risk evaluation determines the magnitude of risks present by assessing the likelihood of a particular risk being present alongside the severity of the consequence, should that event occur. The overall risk classification is a combination of the two and provides a qualitative assessment upon which to base any further work or remedial measures, where deemed necessary.

Where complete pollutant linkages are present, the probability of a contamination risk occurring at the site has been classified in accordance with the terms listed and defined in the table below.

Classification	Definition of Probability
High Likelihood	An event appears very likely in the short term and almost inevitable in the long term; or there is evidence at the receptor that harm or pollution is occurring.
Likely	It is probable that an event will occur, however, the event is not inevitable. It is possible in the short term and is likely over the long term.
Low Likelihood	Circumstances are possible under which an event could occur. However, it is uncertain that the event would occur even over a longer period and even less likely in the short term.
Unlikely	Circumstances are such that it is improbable that an event would occur even in the very long term.

The magnitude of the consequence of a contamination event occurring at this site is classified in accordance with the definitions listed in the following table. The classification of the consequence does not take into account the probability of the consequences being realised.

Classification	Definition of Consequence	Examples
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment protection Act (1990), Part IIA. Short term risk of pollution of controlled waters. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion causing building collapse (can also equate to a short-term human health risk if buildings are occupied.).
Medium	Chronic damage to Human Health ("significant harm"). Pollution of controlled waters. A significant change in a particular ecosystem, or organism forming part of such ecosystem.	Concentrations of contaminants from site exceeding generic or site-specific screening criteria. Leaching of contaminants into a major or minor aquifer. Death of species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy. (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by measures such as protective clothing etc). Easily reparable effects of damage to buildings, structures and services	The presence of contaminants at such concentration that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

Once the probability and consequence of each pathway has been classified, the potential overall risk classification can be evaluated using the following matrix.

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**			Moderate Risk	Moderate/Low Risk
	Likely		Moderate Risk	Moderate/Low Risk	
	Low Likelihood	Moderate Risk	Moderate/Low Risk		Very Low Risk
	Unlikely	Moderate/Low Risk		Very Low Risk	Very Low Risk

The definitions of the risk categories provided in CIRIA C552, together with actions that are likely to be necessary, are presented below.

Classification	Definition of Risk and Likely Actions Required
[redacted]	• High probability that severe harm could arise or that severe harm is already occurring • This risk, if realised, is likely to result in a substantial liability • Urgent investigation and remediation are likely to be required
	• Harm is likely to arise • The risk, if realised, is likely to present a substantial liability • Urgent investigation is required and remediation may be necessary in the short term and likely over the longer term
Moderate Risk	• It is possible that harm could arise, however, it is unlikely that any harm would be severe and more likely it would be relatively mild • Investigation is likely to be required to clarify the risk and determine potential liability • Some remediation may be required in the longer term
[redacted]	• It is possible that harm could arise, but is likely that this harm, if realised, would be mild at worst
Very low Risk	• There is a low possibility that harm could arise • If realised, such harm is not likely to be severe

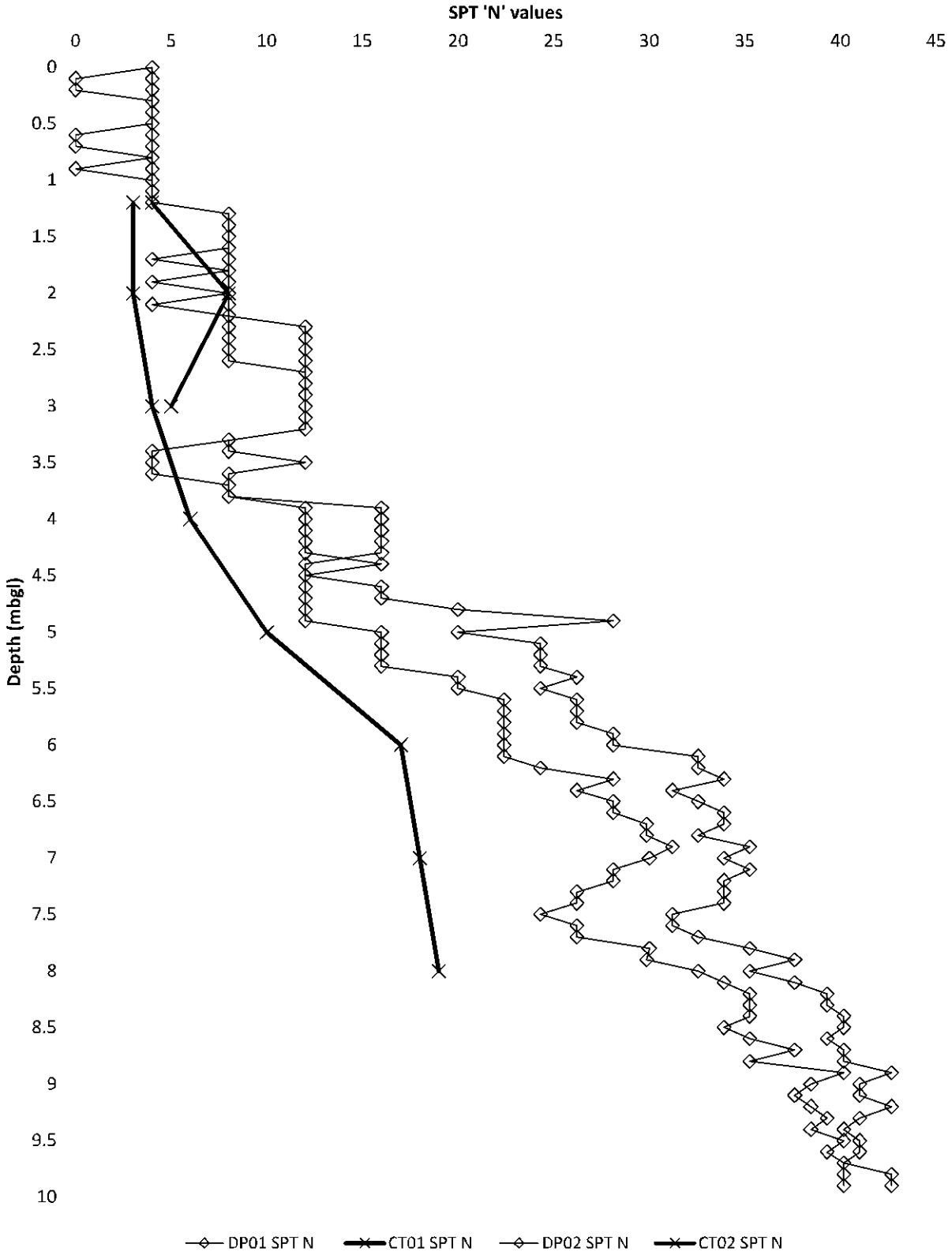
Reference:

Rudland, D J, Lancefield, R M, Mayell, P N, Contaminated land Risk Assessment. A guide to Good Practice, CIRIA Report C552, 2001.

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APPENDIX E
GEOTECHNICAL PLOTS AND TABLES

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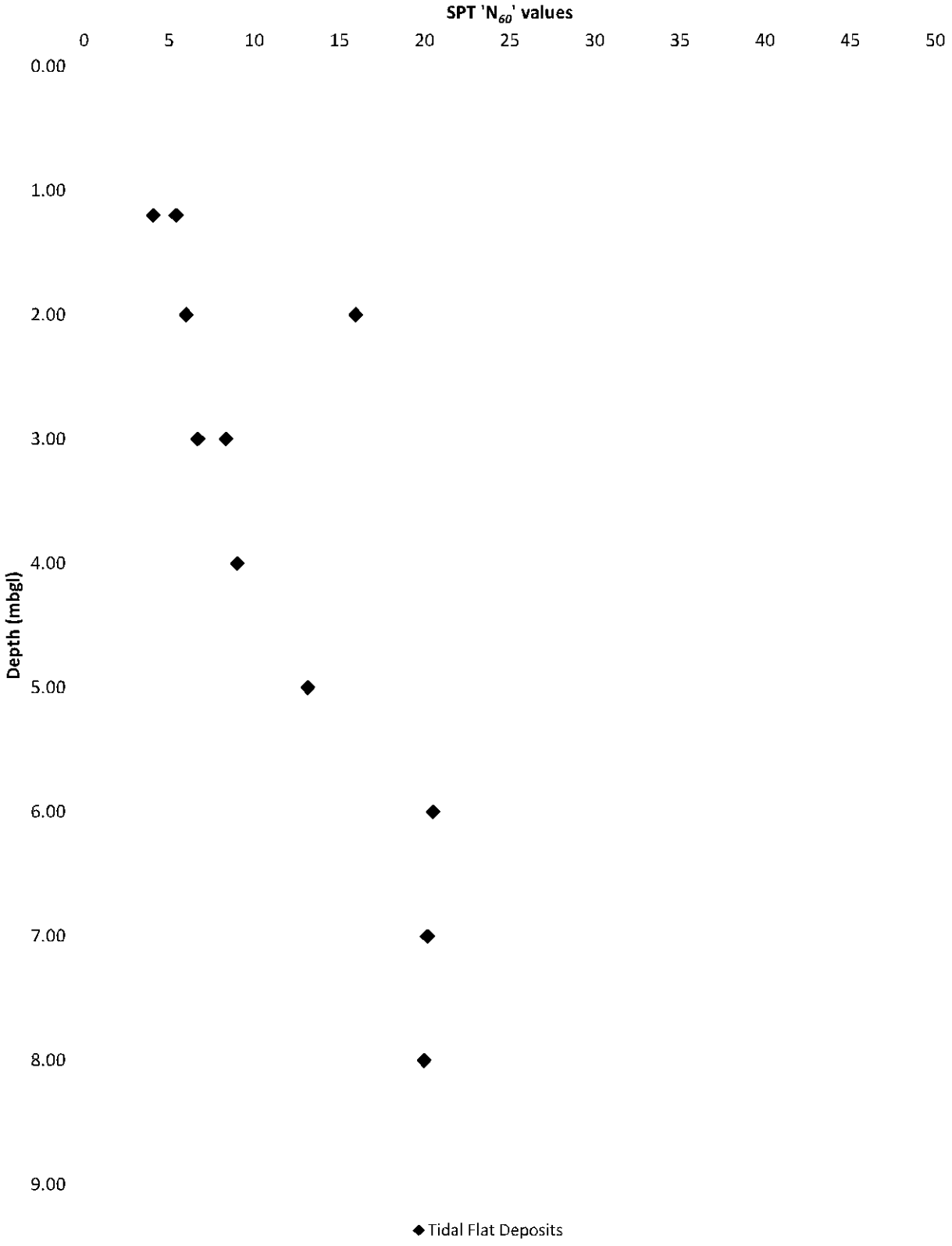


DP01 N (GE) Conversions based on Ground Engineering March 2007 Technical Note: Equivalence of DPSH and SPT Data and Huntley 1990

SPT 'N' VALUES WITH EQUIVALENT DYNAMIC PROBE 'N' VALUES AGAINST DEPTH

Project Ref
25.09.007a

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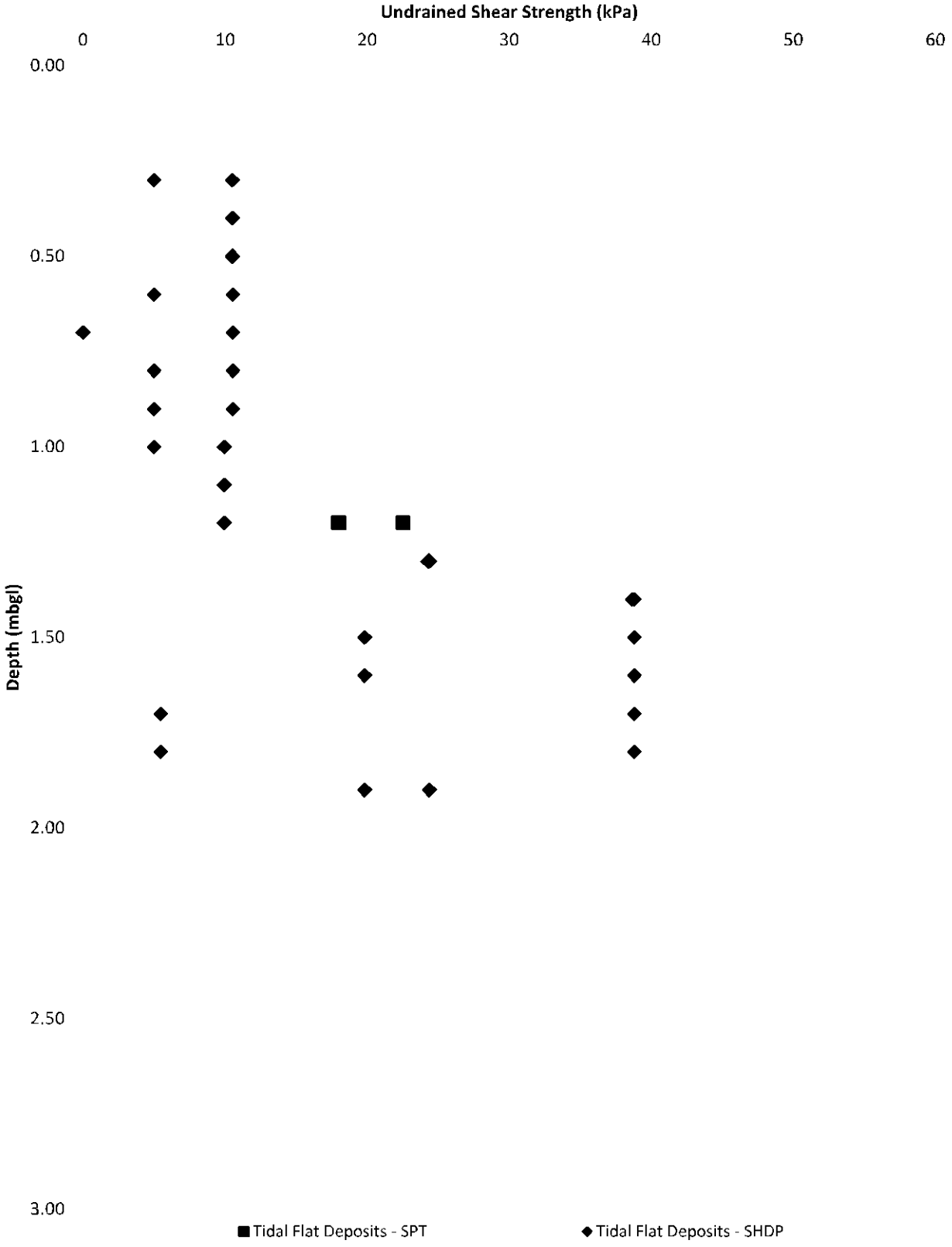


Corrections in accordance with BS EN ISO 22476-3, 2005, National Annex A; using Energy Ratios (81% [CT01 & CT02]) from current equipment calibrations

SPT 'N_{60}' VALUES AGAINST DEPTH

Project Ref
25.09.007a

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Stroud conversion factor, f1=4.5 applied to SPT N_{60} values
Super Heavy Dynamic Probe (SHDP) converted to equivalent undrained shear strength using Butcher et al, 1995

UNDRAINED SHEAR STRENGTH FROM SPT 'N_{60}' VALUE AND SHDP AGAINST DEPTH

Project Ref 25.09.007a

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APPENDIX F
WASTE CLASSIFICATION

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

VSQ7V-HPOHW-LZ1E2

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Report is invalid if pages are removed.

Job name

25.09.007a - Surfleet

Description/Comments

Project

25.09.007a

Site

Surfleet

Classified by

Name:	Company:
Adam Jones	**Listers Geotechnical Consultants**
Date:	**Slapton Hill Farm, Blakesley Road**
24 Nov 2025 11:00 GMT	**Slapton**
Telephone:	**Towcester**
01327 860060	**NN12 8QD**

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: -

Course	Date
Hazardous Waste Classification	-

Purpose of classification

2 - Material Characterisation

Address of the waste

Surfleet Primary School, Station Road, Spalding, Lincolnshire **Post Code** PE11 4DB

SIC for the process giving rise to the waste

41201 Construction of commercial buildings

Description of industry/producer giving rise to the waste

Foundation arisings for new school building

Description of the specific process, sub-process and/or activity that created the waste

Foundation arisings for new school building

Description of the waste

Made Ground and natural soils

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	CT01	0.2	Non Hazardous		3
2	CT01[2]	0.5	Non Hazardous		5
3	CT02	0.2	Non Hazardous		7
4	CT02[2]	0.5	Non Hazardous		9

Related documents

#	Name	Description
1	ListersGeo Reduced Suite WM3 v1.2GB	waste stream template used to create this Job

Report

Created by: Adam Jones

Created date: 24 Nov 2025 11:00 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	11
Appendix B: Rationale for selection of metal species	12
Appendix C: Version	12

Classification of sample: CT01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CT01
Sample Depth:
0.2 m
Moisture content:
18%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 18% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	pH			PH		8.1	pH		8.1	pH	8.1 pH		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11	mg/kg	1.32	11.909	mg/kg	0.00119 %	✓	
3	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
4	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18	mg/kg	1.462	21.573	mg/kg	0.00216 %	✓	
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		19	mg/kg	1.126	17.541	mg/kg	0.00175 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		15	mg/kg	1.579	19.428	mg/kg	0.00194 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	28	mg/kg	1.56	35.813	mg/kg	0.0023 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		**<LOD**
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		60	mg/kg	2.774	136.488	mg/kg	0.0136 %	✓	
11	TPH (C6 to C40) petroleum group			TPH		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
12	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**

#		Determinand EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16	⌐	phenanthrene	201-581-5	85-01-8		0.07	mg/kg		0.0574	mg/kg	0.00000574 %	✓	
17	⌐	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
18	⌐	fluoranthene	205-912-4	206-44-0		0.37	mg/kg		0.303	mg/kg	0.0000303 %	✓	
19	⌐	pyrene	204-927-3	129-00-0		0.31	mg/kg		0.254	mg/kg	0.0000254 %	✓	
20		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.19	mg/kg		0.156	mg/kg	0.0000156 %	✓	
21		chrysene 601-048-00-0	205-923-4	218-01-9		0.2	mg/kg		0.164	mg/kg	0.0000164 %	✓	
22		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		0.32	mg/kg		0.262	mg/kg	0.0000262 %	✓	
23		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.1	mg/kg		0.082	mg/kg	0.0000082 %	✓	
24		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.22	mg/kg		0.18	mg/kg	0.000018 %	✓	
25		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		0.09	mg/kg		0.0738	mg/kg	0.00000738 %	✓	
26	⌐	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
27	⌐	benzo[ghi]perylene	205-883-8	191-24-2		0.1	mg/kg		0.082	mg/kg	0.0000082 %	✓	
										Total:	0.0232 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
⌐	Determinand defined or amended by HazWasteOnline (see Appendix A)
⁂	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: CT01[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CT01[2]
Sample Depth:
0.5 m
Moisture content:
19%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 19% Wet Weight Moisture Correction applied (MC)

#	Determinand EU CLP index number / EC Number / CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	pH PH		7.7	pH		7.7	pH	7.7 pH		
2	arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		11	mg/kg	1.32	11.764	mg/kg	0.00118 %	✓	
3	cadmium { cadmium sulfide } 048-010-00-4 / 215-147-8 / 1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
4	chromium { chromium(III) oxide (worst case) } 215-160-9 / 1308-38-9		21	mg/kg	1.462	24.861	mg/kg	0.00249 %	✓	
5	copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		14	mg/kg	1.126	12.768	mg/kg	0.00128 %	✓	
6	mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
7	nickel { nickel dihydroxide } 028-008-00-X / 235-008-5 [1] 234-348-1 [2] / 12054-48-7 [1] 11113-74-9 [2]		17	mg/kg	1.579	21.75	mg/kg	0.00217 %	✓	
8	lead { lead chromate } 082-004-00-2 / 231-846-0 / 7758-97-6	1	20	mg/kg	1.56	25.269	mg/kg	0.00162 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		**<LOD**
10	zinc { zinc chromate } 024-007-00-3 / 236-878-9 / 13530-65-9		54	mg/kg	2.774	121.341	mg/kg	0.0121 %	✓	
11	TPH (C6 to C40) petroleum group TPH		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
12	naphthalene 601-052-00-2 / 202-049-5 / 91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13	acenaphthylene 205-917-1 / 208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14	acenaphthene 201-469-6 / 83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15	fluorene 201-695-5 / 86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**

#		Determinand EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16	-	phenanthrene	201-581-5	85-01-8		0.08	mg/kg		0.0648	mg/kg	0.00000648 %	✓	
17	-	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
18	-	fluoranthene	205-912-4	206-44-0		0.21	mg/kg		0.17	mg/kg	0.000017 %	✓	
19	-	pyrene	204-927-3	129-00-0		0.2	mg/kg		0.162	mg/kg	0.0000162 %	✓	
20		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.13	mg/kg		0.105	mg/kg	0.0000105 %	✓	
21		chrysene 601-048-00-0	205-923-4	218-01-9		0.14	mg/kg		0.113	mg/kg	0.0000113 %	✓	
22		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		0.18	mg/kg		0.146	mg/kg	0.0000146 %	✓	
23		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.08	mg/kg		0.0648	mg/kg	0.00000648 %	✓	
24		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.13	mg/kg		0.105	mg/kg	0.0000105 %	✓	
25		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		0.09	mg/kg		0.0729	mg/kg	0.00000729 %	✓	
26	-	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
27	-	benzo[ghi]perylene	205-883-8	191-24-2		0.1	mg/kg		0.081	mg/kg	0.0000081 %	✓	
										Total:	0.021 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
✓	Determinand defined or amended by HazWasteOnline (see Appendix A)
⁂	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: CT02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CT02
Sample Depth:
0.2 m
Moisture content:
20%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 20% Wet Weight Moisture Correction applied (MC)

#	Determinand EU CLP index number / EC Number / CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	pH PH		8.1 pH		8.1 pH	8.1 pH		
2	arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		12 mg/kg	1.32	12.675 mg/kg	0.00127 %	✓	
3	cadmium { cadmium sulfide } 048-010-00-4 / 215-147-8 / 1306-23-6	1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		**<LOD**
4	chromium { chromium(III) oxide (worst case) } 215-160-9 / 1308-38-9		20 mg/kg	1.462	23.385 mg/kg	0.00234 %	✓	
5	copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		26 mg/kg	1.126	23.418 mg/kg	0.00234 %	✓	
6	mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		**<LOD**
7	nickel { nickel dihydroxide } 028-008-00-X / 235-008-5 [1] 234-348-1 [2] / 12054-48-7 [1] 11113-74-9 [2]		16 mg/kg	1.579	20.218 mg/kg	0.00202 %	✓	
8	lead { lead chromate } 082-004-00-2 / 231-846-0 / 7758-97-6	1	32 mg/kg	1.56	39.931 mg/kg	0.00256 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		**<LOD**
10	zinc { zinc chromate } 024-007-00-3 / 236-878-9 / 13530-65-9		73 mg/kg	2.774	162.01 mg/kg	0.0162 %	✓	
11	TPH (C6 to C40) petroleum group TPH		<2 mg/kg		<2 mg/kg	<0.0002 %		**<LOD**
12	naphthalene 601-052-00-2 / 202-049-5 / 91-20-3		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
13	acenaphthylene 205-917-1 / 208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
14	acenaphthene 201-469-6 / 83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
15	fluorene 201-695-5 / 86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**

#		Determinand EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16	⌐	phenanthrene	201-581-5	85-01-8		0.09	mg/kg		0.072	mg/kg	0.0000072 %	✓	
17	⌐	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
18	⌐	fluoranthene	205-912-4	206-44-0		0.46	mg/kg		0.368	mg/kg	0.0000368 %	✓	
19	⌐	pyrene	204-927-3	129-00-0		0.39	mg/kg		0.312	mg/kg	0.0000312 %	✓	
20		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.24	mg/kg		0.192	mg/kg	0.0000192 %	✓	
21		chrysene 601-048-00-0	205-923-4	218-01-9		0.24	mg/kg		0.192	mg/kg	0.0000192 %	✓	
22		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		0.36	mg/kg		0.288	mg/kg	0.0000288 %	✓	
23		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.16	mg/kg		0.128	mg/kg	0.0000128 %	✓	
24		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.26	mg/kg		0.208	mg/kg	0.0000208 %	✓	
25		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		0.12	mg/kg		0.096	mg/kg	0.0000096 %	✓	
26	⌐	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
27	⌐	benzo[ghi]perylene	205-883-8	191-24-2		0.15	mg/kg		0.12	mg/kg	0.000012 %	✓	
										Total:	0.0269 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
⌐	Determinand defined or amended by HazWasteOnline (see Appendix A)
✓	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: CT02[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CT02[2]
Sample Depth:
0.5 m
Moisture content:
9.7%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.7% Wet Weight Moisture Correction applied (MC)

#	Determinand EU CLP index number / EC Number / CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	pH PH		8.5	pH		8.5	pH	8.5 pH		
2	arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		9	mg/kg	1.32	10.73	mg/kg	0.00107 %	✓	
3	cadmium { cadmium sulfide } 048-010-00-4 / 215-147-8 / 1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
4	chromium { chromium(III) oxide (worst case) } 215-160-9 / 1308-38-9		15	mg/kg	1.462	19.797	mg/kg	0.00198 %	✓	
5	copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		14	mg/kg	1.126	14.233	mg/kg	0.00142 %	✓	
6	mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
7	nickel { nickel dihydroxide } 028-008-00-X / 235-008-5 [1] 234-348-1 [2] / 12054-48-7 [1] 11113-74-9 [2]		13	mg/kg	1.579	18.542	mg/kg	0.00185 %	✓	
8	lead { lead chromate } 082-004-00-2 / 231-846-0 / 7758-97-6	1	19	mg/kg	1.56	26.762	mg/kg	0.00172 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		**<LOD**
10	zinc { zinc chromate } 024-007-00-3 / 236-878-9 / 13530-65-9		46	mg/kg	2.774	115.232	mg/kg	0.0115 %	✓	
11	TPH (C6 to C40) petroleum group TPH		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
12	naphthalene 601-052-00-2 / 202-049-5 / 91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13	acenaphthylene 205-917-1 / 208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14	acenaphthene 201-469-6 / 83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15	fluorene 201-695-5 / 86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**

#		Determinand EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16	⌐	phenanthrene	201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17	⌐	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
18	⌐	fluoranthene	205-912-4	206-44-0		0.12	mg/kg		0.108	mg/kg	0.0000108 %	✓	
19	⌐	pyrene	204-927-3	129-00-0		0.08	mg/kg		0.0722	mg/kg	0.00000722 %	✓	
20		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.07	mg/kg		0.0632	mg/kg	0.00000632 %	✓	
21		chrysene 601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		0.11	mg/kg		0.0993	mg/kg	0.00000993 %	✓	
23		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
24		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
26	⌐	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
27	⌐	benzo[ghi]perylene	205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
										Total:	0.0196 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
⌐	Determinand defined or amended by HazWasteOnline (see Appendix A)
⁂	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Unknown Oil

Hazard statements taken from WM3 1st Edition 2015
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on risk phrases

cadmium {cadmium sulfide}

Worst case species based on risk phrases

chromium {chromium(III) oxide (worst case)}

Worst case species anticipated, based on site history and chromium(VI) testing

copper {dicopper oxide; copper (I) oxide}

Most likely common species

mercury {mercury dichloride}

Worst case species based on risk phrases

nickel {nickel dihydroxide}

Worst case species based on risk phrases

lead {lead chromate}

Worst case species based on risk phrases

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on risk phrases

zinc {zinc chromate}

Worst case species based on risk phrases

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2025.322.6869.12419 (18 Nov 2025)
HazWasteOnline Database: 2025.321.6868.12417 (17 Nov 2025)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021
GB MCL List v2.0 - version 2.0 of 20th October 2023
GB MCL List v3.0 - version 3.0 of 11th January 2024
GB MCL List v4.0 - version 4.0 of 2nd March 2024
GB MCL List v5.0 - version 5.0 of 26th June 2024
GB MCL List v6.0 - version 6.0 of 15th February 2025
GB MCL List v7.0 - version 7.0 of 23rd September 2025