



Dunsbury Park Plots 500-502

Ground Investigation Report

For Portsmouth City Council

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Executive Summary

SITE INFORMATION AND SETTING	
Objectives	To resolve uncertainties identified in the Phase 1 Desk Study, to identify geo-environmental mitigation requirements to enable development; and to provide preliminary geotechnical recommendations for design.
Client	Portsmouth City Council
Site name and location	Dunsbury Park, Plots 500-502. Fitzwygram Way, Portsmouth, postcode PO9 4EE.
Proposed development	The site development proposals are understood to comprise the continued construction of new industrial units 500, 501 and 502, with a combined floor area of approximately 7,600 sq. m. (81,870 sq. ft.), including associated site infrastructure works, parking and soft landscaping.
GROUND MODEL	
Desk study summary	The site is currently split into three terraces, over an area of approximately 2.0 Ha in area and are set at various levels (from 35m AOD at the north to 25m AOD at the south of the site). These areas are currently unoccupied; however, these areas have been subject to terracing and earthworks and partially covered by aggregate surfacing and grass, surrounded by Heras fencing. Review of historical Ordnance Survey mapping indicates: • The site has remained predominantly undeveloped. • Portsmouth City Council has been engaged in development of infrastructure since 2014 (including site roads, site levelling/plateaus and utility connections). The construction of the roundabout and main road infrastructure (Fitzwygram Way) at the south boundary of the site appeared to be completed in 2016. Currently, Plot 4 is under construction. • Some features such as a clay pit, brick and tile works and brick kiln were noted within 200m of the site between 1859 and 1867. • In 1970s the construction of residential developments in the surroundings of the site started and continued to increase until 1985. • Earthworks were noted along the west boundary of the site between 1980 and 1991 related to the construction of A3 (M). • One historical tank record (unknown content) was noted 110m northwest of the site in 1970. A detailed UXO assessment indicates a low-medium bomb risk. Localised Made Ground is likely to be present as a result of earthworks and construction works. The solid geology consists of Bognor Sand Member (fine to medium partially cemented sands) with an average thickness of 5-10m, overlying by London Clay Formation (blue-grey or grey-brown silty clay/ clayey silt and sometimes silt, with some layers of sandy clay), with a thickness up to 150m. The Bognor Sand Member is classed as Secondary A Aquifer and the London Clay Formation as Unproductive. The site is within a Zone 1c Source Protection Zone and there are no groundwater abstractions within 2km of the site. There is one surface water features located off-site approximately 75m to the southwest (Hermitage Stream). The proposed development is within surface Flood Zone 1. The nearest licensed surface water abstraction is 1558m northeast of the site.
Ground and groundwater conditions	The ground conditions as proven by the investigation (s) undertaken at the site comprise: • Made Ground – Surface Covering, between ground level and 0.30m below ground level (bgl), comprising sandy to very sandy gravel of limestone aggregates; over

encountered by investigation	• Made Ground - Engineered Fill between 0.05m bgl to 1.00m bgl generally comprising very yellowish brown silty fine sand (probable lime/ cement-based stabilised soils). • Made Ground - General, at the eastern side of the site from 0.70m bgl to 1.50m bgl comprising orangish/ yellowish brown silty sand with rare mudstone and brick fragments. • Topsoil, at the western side of the site, between ground level and 0.12m bgl comprising orangish brown sandy silt/clay with abundant rootlets. • Bognor Sand Member, across the centre and south areas of the site between 0.40m bgl and 2.30m bgl, comprising medium dense yellowish/ orangish brown with occasional light grey mottling, silty fine sand or very sandy silt with rare flints. • London Clay Formation (weathered), across the entire site, between 0.40m bgl to 3.30m bgl, generally comprising firm, orangish brown and light grey mottled sandy silt clay. • London Clay Formation, across the entire site, between 0.40m bgl and up to a maximum depth of 25.50m bgl, generally comprising firm, orangish brown and light grey mottled sandy silt clay. Becoming stiff with depth. During the investigation, groundwater was encountered at depths between 1.20m bgl and 3.00m bgl within the trial pits and the windowless sampler boreholes, and at 5.50m bgl, 8.50m bgl and 10.70m bgl within the cable percussive boreholes. Water levels recorded post-fieldwork ranged from 0.86m bgl to 1.98m bgl in plot 500; between 0.34m bgl to 2.69m bgl in plot 501; and between 1.58m bgl to 4.00m bgl in plot 502. There is shallow groundwater within the Bognor Sand Member, London Clay Formation (weathered) and the sandy fraction of the London Clay Formation. A deeper groundwater unit is present at approximately 10m below ground level (bgl) within the London Clay Sand Beds.
GEOTECHNICAL CONCLUSIONS	
Conclusions of geotechnical assessment	The site is previously undeveloped and no buried obstructions were encountered by this investigation. The possibility of buried obstructions being encountered is low. Topsoil and Made Ground was encountered on the site. Any topsoil should be removed and disposed to be reused for landscaping proposes as required. Excavation to proposed founding depth generally should be readily achievable with standard excavation plant. Excavations during investigation were generally stable, although slight spalling should be expected from the Made Ground and Bognor Sand Member. Water seepages into excavations are likely to be adequately controlled by sump pumping. Foundations are recommended to comprise spread foundations across the site to support the columns for the proposed warehouse units. The pad foundations should be founded at least 300mm into the re-engineered Structural Fill, Bognor Sand Formation which comprise medium dense (or better) sands and firm (or better) clay from the London Clay Formation. Allowable net bearing pressure of 100 kN/m² (for the re-engineered fill) and 150kN/m² (for the Bognor Sand Member and the London Clay Formation) is recommended for a 2.5m by 2.5m pad foundations. Floor slabs may be ground bearing or suspended as required, however consideration will need to be given to potential for shrinkable clay soils in accordance with CBRE guidelines. CBR values between 1.3% and greater than 11% from in-situ and laboratory testing have been achieved across the site. A proof rolling of the formation level for a minimum design value of CBR = 5% will be required prior the construction works. Design Sulfate Class - DS-1 and ACEC Class AC-1 for Made Ground, Bognor Sand Member and London Clay Formation (weathered) soils. Equivalent to Design Chemical Class DC-1 for a 50 year design life.

	Design Sulfate Class - DS-4m and ACEC Class AC-4m for London Clay Formation soils. Equivalent to Design Chemical Class DC-4 for a 50 year design life.
GEO-ENVIRONMENTAL CONCLUSIONS	
Conclusions of contamination Generic risk assessment	Human health: - No exceedances were detected above the GAC. Plant growth: - No exceedances were detected above the GAC. Controlled Waters: - A groundwater sample from location WS5.02, presents high concentrations of ammonium, ammoniacal nitrogen, phenol and ARO>EC7-EC8, when compared to DWS and EQS. Ground gases or vapours: - Low to moderate risk from ground gases (subject to additional monitoring) and CS2 conditions apply. Radon: - The site is not in a Radon Affected Area. Water supply pipes: - Standard pipework is envisaged. However, confirmation should be sought from the water supply company at the earliest opportunity.
Proposed mitigation measures	The mitigation measures proposed to remove unacceptable risks include: Installation of ground gas mitigation measures to comply with CS2 (subject to further investigation). The methodology for the remediation should be presented in a Remediation Strategy, which will need to be submitted to the regulatory authorities for approval. In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site. Verification reports by a competent independent geo-environmental specialist will be required following completion of any remedial works.
Waste management	Excavated soils to be disposed of as waste, are likely to be classed as inert landfill waste.

FUTURE CONSIDERATIONS	
Further work	Following the ground investigation works undertaken to date, the following further works will be required: - supplementary gas monitoring, in periods of low atmospheric pressure with detailed gas risk assessment to further assess concentrations of methane up to 4.2% at WS5.02 and WS5.04. - collection of surface groundwater sample from Hermitage Stream to assess risk from contaminant migration via surface water from WS5.02 hotspot. - discussion and agreement with utility providers regarding the materials suitable for pipework; - provision of geotechnical design for the Category 2 structures (earthworks, retaining, floor slabs, foundations etc.); - production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies);

- | | |
|--|---|
| | <ul style="list-style-type: none"> • production of a Materials Management Plan for reuse of soils at the site (if required); • remediation and mitigation works; and • verification of the earthworks, remediation and mitigation works. |
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This Executive Summary forms part of Hydrock Consultants Limited report number 19453-HYD-XX-XX-RP-GE-1004 and should not be used as a separate document.

1. INTRODUCTION

1.1 Terms of reference

In July 2021, Hydrock Consultants Limited (Hydrock) was commissioned by Portsmouth City Council (the Client) to undertake a Phase 2 ground investigation at Dunsbury Park, Plots 500-502, Fitzwygram Way, Portsmouth, postcode PO9 4EE.

Dunsbury Park comprises a commercial development that is partway through construction. Plot 2 is completed and occupied by Fat Face, Plots 3a and 3b are completed and occupied by DPD and Volkswagen, Plot 4 is currently under construction by BAM.

Plot 5 is to comprise units 500, 501 and 502, over a total area of approximately 2.0 Ha set at various levels (between 35m AOD to 25m AOD). The site has been recently subject to terracing and earthworks and is partially covered by aggregate surfacing. A site location plan (19453-HYD-XX-XX-DR-GE-1001) is provided in Appendix A.

Hydrock understands that development will involve the continued construction of new industrial units 500, 501 and 502, with a combined floor area of approximately 7,600 sq. m. (81,870 sq. ft.), including associated site infrastructure works, parking and soft landscaping. A proposed development layout (UMC Architects 'Dunsbury Park Masterplan, Portsmouth' Drawing 20179 F0009 A), is presented in Appendix A.

The works have been undertaken in accordance with Hydrock's proposals (ref:19453-HYD-XX-XX-SP-G-1000 dated 09/06/2021 and 19453-HYD-XX-XX-SP-G-1001 date 11/06/2021) and the Client's instructions to proceed (PO3004424 dated 12/07/2021).

1.2 Objectives

The works have been commissioned to assist with the design of the proposed units 500, 501 and 502.

The objective of the Phase 2 Ground Investigation is:

- to resolve uncertainties identified in the Phase 1 Desk Study by refining and updating the preliminary Ground Model, determining geo-environmental and geotechnical site conditions and identifying key contamination risks by updating and finalising the Conceptual Model in accordance with the principles of Land Contamination Risk Management, 2021 (LCRM);
- to identify geo-environmental mitigation requirements to enable development; and
- to provide preliminary geotechnical recommendations for design.

1.3 Scope

The scope of the Phase 2 Ground Investigation comprises:

- a ground investigation including trial pitting, windowless sampling, cable percussive boring, TRL-DCP and plate load testing, to:
 - » obtain data on the ground and groundwater conditions of the site;
 - » allow collection of samples for geotechnical and chemical laboratory analysis;
 - » allow geotechnical field tests to be undertaken;
 - » install gas and groundwater wells;

- gas concentration and groundwater level monitoring;
- groundwater sampling;
- geotechnical and chemical laboratory analysis;
- updating of the preliminary Ground Model;
- preparation of a geotechnical risk register;
- presentation of an initial geotechnical design recommendations;
- formulation of an updated Conceptual Site Model (CM), including identification of plausible pollution linkages;
- completion of a generic quantitative risk assessment of potential chemical contaminants to establish 'suitability for use' under the current planning regime;
- discussion of potential environmental liabilities associated with land contamination (soil, water and gas); and
- identification of outline mitigation requirements to ensure the site is 'suitable for use'.

1.4 Available information

The following documents, reports etc have been provided to Hydrock by The Client for use in the preparation of this report:

- Hydrock. September, 2021. 'Dunsbury Park Plots 500-502 Ground Investigation Factual Report' undertaken for Portsmouth City Council. Reference: 19453-HYD-XX-XX-RP-GE-1001.
- 1st Line Defence. July, 2021. 'Dunsbury Park - Detailed Unexploded Ordnance (UXO) Risk Assessment' undertaken for Avison Young Holdings Limited. Reference: DA13636-00.
- Hydrock. June, 2021. 'Dunsbury Park Phase 1 Desk Study' undertaken for Portsmouth City Council. Reference: 19453-HYD-XX-XX-RP-GE-1001.
- UMC Architects. June 2021. 'Dunsbury Park Masterplan, Portsmouth'. Drawing reference: 20179 F0009 A.
- Avison Young. March 2021. 'Project Brief Dunsbury Park Portsmouth PO9 4EE';
- Bam design. 17th May 2017. 'Dunsbury Park Masterplan'. Drawing reference: DHF-BMD-MP-XX-DR-A-10014-S2-P19.
- Bam design. 11th May 2017. 'Dunsbury Park – Site infrastructure: External works Eastern access road construction details'. Drawing reference: DHF-BMD-ZZ-XX-DR-S-20511 RD.
- Bam design. October 2014. 'Dunsbury Hill Farm – Below ground drainage strategy'. Drawing reference: 4330.

The Client has commissioned or obtained assignment of the above documents and Hydrock and Hydrock is entitled to full reliance upon their contents.

The following documents have been reviewed by Hydrock from publicly available sources for use in the preparation of this report:

- Havant Borough Council. Ordnance Survey Map. Havant Borough Conservation areas. Recovered from <https://www.havant.gov.uk/conservation-areas-and-listed-buildings/details-conservation-areas>.

- British Geological Survey. England and Wales. Sheet 316 Fareham. Recovered from <https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1001806>
- Havant Borough Council. February 2018. 'Draft Havant Borough Local Plan 2036'.

Hydrock acknowledge that these documents are not assigned to The Client, and have been used for information purposes only. No formal reliance has been placed upon their contents.

1.5 Regulatory context and guidance

The investigation work has been carried out in general compliance with recognised best practice, including (but not limited to) BS 5930:2015, BS 10175:2011+A2:2017 and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The geo-environmental section of this report is written in broad accordance with BS 10175:2011+A2:2017, 'Land Contamination: Risk Management' (LCRM, 2021) and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The methods used follow a risk-based approach, the first stage of which is a Phase 1 desk study and field reconnaissance, with the potential geo-environmental risk assessed qualitatively using the 'source-pathway-receptor contaminant linkage' concept to assess risk as introduced in the Environmental Protection Act 1990 (EPA, 1990). Potential geotechnical risks are also assessed.

Phase 2 comprises intrusive ground investigation work and testing. The factual information from Phase 1 and Phase 2 are used to develop the Conceptual Model (CM). This CM is based on a ground model of the site physical conditions and an exposure model of the possible contaminant linkages. The CM forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines. This GQRA might lead to more Detailed Quantitative Risk Assessment (DQRA).

Professional judgement is then used to evaluate the findings of the risk assessments and to provide recommendations for the development.

The geotechnical section of this report is prepared in general accordance with BS EN 1997-1+A1: 2013, BS EN 1997-2:2007 and BS 8004:2015. This report constitutes a Ground Investigation Report (GIR) as described in Part 2 of Eurocode 7 (BS EN 1997-2) (EC7). However, it is not intended to fulfil the requirements of a Geotechnical Design Report (GDR) as specified in EC7.

The geo-environmental and geotechnical aspects are discussed in separate sections. Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. Designers should take all aspects of the investigation into account.

Remaining uncertainties and recommendations for further work are listed in Section 9 and Section 10.

2. DESK STUDY REVIEW

2.1 Introduction

Hydrock have prepared desk study assessment of the site in June 2021 (reference 19453-HYD-XX-XX-RP-GE-1001) for the wider site and this is provided in Appendix B. The following section is a summary of the pertinent information presented in the Desk Study, supplemented by additional information, as required.

2.2 Site location

The site is located to the north of Fitzwygram Way, Havant, Hampshire, nearest postcode PO9 4EE, to the east of A3 (M), adjacent to junction 3, approximately 8 miles north of Portsmouth. The National Grid Reference of the approximate centre of the site is 469876E, 109295N.

2.3 Site description

Units 500, 501 and 502 areas are currently split over three terraces over an area of approximately 2.0 Ha. Each terrace is separated by a slope. The site is partially grassed with aggregate surfacing (limestone gravel in a fine matrix), with field boundary hedgerows remaining in-situ to the east and north and landscaping and planting present along the west. A recently constructed roundabout and main access road (Fitzwygram Way) is located in the south area of the site. New drainage infrastructure is noted running approximately north to south along to the eastern boundary. A stream is noted to flow north to south, circa 75m south of the site.

2.4 Site history

The site has remained largely undeveloped until 2014, at which time development of infrastructure (including site roads, site levelling/plateaus and utility connections) was commenced. The construction of the roundabout and main road infrastructure (Fitzwygram Way) at the south boundary of the site is understood to have been completed in 2016.

With regards the surrounding areas, features of note include a clay pit, brick and tile works and brick kiln are known to have been located within 200m of the site between 1859 and 1867. In the 1970s the construction of residential developments across the area started and continued to increase until 1985. Earthworks were noted along the west boundary of the site between 1980 and 1991 related to the construction of A3 (M). It is understood that an area to the north east of the site, recorded as landfilled, is formed of soils cut from the line of the A3 (M).

One historical tank record was noted to the west of the site in 1970 over 100m away. No historical records related to historical garages or military land were identified within 500m of the site during the desk study research. Eight records of electricity substations were identified within 167m to 500m of the site between 1970 and 1993. One record of a gas governor was identified at 478m west of the site between 1984 and 1992.

2.5 Geology

Localised Made Ground is likely to be present as a result of earthworks and construction works.

The solid geology is formed by Bognor Sand Member, comprising glauconitic bioturbated or cross-bedded fine- and medium-grained partially cemented sands (with an average thickness of 5-10m according to BGS records), overlying the London Clay Formation, comprising blue-grey or grey-brown

bioturbated or poorly laminated slightly calcareous, silty to very silty clay/ clayey silt and sometimes silt, with some layers of sandy clay (with a thickness up to 150m according to BGS records).

Drawing 19453-HYD-XX-XX-DR-GE-1007 presented in Appendix A shows the proposed development in relation to BGS geological map records.

2.6 Hydrogeology

The Bognor Sand Member is classed as Secondary A Aquifer and the London Clay Formation as Unproductive.

The site is within a Zone 1C Source Protection Zone for confined aquifer body, presumed to relate to the underlying (at depth) chalk. There are no groundwater abstractions within 2km of the site.

2.7 Hydrology

There are no surface water features within the site boundary. Nearest surface water feature (Hermitage Stream) is located southwest of the site.

Reference to the Environment Agency web site shows the site is located within the catchment of the East Hampshire Rivers, with the specific river water body being the Hermitage Stream - source to confluence with Langstone Harbour. The current (2019 cycle 2) overall status under the Water Framework Directive is 'moderate'.

The nearest licensed surface water abstraction is 1558m northeast of the site corresponding to direct spray irrigation.

2.8 Flood risk

The desk study information indicates the proposed development is in Flood Zone 1 (with a low probability of flooding from rivers or the sea).

No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regard to drainage and flooding.

2.9 Mining or mineral extraction

In summary, the risk associated with mining or mineral extraction within the site boundary is considered low. The desk study information indicates several records of surface mining and surface groundworks in the vicinity of the site, as listed below:

- Cuttings, between 28m to 211m west, probably associated with the construction of the A3 (M).
- Brick kiln and tile works are recorded at 155m east and 124m south of the site.

2.10 Natural ground instability

The majority of the site is underlain by the Bognor Sand Member, and the risk of shrink swell clay is negligible to low due to its likely non-plastic condition. However, trees and hedges are present around the site boundaries and the presence of shallow cohesive deposits of the London Clay Formation may be affected by potential for shrink-swell ground movements in clays as a result of changes in moisture content from removal or growth of trees or hedge row. This can pose a significant risk of shrink swell clays. Head Deposits containing cohesive soils may also represent a potential shrink swell risk.

The Groundsure reports indicates risk of running sands, landslides, compressible and collapsible deposits within site boundary is very low to low. However, due to the presence of natural sand deposits, unknown composition and extend of the made ground and landfill, risk of running sands cannot be discounted.

2.11 Waste management

There is one historical landfill record located 140m east and north east of the site at its closest point (between the Unit 600 and 700 areas), classed as inert waste (understood to be related to construction of the A3 (M)).

2.12 Regulatory information

Notable regulatory controls in the vicinity of the site include:

- Two entries of discharge consent for sewage discharge to an unnamed tributary of the River Wallington located 219m north.

2.13 Natural soil chemistry

Information contained within the Groundsure report (included in Appendix B, as part of the Hydrock Desk Study Report Appendix B) gives indicative (estimated) concentration values for the natural soils at the site for a selection of Contaminants of Potential Concern (CoPC). These have been reproduced in Table 2.1.

Table 2.1: Natural soil chemistry

Element	Arsenic	Cadmium	Chromium	Lead	Nickel
Concentration (mg/kg)	15	1.8	60 - 90	100	15 - 30

2.14 Radon and ground gas

The site is not in a Radon Affected Area (less than 1% of homes are above the action level). Therefore, no radon protection measures are required.

2.15 Unexploded ordnance (UXO)

Hydrock desk study assessment of the site indicated further assessment is required with regard to UXO in relation to ground investigation. A specialist UXO risk assessment was recommended and has been undertaken by 1st Line Defence, completed in July 2021. The full report (reference DA13636-00) is presented in Appendix B.

The specialist UXO risk assessment indicates a Low-Medium Risk from items of German aerial delivered UXO and Low from Allied UXO across the site. However, it is recommended that all works have:

- A written site-specific site management plan for UXO (presented in Appendix B).
- Site specific UXO awareness briefings to all personnel conducting intrusive works.

2.16 Environmental and agricultural Designations

There are 39 entries related to areas with environmental designations within 2000m from the site boundary, relating to Local Natural Reserve, Ancient and Semi-Natural Woodland and Ancient

Replanted Woodland. There are 3 entries related to agricultural land, one open access land record, one nitrate vulnerable zone record, one environmental and countryside stewardship schemes record.

3. OUTLINE CONCEPTUAL MODEL

3.1 Introduction

The outline Conceptual Model (oCM) incorporates evidence from the site walkover, the Desk Study and previous investigations carried out at the site. The formulation of an outline Conceptual Model is a key component of the LCRM methodology. The oCM incorporates a ground model of the site physical conditions and an exposure model of the possible contaminant linkages; it forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines.

3.2 Ground model

The preliminary ground model presented in Section 2 provides an understanding of the ground conditions and is the basis for preparing the preliminary geotechnical hazard assessment (Section 3.3) and the preliminary geo-environmental exposure model (Section 3.4).

3.3 Geotechnical hazard identification

3.3.1 Context

The preliminary geotechnical hazard identification has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622.

The following section sets out the identified geotechnical hazards and the development elements potentially affected (see Table H.1 in Appendix H for further information).

3.3.2 Plausible geotechnical hazards

Plausible geotechnical hazards identified at the site are:

- Uncontrolled Made Ground (variable strength and compressibility).
- Soft / loose compressible ground (low strength and high settlement potential).
- Shrinkage / swelling of the clay fraction of soils under the influence of vegetation.
- Variable lateral and vertical changes in ground conditions.
- Attack of buried concrete by aggressive ground conditions.
- Shallow groundwater.
- Changing groundwater conditions.
- Running sands and / or loose Made Ground, leading to difficulty with excavation and collapse of side walls.
- Risk from erosion.
- Obstructions.
- Slope stability issues – general slopes.
- Slope stability issues – retaining walls.
- Earthworks – settlement (due to placement of fill on soft / loose ground).
- Earthworks – poor bearing capacity of new fill.
- Earthworks – unsuitability of site won material to be reused as fill.

- Unforeseen ground conditions - risk associated with limited data.

3.3.3 *Potential development elements affected*

Development elements potentially affected by geotechnical hazards are:

- Buildings – foundations.
- Buildings – floor Slabs
- Roads and pavements.
- Services.
- General slopes.
- Retaining walls.
- Public open spaces (POS).
- Construction staff, vehicles and plant operators.
- Concrete below ground.

Health and safety risks to site Contractors and maintenance workers have not been assessed during these works and will need to be considered separately during design.

The above plausible geotechnical hazards and development elements affected have been carried forward for investigation and assessment. The investigation is presented in Section 5 and the assessment is presented in Section 6.

3.4 Geo-environmental exposure model

3.4.1 *Context*

The preliminary exposure model is used to identify geo-environmental hazards and to establish potential pollution linkages, based on the source-pathway-receptor (SPR) approach.

A viable pollution linkage requires all the components of an SPR to be present. If only one or two are present, there is no linkage and no further assessment is required.

3.4.2 *Potential contaminants*

For the purpose of this assessment the potential contaminants have been separated according to whether they are likely to have originated from an on-site or off-site source.

3.4.2.1 *Potential on-site sources of contamination*

- Made Ground, associated earthworks/construction works, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S01).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / earthworks / construction works (S02).

3.4.2.2 *Potential off-site sources of contamination*

- Made Ground, associated with landfill, historical mining activities (old clay pit, brick and tile works) in the north of the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S03).

- Made Ground, associated with earthworks for the construction of A3 (M) in the west boundary of the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S04).
- Hydrocarbon vapours from potential VOC and petroleum hydrocarbon spillages/leaks from unspecified tank located at 110m N of the site. (S05).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / landfill / backfilled clay pits/brick works. (S06).

3.4.3 *Potential receptors*

The following potential receptors in relation to the proposed land use have been identified.

- People (neighbours, site end users) (R01).
- Development end use (buildings, utilities) (R02).
- Groundwater: Secondary A aquifer status of the Bognor Sand Member (R03).
- Surface water: off-site Hermitage Stream approximately 75m to the south of the site (R04).
- Plant life / Soft landscaping areas (R05)
- Ecology: Habitat Creation Area at the west side of the site (R06).
- Ecology: Designated Ancient and Seminal Woodland / Ancient Replanted Woodland in the surrounding areas of the site (R07).
- Aquatic ecosystem in the Hermitage Stream (R08).

3.4.4 *Potential pathways*

The following potential pathways have been identified.

- Ingestion, skin contact, inhalation of dust and outdoor air by people (P01).
- Direct contact with substances deleterious to building materials (P02).
- Ground gas (Methane, carbon dioxide, etc.) ingress via permeable soils and/or construction gaps (P03).
- VOC and petroleum hydrocarbon vapour ingress via permeable soils and/or construction gaps (P04).
- Root uptake by plant (P05).
- Migration of contaminant via leachate migration through the unsaturated zone in Bognor Sand Member (P06).
- Surface water via overland flow (P07).
- Surface water via drainage discharge (P08).
- Surface water via base flow from groundwater (P09).

Health and safety risks to site development contractors and maintenance workers have not been assessed as part of this study and will need to be considered separately.

The above sources, pathways and receptors have been considered as part of the Preliminary Risk Assessment in accordance with LCRM (2021), are considered to be plausible in the context of this site and have been carried forward for investigation and assessment. The investigation is presented in Section 5 and the assessment is presented in Section 7. An assessment of the Source – Pathway –

Receptor linkages is undertaken following the assessment (Section 7) and is presented in Appendix I (Table I.1).

4. GROUND INVESTIGATIONS

4.1 Investigation rationale

The ground investigation rationale was based on the findings of the preliminary risk assessment and is summarised in Table 4.1.

Table 4.1: Investigation rationale

Location	Purpose
TP5.01 - TP5.07	To assess shallow ground conditions. To allow collection of samples for contamination testing. To allow collection of samples for geotechnical characterisation. Targeting the areas of the proposed road and car parking/ loading areas.
SA101	To assess shallow ground conditions. To allow collection of samples for contamination testing. To allow collection of samples for geotechnical characterisation. To undertake infiltration testing.
WS5.01 - WS5.10	To assess shallow ground conditions and to allow SPTs to be undertaken. To allow collection of samples for geotechnical characterisation. To allow collection of samples for contamination testing. Installation of gas and groundwater monitoring and sampling wells. Targeting the proposed building footprints and car parking/ loading areas.
BH5.01 - BH5.05	To assess deeper ground conditions and to allow SPTs to be undertaken. To allow collection of samples for geotechnical characterisation. To allow collection of samples for contamination testing. Installation of gas and groundwater monitoring and sampling wells. Targeting the proposed building footprints.
PL5.01 - PL5.06	To undertake plate load testing to determine bearing capacity of existing plateaus. Targeting the areas of the proposed car parking/ loading areas.
DCP5.01 - DCP5.07	To undertake TRL - DCP testing. Targeting the areas of the proposed car parking/ loading areas.

4.2 Constraints

Soakaway infiltration test at location SA101 could not be completed due to extremely slow infiltration rate.

Ground gas monitoring could not be carried out during low atmospheric pressure conditions since these were not readily available during the monitoring programme.

4.3 Site works

The fieldwork took place between 19/07/2021 and 26/08/2021 and is summarised in

Table 4.2. The ground investigation locations were surveyed in using a GPS survey instrument or a topographic survey quality GPS in areas of difficult access and are shown on the Exploratory Hole Location Plans (Hydrock Drawing 19453-HYD-XX-XX-DR-GE-1002) in Appendix C.

The logs, including details of ground conditions, soil sampling, *in situ* testing and any installations, are also presented in Appendix C.

The weather conditions during the Hydrock fieldwork and for the previous week were sunny and hot with occasional showers.

Table 4.2: Summary of site works

Activity	Method	No.	Depth Maximum (m bgl)	In situ tests	Notes (e.g. installations)
Boreholes	Cable percussive	5	25.45	SPT	63mm HDPE wells with gas taps in 4 holes.
	Windowless sampler	10	5.45	SPT	50mm HDPE wells with gas taps in 4 holes.
Trial pits	Machine (JCB 3X)	8	3.0- 3.50	HSV	-
Infiltration	BRE 365 / Indicative	1	3.0		In SA101.
Probes	TRL dynamic cone penetrometer	12	1.0	CBR	-
Plate Load test	Plate Load test	6		CBR	-
SPT denotes Standard Penetration Test					
HSV denotes Hand Shear Vane Test					
CBR denotes California Bearing Ratio					

Wells for monitoring groundwater levels and ground gas concentrations, and to facilitate the sampling of groundwater, were installed in a number of the windowless sampler and cable percussion boreholes. A summary of the monitoring well installations is presented in Table 4.3.

Table 4.3: Summary of monitoring installations

Location	Ground level (m OD)	Standpipe diameter	Screen top and base depth (m bgl)	Screen top and base elevation (m OD)	Strata targeted
Unit 500					
BH5.05	26.57	63	1.00 to 10.00	25.57 to 16.57	London Clay Formation (Weathered) / London Clay Formation
WS5.08	26.73	50	1.00 to 5.00	25.73 to 21.73	
Unit 501					
WS5.04	30.79	50	1.00 to 5.00	29.79 to 25.79	Bognor Sand Member / London Clay Formation (Weathered) / London Clay Formation
WS5.05	32.05	50	1.00 to 5.00	31.05 to 27.05	Bognor Sand Member / London Clay Formation
BH5.02	32.68	63	1.00 to 5.00	31.68 to 27.68	London Clay Formation (Weathered) / London Clay Formation
BH5.03	30.71	63	1.00 to 10.00	29.71 to 20.71	London Clay Formation
Unit 502					
BH5.01	35.34	63	1.00 to 10.00	34.34 to 25.34	London Clay Formation (Weathered) / London Clay Formation
WS5.02	35.20	50	1.00 to 5.00	34.20 to 30.20	Made Ground / London Clay Formation (Weathered) / London Clay Formation

4.4 Geo-environmental testing

4.4.1 Sampling strategy and protocols

Exploratory hole positions were determined by reference to the site conditions and proposed development.

No specific sampling statistics or grid were utilised in this instance.

Samples were taken, stored and transported in general accordance with BS 10175:2011+A2:2017.

4.4.2 Geo-environmental monitoring

Ground gas and groundwater monitoring boreholes have been monitored on 6 occasions. The results are presented in Appendix E.

4.4.3 Geo-environmental laboratory analyses

The chemical test certificates for testing undertaken by a specialist laboratory on behalf of Hydrock are provided in Appendix F. Wherever possible, UKAS and MCERTS accredited procedures have been used.

The geo-environmental analyses undertaken on soils are summarised in Table 4.4.

Table 4.4: Geo-environmental analyses of soils

Determinand Suite	Made Ground ⁺	Topsoil	Head Deposits	Bognor Sand Member	London Clay Formation
Hydrock minimum suite of determinands for solids*	11	-	-	2	3
Hydrock Tier 2 TPH Suite**	7	-	-	1	-
WAC Full Solid Suite	3	-	-	-	1
*Hydrock minimum soil suite comprises: As, B (water soluble), Be, Cd, Cr (total), Cr (VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulfide, pH, asbestos fibres, speciated polynuclear aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon					
** Hydrock Tier 2 TPH Suite comprises: speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID					
⁺ Made Ground includes: surface covering, engineered fill and general.					

The soils chemical test data are interpreted and assessed in Sections 7.3 and 7.4.

The geo-environmental analyses undertaken on waters for testing undertaken by a specialist laboratory in behalf of Hydrock are summarised in Table 4.5.

Table 4.5: Geo-environmental analyses of waters

Determinand Suite	London Clay Formation (weathered)	London Clay Formation
Hydrock minimum suite of determinands for waters	6	2
Hydrock Tier 2 TPH Suite - Water	6	2
Hydrock Tier 2 TPH Suite - Water comprises: speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID		

The groundwater chemical test data are interpreted and assessed in Section 7.

4.5 Geotechnical testing

The geotechnical tests undertaken by a specialist laboratory on behalf of Hydrock are summarised in Table 4.6 and the test certificates are provided in Appendix D. Wherever possible, UKAS accredited procedures have been used.

Table 4.6: Summary of sample numbers for geotechnical tests

Test	Made Ground ⁺	Bognor Sand Member	London Clay Formation (weathered)	London Clay Formation
Natural moisture content	3	-	7	20
Atterberg limits	2	-	7	19
Particle size distribution (wet sieve)	6	3	-	2
Sulfate and aggressive chemical environment classification for buried concrete classification (full BRE SD1 suite)	2	3	1	9
One dimensional oedometer consolidation	-	-	-	3
Optimum Moisture Content / Maximum Dry Density Relationship (vibrating hammer)	2	1	1	1
Optimum Moisture Content / Maximum Dry Density Relationship (4.5kg hammer)	-	-	1	2
Remoulded California Bearing Ratio at natural moisture content (soaked)	4	-	2	1
Remoulded California Bearing Ratio at natural moisture content (not soaked)	1	1	2	1
Single stage undrained triaxial compressive strength	-	-	-	17
Consolidated Drained Triaxial Test	-	-	-	1
+ Made Ground includes: surface covering, engineered fill and general.				

The geotechnical test data are summarised in Section 5.5 and interpreted in Section 6.

5. GROUND INVESTIGATION RECORDS AND DATA

5.1 Physical ground conditions

The following presents a summary of the properties of the ground and groundwater conditions encountered, based on field observations, interpretation of the field data and laboratory test results, taking into account drilling, excavation and sampling methods, transport, handling and specimen preparation.

All relevant data from the Hydrock investigation discussed in Section 4 are used from this point forward.

Details of the Hydrock ground investigation works are provided in the logs in Appendix C, a summary of the ground model is presented in Table 5.1 and the individual strata are described in the sections below. A cross-section is presented in Drawing 19453-HYD-XX-XX-DR-GE-1006 (Appendix A).

5.1.1 Summary of strata encountered

A summary of the strata encountered is presented in Table 5.1 and the individual strata are described in the sections below.

Table 5.1: Strata encountered at Units 500-502 areas

Stratum	Depth to top (m bgl)	Depth to base (m bgl)	Thickness (m) (range)	Thickness (m) (average)
Made Ground - gravel cover	0.00	0.05 - 0.30	0.05 - 0.30	0.15
Made Ground - engineered fill	0.05 - 0.30	0.40 - 1.00	0.20 - 0.80	0.44
Made Ground - General	0.70 - 1.00	1.40 - 1.50	0.40 - 0.80	0.60
Topsoil	0.00	0.12	0.12	0.12
Bognor Sand Member	0.40 - 1.40	1.00 - 2.30	0.40 - 1.85	1.16
London Clay Formation (weathered)	0.12 - 2.30	0.90 - 3.30	0.35 - 2.60	1.35
London Clay Formation	0.40 - 3.30	>25.50	>24.20	Not proven

5.1.1.1 Made Ground - gravel cover

Plots 500, 501 and 502 are generally covered by sporadic grass and limestone aggregates between ground level and up to 0.30m bgl, with an average thickness of 0.15m, comprising reddish brown silty sandy to very sandy gravel or pinkish brown gravelly sand with occasional to abundant roots and rootlets. Gravel is subangular to angular fine to coarse of limestone.

5.1.1.2 Made Ground - Engineered Fill

Below the surface covering, Made Ground – Engineered Fill was recorded across Plots 500, 501 and 502 at depths between 0.05m bgl and 1.00m bgl, with an average thickness of 0.44m. It generally comprises very compacted, yellowish brown fine sand or stiff very sandy silt with rare gravel of subrounded fine to medium of flint and occasional limestone/weakly cemented sands (probable lime/cement-based stabilised soils).

5.1.1.3 Made Ground - General

Made Ground was encountered at a maximum depth at the eastern side (Plot 501) of the site at locations WS5.02 and TP5.04, to depths of 1.50m to 1.40m bgl respectively, with an average thickness of 0.60m, generally comprising orangish/ yellowish brown silty sand with rare mudstone and bricks.

5.1.1.4 Topsoil

Topsoil was encountered only at location TP5.05 at the western side of the site (Plot 501), between ground level and 0.12m bgl, comprising vegetated, orangish brown, sandy, silt/clay with abundant rootlets.

For the purposes of this report, topsoil is defined as the upper layer of an in-situ soil profile, usually darker in colour and more fertile than the layer below (subsoil), which is a product of natural chemical, physical, biological and environmental processes, but does not imply compliance with BS 3882:2015. Reuse of topsoil as a growing medium at the site should be determined by the landscape architect or the landscape Contractors.

5.1.1.5 Bognor Sand Member

The Bognor Sand Member was encountered underlying the Made Ground across the centre/ southern area of the site (Plots 500 and 501) where terracing of the site has not removed the deposit, at locations TP5.04, WS5.03 to WS5.10, between 0.40m and 2.30m bgl, with an average thickness of 1.16m. This generally consisted of yellowish/orangish brown with occasional light grey mottling, silty fine sand or sandy to very sandy silt with rare subrounded fine to medium of flint and occasional inclusions of light grey sandy silt.

5.1.1.6 London Clay Formation (weathered)

A weathered fraction of the London Clay Formation was encountered across Plots 500, 501 and 502, underlying the topsoil (at location TP5.05 between 0.12m and 1.10m bgl), below the Made Ground (at locations BH5.01, BH5.02, BH5.03, BH5.05, SA101, TP5.01, TP5.02, TP5.03, TP5.07, WS5.01, WS5.02) and below the Bognor Sand Member (at locations TP.04, WS5.03, WS5.04, WS5.08). Found at depths between 0.40m and up to 3.30m bgl, with an average thickness of 1.35m. It generally comprises firm, orangish brown and light grey mottled sandy silty clay.

5.1.1.7 London Clay Formation

London Clay Formation was encountered within the southern area of the site (Plot 500) underlying the Made Ground (at locations BH5.04, TP5.06, WS5.06, WS5.07) and below the Bognor Sand Member at locations (WS5.05, WS5.09, WS5.10); and underlying the weathered London Clay Formation across the rest of the site (Plots 501 and 502), from between 0.40m and 3.30m and to a maximum depth of 25.50m bgl. The base of the strata was not proven. This generally consisted of firm to stiff, dark grey/ blueish grey, sandy clay with rare to occasional white shell fragments. Becoming stiff to very stiff and generally a silty clay from between 8.00m / 14.00m bgl.

5.2 Obstructions

No obstructions were encountered during ground investigation works.

5.3 Groundwater

5.3.1 Groundwater observations and levels

Groundwater encountered during the investigation is listed in Table 5.2. A groundwater observation represents the depth at which groundwater was first observed and is likely to be deeper than the actual water table level at that location.

Table 5.2: Groundwater occurrence

Stratum	Date	Location	Fieldwork				Comment
			Groundwater observation		Rose to after 20 min		
			m bgl	m AOD	m bgl	m AOD	
Unit 500							
London Clay Formation	16/08/21	BH5.05	8.50	18.07	8.20	18.37	Slow seepage
	16/08/21	BH5.05	10.70	15.87	10.50	16.07	Slow seepage
	11/08/21	BH5.04	5.50	21.20	5.40	21.30	Slow seepage
	11/08/21	BH5.04	10.10	16.60	9.70	17.00	Slow seepage
Unit 501							
Bognor Sand Member	27/07/21	WS5.05	1.20	30.85	-	-	Soil recovered wet.
London Clay Formation	10/08/21	BH5.02	8.50	24.18	8.10	24.58	Slow seepage
	12/08/21	BH5.03	5.50	25.21	5.20	25.51	Slow seepage
	12/08/21	BH5.03	8.80	21.91	8.50	22.21	Slow seepage
Unit 502							
London Clay Formation (Weathered)	21/07/21	TP5.02	3.00	32.6	-	-	Slow seepage
London Clay Formation	27/07/21	WS5.02	1.85	33.35	-	-	Soil recovered wet.
	09/08/21	BH5.01	8.50	26.84	8.20	27.14	Slow seepage

Groundwater levels recorded during post-fieldwork monitoring are summarised in Table 5.3.

Table 5.3: Groundwater level data summary

Stratum*	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (range) (m bgl)	Groundwater elevation (range) (m OD)
Unit 500				
London Clay Formation (weathered) / London Clay Formation	27/08/21 - 24/09/21	BH5.05	1.78 - 1.98	24.59 - 24.79
	11/08/21 - 24/09/21	WS5.08	0.86 - 1.55	25.18 - 25.87
Unit 501				
Bognor Sand Member / London Clay Formation (weathered)	11/08/21 - 24/09/21	WS5.04	2.06 - 2.47	28.33 - 28.73
Bognor Sand Member	11/08/21 - 24/09/21	WS5.05	1.54 - 2.20	29.85 - 30.51
London Clay Formation (weathered)	27/08/21 - 24/09/21	BH5.02	2.49 - 2.69	29.99 - 30.19
London Clay Formation	11/08/21 - 24/09/21	BH5.03	0.34 - 0.75	29.96 - 30.37
Unit 502				
London Clay Formation (weathered)	27/08/21 - 24/09/21	BH5.01	1.58 - 2.00	33.34 - 33.76
London Clay Formation	11/08/21 - 24/09/21	WS5.02	3.56 - 4.00	31.20 - 31.64
*Stratum in which groundwater was encountered during monitoring visits.				

5.3.2 Infiltration tests

The results of the infiltration testing undertaken are summarised in Table 5.4. The results sheets are presented in Appendix C.

Testing was carried out in accordance with Hydrock's 1-day assessment methodology. This is in general accordance with BRE Digest 365 (BRE DG 2016) where infiltration rates allow three test runs during a working day (or where there is no infiltration), but where low infiltration rates were encountered the available time may not have been sufficient to fully comply with the BRE test method (i.e. three runs of the test).

Table 5.4: Infiltration test results

Stratum	Location	Depth to base of pit (m bgl)	Infiltration rate (m/s)			
			Run 1*	Run 2	Run 3	Range
London Clay Formation	SA101	3.0	No infiltration	-	-	Monitoring extended over the course of several days

*Where less than three tests were possible in a particular location the results provided should usually be considered indicative only and should not be used for design purposes. If infiltration is critical to the development of the site, multi-day infiltration testing is normally recommended. In this instance monitoring across the duration of several days indicated no infiltration occurred.

5.3.3 Groundwater summary

During the investigation, shallow groundwater was encountered at depths between 1.20m bgl and 3.00m bgl within the trial pits and the windowless sampler boreholes, and a deeper groundwater body was encountered between 5.50m bgl, 8.50m bgl and 10.70m bgl, according to observations from the cable percussive boreholes.

The monitoring indicates there is perched groundwater present within the Bognor Sand Member and the sandy fraction of the London Clay Formation, between 0.86m bgl to 1.98m bgl in unit 500; between 0.34m bgl to 2.69m bgl in unit 501; and between 1.58m bgl to 4.00m bgl in Unit 502. The groundwater flows north to south and appears to be topographically controlled.

Soakaway infiltration testing was aborted due to negligible infiltration.

5.4 Ground gases (carbon dioxide and methane)

Records from the gas monitoring boreholes are presented in Appendix E and summarised in Table 5.5.

6 monitoring visits have been undertaken and the monitoring programme is complete. The data are assessed in Section 7.6.

Table 5.5: Range of ground gas data

Stratum	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Steady flow rate (l/hr)	Comment
Made ground / London Clay Formation (Weathered) / London Clay Formation	ND to 4.1	ND to 0.1	4.4 to 20.8	-0.1 to 4.5	Concentrations of methane were mostly below detection, with highest at WS5.02 (between 2.6 to 4.1%). Concentrations of carbon dioxide readings are below 5%.
Bognor Sand Member / London Clay Formation	ND	0.4 to 1.1	11.9 to 20.3	-11.7 to 0.1	Concentrations of methane were below detection. Concentrations of carbon dioxide readings are up to 1.2% at WS5.05.
ND denotes Not Detected.					

5.5 Geotechnical data

5.5.1 Introduction

Laboratory test results are contained in Appendix D with *in situ* test results shown on the relevant exploratory hole log or datasheet in Appendix C. The following sections summarise the main findings and provide interpretation where appropriate.

5.5.2 Plasticity

A total of 28 Atterberg Limit tests were undertaken on soil samples collected during the ground investigation. These are summarised in Table 5.6 and are plotted in Figure 5.1.

Testing on Made Ground-Engineered Fill (2No) returned results indicating low to medium plasticity. Testing completed on samples obtained from the weathered fraction of the London Clay Formation (7No) returned results indicating generally medium plasticity with a single value indicating high plasticity at 2.50m bgl (WS5.04). Of the 19No tests undertaken on samples obtained from the London Clay Formation up to a depth of 6.5m bgl, the results show medium to high plasticity.

The volume change potentials, in terms of BRE Digest 298 with respect to building near trees, have been determined from the results of plasticity index tests on samples of soil. The results are summarised in Table 5.6 and Figure 5.1.

Table 5.6: Volume change potential

Stratum	No. of tests	Plasticity Index			Modified Plasticity Index			Plasticity designation	Volume Change Potential
		Min.	Max.	Av.	Min.	Max.	Av.		
Made Ground - Engineered fill	2	20	26	23	20	26	23	Low to medium	Medium
London Clay Formation (weathered)	7	16	35	25	16	35	25	Medium	Medium
London Clay Formation	19	26	33	29	22	33	28	Medium to high	Medium

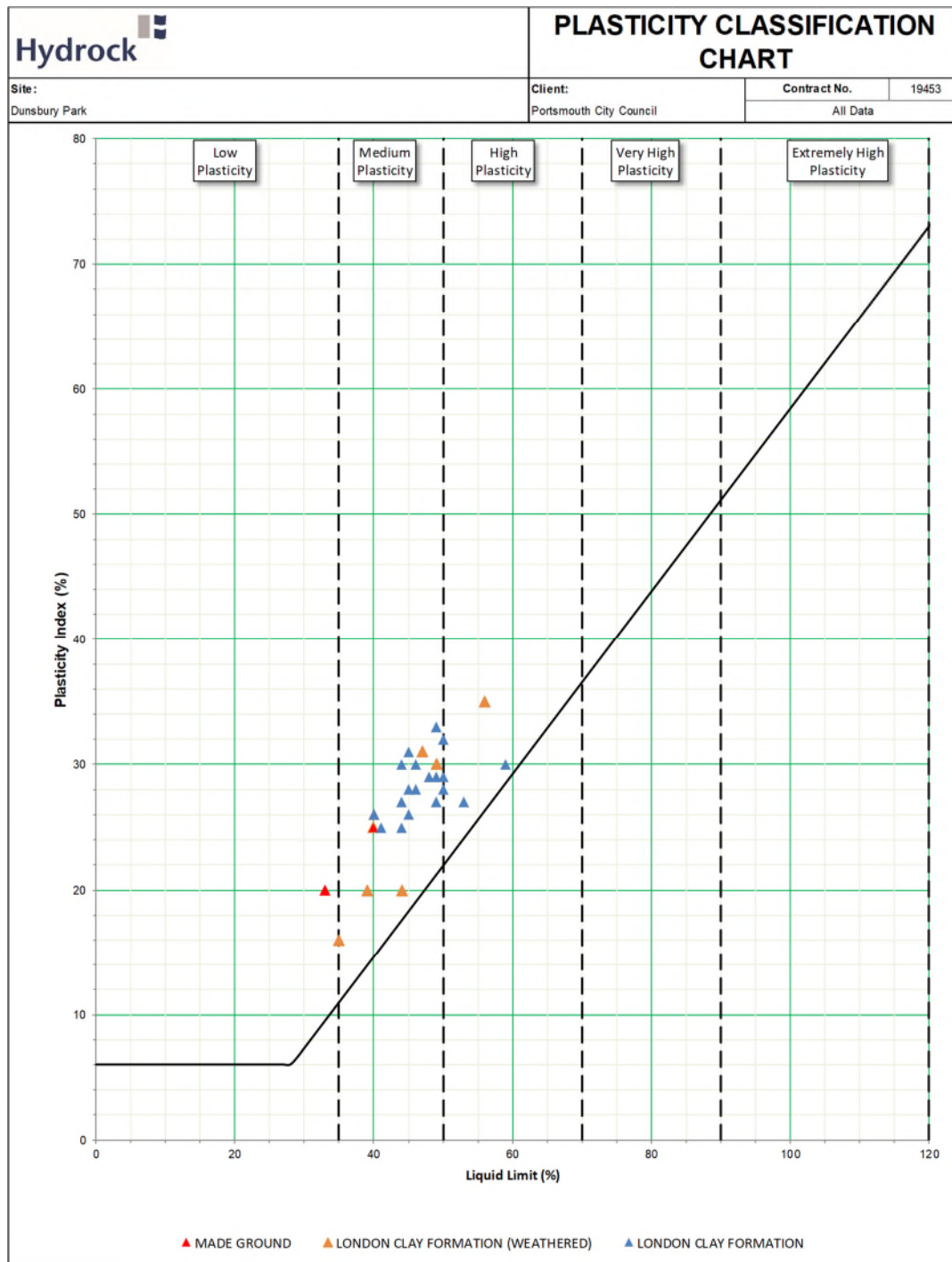


Figure 5.1: Plasticity Classification Chart Summary

5.5.3 Particle size distribution

A total of 11 No Particle Size Distribution tests (PSDs) were undertaken on soil samples collected during the ground investigation, 6 No tests within the Made Ground - Engineering Fill, 3 No tests within the Bognor Sand Member and 2 No tests within the London Clay Formation.

One PSD result at location WS5.08 indicates brown silty fine to coarse sandy GRAVEL at 0.30m bgl, which corresponds to the in-situ observations of the Made Ground - Surface Covering instead of Engineered Fill; therefore, this result was not included in the Made Ground- Engineered Fill strata.

Sample collected at location BH5.01 at 3.0m was described as brownish grey clayey/silty fine to coarse sandy fine to coarse GRAVEL during the PSD test; however, the same sample was described as brownish grey, fine to coarse gravel, silty, sandy CLAY during the consolidated drained triaxial compression test. Considering inconsistency within the laboratory results, this sample was discounted.

Results are summarised in Table 5.7 and summary descriptions and PSD plots of the material analysed are presented in Appendix D.

Table 5.7: PSD results summary

Stratum	No. of tests	Silt/Clay %	Sand %	Gravel %	General description
Made Ground - Engineered Fill*	6	29 - 78	22 - 60	0 - 11	Brown fine slightly gravelly fine to medium sandy silty CLAY.
Bognor Sand Member	3	46 - 79	21 - 42	0 - 12	Brown fine to medium gravelly fine to coarse sandy silty CLAY.
London Clay Formation (weathered)**	2	55	44	1	Brown fine slightly gravelly fine to coarse sandy silty CLAY.
*One PSD result at location WS5.08 was discounted as it is considered not representative of the Made Ground - Engineered Fill strata as per in-situ observations.					
**One PSD result at location BH5.01 was discounted as it is not representative of the London Clay Formation strata.					

5.5.4 Soil strength of cohesive soils

A total of 99 Standard Penetration Tests (SPTs) were undertaken during the progression of the boreholes; 1No. within MG, 6No. in the Bognor Sand Member, 12No. in the London Clay Formation (weathered), and 80No. in the London Clay Formation.

Factual results are summarised for laboratory tests, correlations and Standard Penetration Tests (SPT) corrected for test procedure, to obtain N_{60} values, to allow correlation with published data.

A total of 17No. of Unconfined Undrained triaxial Tests (UU) were undertaken on samples from the London Clay Formation to obtain the undrained shear strength (c_u).

1No. Consolidated Drained triaxial Test (CD) were undertaken on samples from the London Clay Formation to obtain the effective strength and angle of friction.

For SPTs in cohesive material (London Clay Formation weathered and non-weathered), correlations between SPT N_{60} and undrained shear strength (c_u) have been undertaken using the relationship between c_u/N_{60} and Plasticity Index (PI), from Tomlinson (2001), after Stroud (1975)).

To estimate the internal angle of friction within the cohesive strata (London Clay Formation weathered and non-weathered), plasticity index correlations according with the BS8002:2015 Code of Practice for earth retaining structures (2015) has been used.

Table 5.8 summarises information pertaining to the shear strength of the soils according to geological stratum. Factual results are summarised for laboratory tests, field tests (e.g. hand shear vane) and corrected Standard Penetration Tests (SPT). Where the SPT is used to infer shear strength by published correlation, this is also tabulated. A shear strength versus depth profile is summarised in Table 5.8.

Table 5.8: Soil strength results and derived values

Stratum	No. of tests	SPT (N ₆₀ -value) (range)	c _u (kPa) (range)	c' (kPa) (range)	Phi (φ) (range)	Method
Made Ground - Engineered Fill	1	19	97 ^a	-	-	
	-	-	-	-	26 ^d	Estimated from Plasticity Index.
Made Ground - General	1	-	48	-	-	Hand shear vane
London Clay Formation (weathered)	12	4 - 14	30 - 68 ^b (50)	-	23 - 34 (40)	SPT – cable percussive and windowless sampler boreholes.
	8	-	63 - 85	-	-	In situ hand shear vane.
London Clay Formation	80	9 - 63	44 - 315 ^c	-	23 - 40	SPT – cable percussive and windowless sampler boreholes.
	26	-	41 - 150	-	-	In situ hand shear vane.
	17	-	58 - 335	-	-	Laboratory unconsolidated undrained triaxial test
	1	-	-	27	19.7	Laboratory consolidated drained triaxial test

^a A f1 value of 5.0 has been used based on a plasticity index of 23 for Made Ground.
^b A f1 value of 5.0 has been used based on a plasticity index of 25 for London Clay Formation (weathered).
^c A f1 value of 5.0 has been used based on a plasticity index of 28 for London Clay Formation. (Tomlinson (2001), after Stroud (1975)).
^d Calculated from BS8002: Code of Practice for earth retaining structures (2015)
Values in brackets represents characteristic value.
An SPT N₆₀ value of 3 was discounted due to groundwater influence between 3.40m to 5.0m bgl within the London Clay Formation.

Figure 5.2 presents shear strength results using in situ testing, laboratory testing and published correlations.

It is noted that the London Clay Formation (Weathered) stratum, which is encountered within the first 3.5m bgl, presents variable shear strength values from approximately 30kPa to 90kPa. The fluctuations in strength within this stratum can be attributed to the presence of groundwater between approximately 1.00m to 4.00m bgl as confirmed by the monitoring results. The average shear strength of the London Clay Formation (Weathered) is 60 kPa, with two values below 40 kPa. Therefore, for design purposes, a conservative value of 40 kPa is assumed for London Clay Formation (Weathered), as shown in the trendline.

Within the London Clay Formation, Figure 5.2: Undrained shear strength versus depth summary (using multiple methods) and corresponding trendlines Figure 5.2 shows a wide range in shear strength values

between 3.30m to 5.50m bgl (shallow London Clay) with values ranging from 20kPa to more than 200kPa. These variations can be attributed to the influence of the compaction of upper strata during earthworks and terracing. After 7.0m bgl, the results of shear strength from SPT correlations indicate a steady increasing shear strength with depth. However, on the left side of the plot, it is noted that some values from in-situ Hand Shear Vane testing and laboratory unconsolidated undrained triaxial testing indicate lower shear strength values (within the range of 50 to 150kPa) when compared to results obtained at the same depths using SPT correlations. This is probably due to the fact that these tests were carried out using disturbed samples. Therefore, the results of the in-situ tests have been given precedence over the low values from the laboratory tests

Two trend lines were calculated for the London Clay Formation, one which indicates trend within the first 5.50m bgl for the shallow London Clay, and the other which presents the trend from 7.0 to 25.0m bgl. The linear equations are presented in Figure 5.2. The equations are calculated from the top of each strata.

According to literature, a conservative effective cohesion value of 0.5 kPa for engineered fill and 3 kPa for London Clay Formation (weathered) is recommended. As only one consolidated drained triaxial test was undertaken in the London Clay Formation to determine effective cohesion of soils, the value of 27kPa is not considered reliable. Therefore, for design purposes, a conservative value of 5 is recommended.

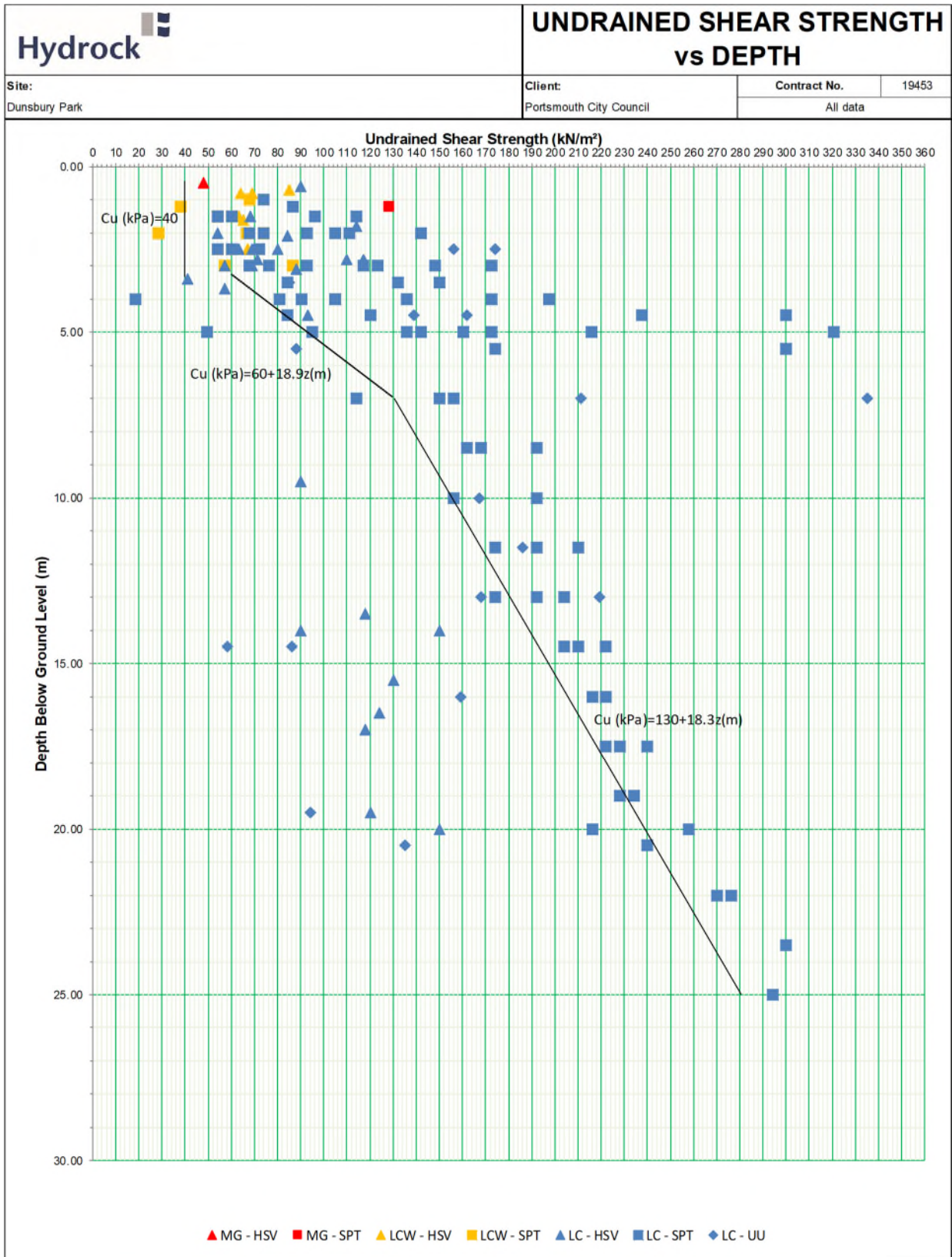


Figure 5.2: Undrained shear strength versus depth summary (using multiple methods) and corresponding trendlines

5.5.5 Relative density

Table 5.9 summarises information pertaining to the relative density of the granular soils according to geological stratum. Factual results are summarised for laboratory tests, field tests (e.g. SPT). A SPT 'N₆₀' value versus depth profile is summarised in Figure 5.3.

To estimate the internal angle of friction within the granular deposits from the Bognor Sand Member, N₆₀ values have been used as per Tomlinson (2001), after Terzaghi & Peck (1967).

Table 5.9: Relative density results and derived values

Stratum	No. of tests	Method	SPT (N ₆₀ -value) (Range)	phi' (°)
Bognor Sand Member	6	SPT – windowless sampler boreholes (Peck et. al. (1967)).	11 - 16 (11)	32 - 36 (32)
Values in brackets represents characteristic value (considered as the lowest value from the dataset).				

The SPT 'N₆₀' values from Bognor Sand Member as shown in Figure 5.3 indicates medium dense sands.

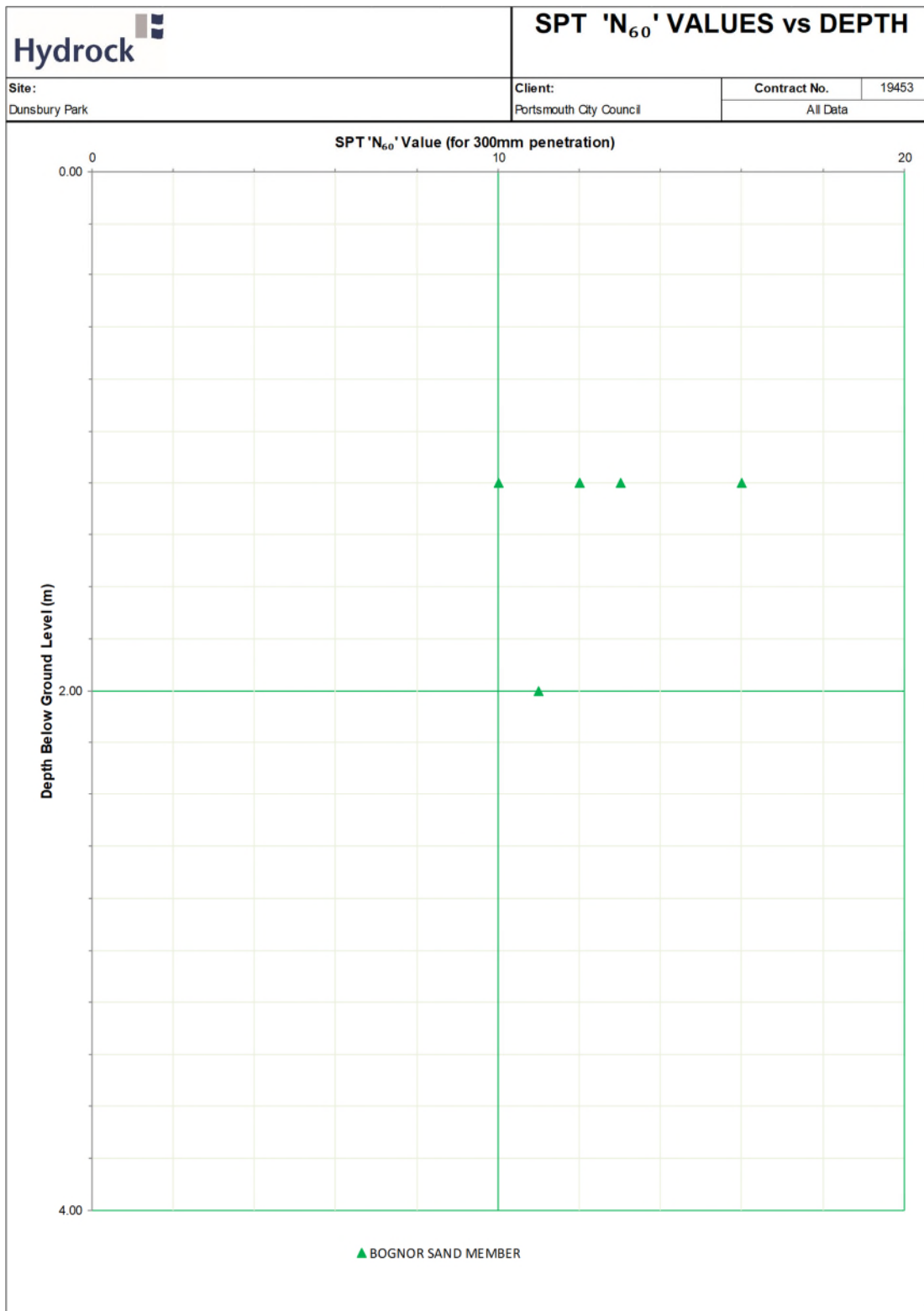


Figure 5.3: SPT 'N60' Value versus depth in Bognor Sand Member

5.5.6 Compressibility

A total of 3No Oedometer test were undertaken on samples collected from London Clay Formation during the site works. Table 5.10 presents a summary of the derived parameters for coefficient of consolidation and compressibility.

Table 5.10: Summary of compressibility

Stratum	No. of tests / results	Method	Pressure range (kN/m²)	Coefficient of volume compressibility (m _v) (m²/MN)	Coefficient of consolidation (C _v) (m²/yr)
Made Ground - Engineered Fill	1	Correlation with SPT ^a	23	0.08	-
London Clay Formation (weathered)	12	Correlation with SPT ^b	19 - 57	0.12 - 0.26 (0.19)	-
London Clay Formation	80	Correlation with SPT ^c	19 - 262	0.03 - 0.21 (0.08)	-
	3	One Dimensional Consolidation Test (oedometer)	0 - 75	0.2 - 0.6	1.6 - 16.0
			50 - 150	0.12 - 0.18	4.0 - 9.7
			100 - 300	0.11 - 0.16	9.4 - 11.0
			200 - 400	0.08 - 0.11	6.2 - 16
			300 - 600	0.02	9.3
			600 - 50	0.023 - 0.042	3.3 - 9.2
^a A f ₂ value of 0.55 has been used based on a plasticity index of 23 for Made Ground.					
^b A f ₂ value of 0.50 has been used based on a plasticity index of 25 for London Clay Formation (weathered).					
^c A f ₂ value of 0.48 has been used based on a plasticity index of 28 for London Clay Formation. (Tomlinson (2001), after Stroud)).					
Values in brackets represents characteristic value (obtained from the average value from the dataset).					

The Coefficient of Volume Compressibility for Made Ground- Engineered Fill at applied pressure of 23kN/m² (based on the depth the SPT was undertaken at) is 0.08m²/MN. The weathered fraction of the London Clay Formation presents compressibility values between the range of 0.12 to 0.26m²/MN, with an average value of 0.19 m²/MN. The London Clay Formation presents a wide range of compressibility values, from 0.11 to 0.18 m²/MN at pressures between 0 to 300kN/m², to values of 0.02 to 0.11 m²/MN between 300 to 600kN/m².

5.5.7 Compaction and moisture content

A total of 7No. Compaction tests were undertaken on samples collected during site works: 2No tests on the Made Ground - Engineered Fill, 1No. test within the Bognor Sand Member, 2No. tests within London Clay Formation (weathered) and 2No. tests within London Clay Formation.

Table 5.11 presents a summary of the moisture content tests and compaction studies undertaken at the site. Figure 5.4 presents a summary of moisture content versus depth.

Table 5.11: Compaction study results

Stratum	No. tests	Method	Natural moisture content (%) (range)	Optimum moisture content (%) (range)	Particle density (Mg/m ³) (range)	Maximum dry density (Mg/m ³) (range)
Made Ground - Engineered Fill	2	Vibrating Rammer	11 - 23	14 - 18	2.65*	1.73 - 1.75
Bognor Sand Member	1	Vibrating Rammer	19	15	2.65*	1.74
London Clay (weathered)**	1	Vibrating Rammer	19	13	2.65*	1.99
	1	4.5kg rammer	21	13	2.65*	1.83
London Clay Formation	2	4.5kg rammer	29 - 32	13	2.65*	1.78 - 1.80

* Assumed

** One of the compaction tests within the London Clay Formation (weathered) was analysed using the vibrating rammer method as it was described as sandy clayey SILT with occasional pockets of yellowish brown fine Sand (BH5.03 at 0.50-1.0m bgl).

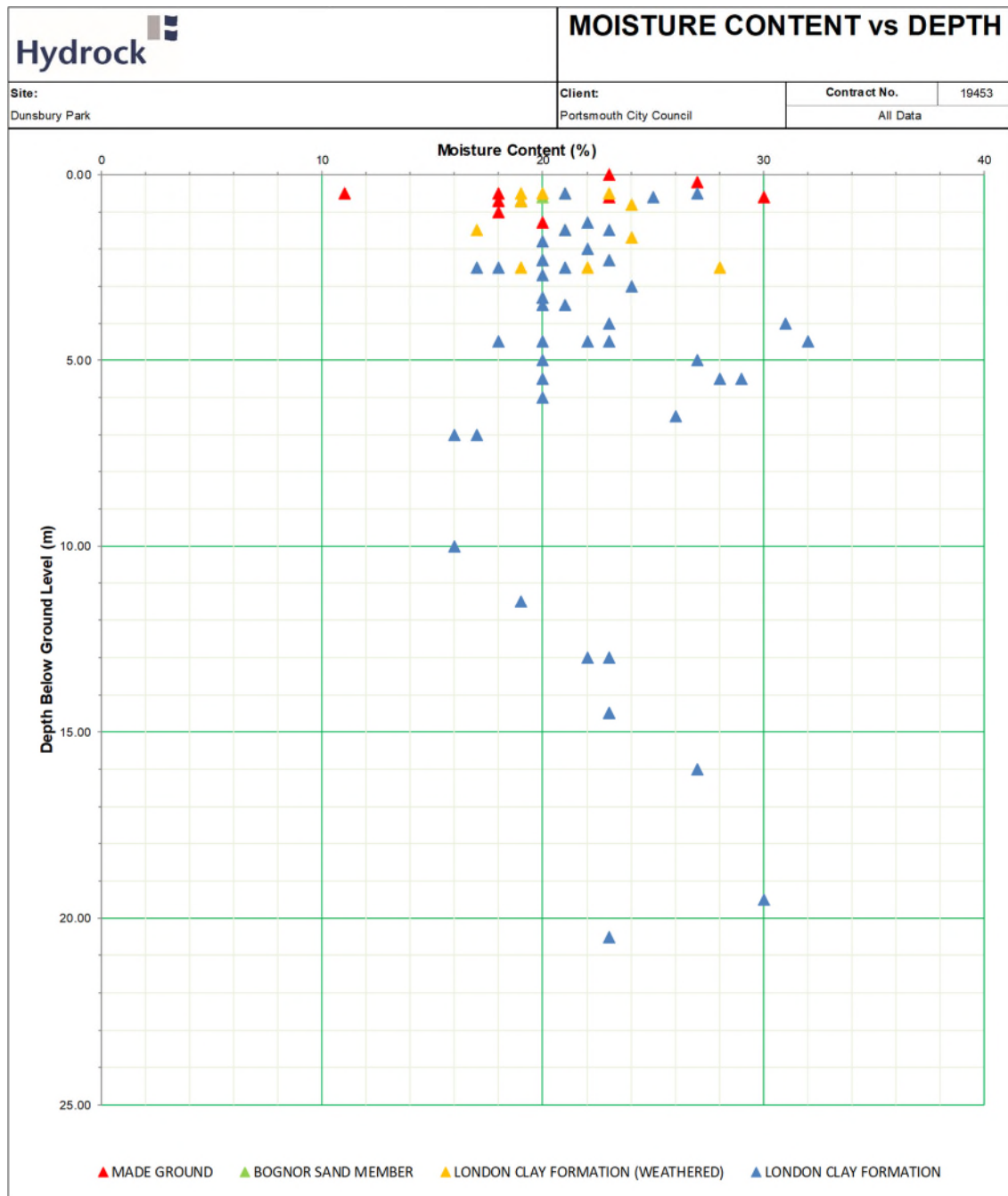


Figure 5.4: Moisture content versus depth summary

Figure 5.4 presents moisture content values from laboratory data versus depth. It is noted that moisture content values within the Made Ground are highly variable, with values from 11% to 30% and an optimum moisture content range of between 14% to 18%. The Bognor Sand Member has moisture content values of 19% and 20%. The optimum moisture content for the Bognor Sand Member is 15%. The weathered fraction of the London Clay Formation exhibits moisture content values of between 17% and 28%. London Clay Formation presents values of 20% up to 32% at approximately 5.0m bgl, where groundwater strikes were noted during cable percussive drilling works, then decreases to 16% at 10.0m bgl to increase again up to a maximum value of 30%. These variations are probably related to sand

bands within the strata with higher moisture content. However, according to the laboratory results, the optimum moisture content for London Clay Formation (weathered and non-weathered) is 13%.

5.5.8 Subgrade stiffness

A total of 6No. plate load tests were undertaken in the Made Ground - surface covering, 21No. TRL-DCP tests in the Made Ground - Engineered Fill, 1No. TRL DCP test in the Bognor Sand Member and 6No. TRL DCP tests in the London Clay Formation (Weathered) during site investigation works.

A total of 5No. laboratory remoulded CBR tests were undertaken on samples collected from Made Ground - Engineered Fill, 1No. test on a sample collected from the Bognor Sand Member, 4 No. tests on samples collected from London Clay Formation (Weathered) and 2No. tests on samples collected from London Clay Formation.

The subgrade stiffness (CBR and Subgrade Surface Modulus) results are summarised in Table 5.12.

Table 5.12: CBR results and derived values

Stratum	No. tests	Method	Subgrade surface Modulus ^a - (MPa) Range (average)	CBR (%) (Range)
Made Ground - Surface Covering	6	Plate Load Test	30.8 - 138.1 (30.8)	2.4 - 25* (2.4)
Made Ground - Engineered Fill	5	Laboratory remoulded sample at Natural Moisture Content (NMC)	20.8 - 30.0 (22.9)	1.3 - 2.3 (1.5)
	21	TRL - DCP	81.7 - 315.7 (81.7)	11 - 91 * (11)
Made Ground - General	1	Correlation from SPT ^b	130.1	23
Bognor Sand Member	1	Laboratory remoulded sample at Natural Moisture Content (NMC)	21.8	1.4
	1	TRL - DCP	136	48
	6	Correlation from SPT ^b	84.7 - 114.4 (84.7)	12 - 19 (12)
London Clay (weathered)	4	Laboratory remoulded sample at Natural Moisture Content (NMC)	20.8 - 42.1 (20.8)	1.3 - 3.9 (1.3)
	6	TRL - DCP	66.6 - 228.7 (66.6)	8 - 55 (8)
	12	Correlation from SPT ^b	51.7 - 105.0 (51.7)	5 - 16 (5)
London Clay Formation	2	Laboratory remoulded sample at Natural Moisture Content (NMC)	27.4 - 41.4 (27.4)	2.0 - 3.8 (2.0)
	79	Correlation from SPT ^b	79.5 - 280.1 (79.5)	11 - 76 (11)
^a From CD225 revision 1 (2020) ^b Putri et al (2012) to estimate CBR. *Values of CBR over 100% were discounted. Strata from DCP testing were inferred from the nearest trial pit/ windowless sampler borehole. Values in brackets represents characteristic value(using conservative lowest value).				

According to Table 5.12, it is noted that in-situ CBR results were significantly higher when compared to laboratory CBR results. In addition, correlations from SPT values also indicate higher CBR values when compared to laboratory results. This is probably due to the fact that in-situ soils were previously treated

with lime/cement-based binders during previous terracing works and, therefore, the geotechnical properties were modified during the sampling process as the lightly cemented soil structure was broken down.

As a result, it is considered that in-situ results are the most representative of the properties of the soils and a conservative CBR value of 5%, with a corresponding Subgrade Surface Modulus value of 49.3MN/m², is recommended.

5.5.9 Sulfate content

Visual evidence of possible pyrite was encountered at locations TP5.05 and BH5.01 (as described in the logs).

In accordance with BRE (Special Digest 1), the Design Sulfate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in Table 5.13. The assessment summary sheets are presented in Appendix D.

Table 5.13: Aggressive chemical environment concrete classification

Stratum	No. tests	DS	ACEC
Made Ground - Engineered Fill	2	DS-1	AC-1
Bognor Sand Member	3	DS-1	AC-1
London Clay Formation (weathered)	1	DS-1	AC-1
London Clay Formation	9	DS-4m	AC-4m

6. GEOTECHNICAL ASSESSMENT

6.1 Geotechnical categorization of the proposed development

Eurocode 7, Section 2 advocates the use of geotechnical categorization of the proposed structures to establish the design requirements.

The proposed development is shown on UMC Architects drawing 20179 F0009 Revision A in Appendix A. This comprises three warehouse units covering approximately 7,600 sq. m. (81,870 sq. ft.), including associated site infrastructure works, parking and soft landscaping.

The layout shows three platforms separated by two retaining walls of approximately 3.5m height. The northern area of the site will involve cutting up to 2.75m to create the development platform for Unit 502. A cut and fill exercise is required in the central area of the site to create the development platform for Unit 501, with the northern portion of the structure supported in cut and the southern section supported on engineering fill. The platform for Unit 500 will involve minimal cut and fill works as it is planned to be on the current level.

The design also includes an access road in the west of the site which comprises a cutting section with the potential for retaining walls on both sides.

Based on the above, for the purposes of this investigation, the proposed structures have been classed as Geotechnical Category 2.

For Category 2 structures, the Geotechnical Category should be re-assessed at the design stage and specific geotechnical design (in addition to this investigation), is required.

Following ground investigation and as part of the assessment provided in the following section, the preliminary geotechnical hazard identification undertaken in Section 3.3 has been updated.

Assessment has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents CD 622. The preliminary Geotechnical Risk Register following investigation is provided in Appendix H (Table H.3) and will need to be updated during future design works.

6.2 Characteristic design values

In accordance with BS EN ISO 1997-1 (EC 7), Hydrock consider the proposed structures would be classified as Category 2 structures. As part of the separate geotechnical design, the designer should determine the geotechnical design values.

Table 6.1 provides characteristic geotechnical values to assist the designer. These are based on laboratory testing, in situ testing and by professional judgement using published data together with knowledge and experience of the ground conditions. Care should be exercised in using these assumed soil strength parameters for any purpose beyond the scope of this report because it may be that additional sampling and testing are required for certain purposes. The reader should refer to the original test results summarised in Section 5 and provided in Appendix C and Appendix D.

Table 6.1: Characteristic geotechnical values

Parameter	Bulk unit weight kN/m ³	Effective angle of internal friction °	Effective cohesion kN/m ²	Undrained shear strength kN/m ²	Coefficient of compressibility m ² /MN	Subgrade Surface Modulus MPa
Stratum	γ^a	$\phi'^{b,c}$	c'^d	c_u^e	m_v^f	E^g
Made Ground - General	17.0	-	-	48	-	-
Made Ground - Engineering fill	19.0	26	0.5	97	0.08	49.3
Bognor Sand Member	19.0	32	-	-	-	49.3
London Clay Formation (weathered)	18.0	23	3	50	0.19	49.3
London Clay Formation	19.0	26	5	60 + 18.9z ^h to 7mbgl, then 130 + 8.3z ⁱ	0.08	49.3

- a. Measured as part of the triaxial strength test and estimated based on the recommendations of BS 8004-2015.
- b. Internal friction (ϕ') values for the granular in situ material derived from SPT data following the recommendations of Peck et al., (1967), using conservative lowest value (Table 5.8).
- c. Internal friction (ϕ') values for the cohesive in-situ material derived from BS 8004-2015, where ϕ_{cv}' is derived from plasticity index. The use of ϕ_{cv}' in the analysis is considered to provide a conservative estimate of ϕ' .
- d. BS 8002:1994 Code of practice for Earth retaining structures, British Standards institution.
- e. Site measurements and laboratory data.
- f. Laboratory data and estimated from SPT (Table 5.10)
- g. From CD225 revision 1 (2020), using conservative CBR value of 5% (See Section 5.5.8)
- h. Design line for shallow London Clay Formation (3.30m to 5.50m bgl). z is depth below top of strata.
- i. Design line for London Clay Formation (7.0m to 25.0m bgl). z is depth below top of strata.

6.3 Groundwork

6.3.1 Site preparation

The site is previously undeveloped and no buried obstructions were encountered by this investigation. The possibility of buried obstructions being encountered is low.

Topsoil and general Made Ground were encountered on the site. Any topsoil should be removed and disposed to be reuse for landscaping proposes.

6.3.2 Groundworks

As no breaking out of hardstanding or obstructions is expected to be needed, excavation of shallow soils should be readily undertaken by conventional plant and equipment.

Trial pit faces within the Engineering Fill and both weathered and unweathered London Clay were noted to remain generally vertical without collapse, while excavations within General Made Ground and the

Bognor Sand member experienced small collapses and spalling. The faces of shallow, near vertically sided excavations put down at the site are likely to remain stable for short periods of time within the Engineering Fill and weathered and unweathered London Clay units while, excavations in General Made Ground and Bognor Sands formation will require temporary support.

Temporary trench support, or battering of excavation sides, is recommended for all excavations that are to be left open for any length of time and will definitely be required where man entry is required.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015); Construction Information Sheet 47: Inspections and Reports (2005) and HSG47: Avoiding Danger from Underground Services.

To ensure no loads are imposed on the sides of the excavation, spoil should be placed a suitable distance from the edge of the excavation (as assessed by a competent person).

Based on site observations, the rate of water ingress to the proposed excavations is likely to be slow. In these circumstances, groundwater control by sump pumping is likely to be sufficient.

However, it should be recognised that groundwater levels may vary from those at the time of the investigation, for example in response to seasonal fluctuations and the timing of construction may dictate the extent of groundwater control required.

Any water pumped from excavations may need to be passed via settlement tanks (to reduce suspended solids) before being discharged to the sewer. Discharge consents may also be required.

The classification of materials obtained from cutting areas for use as engineered fill depends on both the proposed end use and whether the material from excavations will meet the soil classification and performance requirements. Based on Hydrock's understanding, the following assessment is based on General Fill / Structural Fill for external yard areas and building footprints.

An initial assessment of classification data (see Section 5.5 and Appendix D) has been completed based on Hydrock's understanding of the development and the potential to reuse site-won materials as an engineered fill material. This is summarised in Table 6.2.

The presence of sulfates, or the potential for sulfates to form, within London Clay (weathered and unweathered) in combination with water and natural minerals may allow for the formation of expansive materials if modified with lime or cement. Current guidance suggests that:

- values of total sulfate (as % SO₄) below 0.2% may be acceptable.
- Values recorded between 0.2% and 1.0% need careful consideration, and
- values in excess of 1.0% indicate that sulfates would make the soil unsuitable to modify and/or stabilise with lime or cement.

In addition to these values for total sulfate, stabilization soils have to be designed according with standard HA 74/07 (Treatment of fill and Capping Materials Using Either Lime or Cement or Both)

Table 6.2: Preliminary earthworks assessment

Stratum	Proposed end use	Preliminary classification (SHW Series 600)	Comment	Suitability for improvement by the inclusion of binders
Made Ground - General	Open space	Class 4 (Landscape Fill)	Unsuitable for General Fill due to its heterogeneity and presence of organic content. Can only be used in areas which are not sensitive to settlement.	Landscaping
Made Gound - Engineering Fill	External Areas	Class 1 General Fill	Hinging of the assessment for its suitability	May be suitable subject to further detailed design and testing.
Bognor Sand Member	External Areas	Class 1A General Fill Class 1B General Fill	Dry of optimum, moisture conditioning (e.g. wetting down by bowser and rotavator) likely to be required.	Likely to be suitable.
	Below Structures	Class 6 Structural Fill	Dry of optimum, moisture conditioning (e.g. wetting down by bowser and rotavator) likely to be required.	Likely to be suitable.
London Clay Formation (weathered)	Below Structures	Class 7A Selected Fill	Dry to optimum, moisture conditioning (e.g. lime modification) likely to be required.	Likely to be treated with binders to form suitable class 9 fill
		Class 7* Structural Fill	Dry to optimum, moisture conditioning (e.g. lime modification) likely to be required.	Likely to be treated with binders to form suitable class 9 fill
London Clay Formation	Below Structures	Class 7A Selected Fill	Dry to optimum, moisture conditioning (e.g. lime modification) likely to be required.	Likely to be treated with binders to form suitable class 9 fill
		Class 7* Structural Fill	Dry to optimum, moisture conditioning (e.g. lime modification) likely to be required.	Likely to be treated with binders to form suitable class 9 fill

*Where the as dug material does not meet the requirements of a Class 7 Fill, but is still required for use below structures, it can be treated with hydraulic binders to form a suitable Class 9 fill. The exact sub-class under Class 9 will depend on the hydraulic binder used. This will be subject to detailed design by a specialist Contractor.

The earthworks may need to be undertaken under a Materials Management Plan (see Section 8.3).

Before the use of hydraulic binders is approved, comprehensive testing will need to be completed by a specialist Contractor to satisfy both themselves and the Engineer of the suitability of the soils for treatment and to confirm that the requisite end-performance of the material is achievable. In all instances where improvement by the inclusion of binders is considered, a mix design is required and as

part of this design, samples should be checked for swelling, even where very low sulfate values are recorded.

Where it is proposed to reuse site won materials as an engineered fill it will be necessary to develop an appropriate Site-Specific Earthworks Specification. The basis for the Specification should be BS 6031:2009 and the latest version of the SHW, Series 600 Earthworks. Once site proposals have been further defined more specific consideration will need to be given to the reuse of materials and reference should be made back to Hydrock.

6.3.3 Consolidation settlement

It is understood that consolidation settlement at the building areas is likely to occur within the London Clay Formation. Based on site in situ plate load test results, a maximum settlement between 1.03mm to 1.73mm was observed when an applied pressure between 12 and 92 kPa. Therefore, it is anticipated that settlement may occur on site. However, to confirm that settlement will be within acceptable limits, a separate geotechnical design will be required to fully assess the impact of settlement and to study if the it will be within the range of the allowable settlement or if the design of ground improvement works will be necessary. Site monitoring during the earthwork construction potentially will be required to confirm that the settlements are acceptable.

6.4 Retaining walls

With regard to the proposed retaining walls, Hydrock understand there will be different retaining walls at different heights associated with the access road and between units 501 and 502 in the northern area, and between 501 and 500 in the southern area of the site, which will retain both cut soils and placed soils. In addition, it is understood that these retaining walls will be founded within Engineered Fill.

Where the proposed retaining walls are greater than 2.0m high, they are considered to be Category 2 structures and further geotechnical design will need to be considered. The designer is referred to characteristic values provided in Table 6.1.

With regard to the retaining walls, these will require a more substantial structure which may comprise:

- preformed concrete retaining wall;
- king posts with concrete or infill panels;
- gabion walls with reinforcement;
- crib lock walls with reinforcement; or
- Mechanically Stabilised Earth (MSE).

It is recommended that all retaining walls are individually designed using site specific design criteria, assessed as part of the required geotechnical design. Associated as-built records will be required for verification purposes.

Allowance should be made in the design of the retaining walls for adequate drainage behind the structure, or for water seepage through the face of the wall. The overall stability of the retaining wall is not considered in this report. The stability of the retaining wall should be considered in the design process.

There is a risk that the compressible soils (Engineering Fill and both weathered and unweathered London Clay) will settle over time and/or under additional loads. For retaining structures founded in

the compressible soils, allowance should be made for consolidation settlement, creep and differential settlement over time. If the risk of settlement is unacceptable to the designer and does not meet appropriate serviceability criteria then it is suggested that a flexible retaining construction is considered. This could comprise a gabion cage wall, a timber crib wall, a reinforced earth system or similar construction method. Alternatively, a different foundation could be considered.

Care will need to be taken to ensure that any works close to the site boundaries will not destabilise or cause damage to neighbouring properties including the existing boundary walls and fences. A structural survey is recommended to ensure that existing walls will not be adversely affected.

6.5 Foundation recommendations

In accordance with EC7, BS EN 1997-1+A1 (2013), the development of warehouse units 500, 501 and 502 at Dunsbury Park are considered to be Geotechnical Category 2. As such, foundation recommendations are presented to aid development proposals only and separate geotechnical design will be required.

6.5.1 Foundation Types

The site comprises three platforms. The Northern platform for development of Unit 502 will involve the cutting of approximately 2.75m. The Central platform for development of Unit 501 will require approximately 1.5m of cut and 4.0m of engineering fill. The Southern platform for development of Unit 500 will involve minimal cut and fill works as it is planned to be on the current level.

The Made Ground (surface covering and general) is considered unsuitable in its present condition for use as founding soils on the basis of its unpredictable nature and likely deposition in an uncontrolled manner. The Made Ground - Engineered Fill is considerable suitable although further assessment is necessary to avoid differential settlement between the foundations built in natural strata and in Engineering Fill.

The Bognor Sand Member is considered suitable in its present condition for use as founding soils on the basis of its strength. However, it is most likely that this unit will be fully excavated during the foundation construction works due to small thickness of this unit.

On the basis of the ground conditions indicated from the current investigation, the foundations will likely comprise spread foundations across the site to support the columns for the proposed warehouse units. The pad foundations should be founded at least 300mm into the re-engineered Structural Fill, Bognor Sand Formation which comprise medium dense (or better) sands and firm (or better) clay from the London Clay Formation.

On the basis that an appropriate Earthworks Specification is followed, including all comments relating to over-excavation, proof-rolling and removal of soft spots, then a permissible net bearing pressure (for a pad foundation of 2.5m by 2.5m) of 100kN/m² for the re-engineered fill and 150kN/m² for the Bognor Sand formation and the London Clay Formation is achievable.

If enlarging the foundations is considered (for example because loads are such that the quoted permissible bearing pressure is inadequate) this could lead to increased settlements and the above recommendations should be reviewed.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity and to below any remaining root hairs.

Deepening of foundations in accordance with BRE 240 and BRE 298 will be required where pad foundations are within the zone of influence of existing, removed or proposed trees and proposed shrub planting. A tree survey should be undertaken by an arboriculturist in accordance with BS 5837:2012 to identify the type, and height of existing trees on the site and including any off-site trees, that could have an effect on foundation design.

Where it is not practical to deepen individual pads beyond the influencing distance of the desiccated soils, it is recommended that bulk excavation of the affected area be undertaken and, following moisture conditioning, the soils are replaced to an Engineered Specification.

Where foundations are within the zone of potential desiccation from trees and are deeper than 1.5m bgl, a suitable compressible material or void former will be required on the inside faces of foundations to external walls, and beneath piled ring beams and ground bearing floor slabs.

Foundation formations should be inspected by a geotechnical engineer or other suitably competent person to ensure the founding conditions are suitable and as indicated in this report. Any formation materials deemed as unsuitable should be excavated and replaced with lean mix concrete or deepened to suitable strata.

Foundation excavations should be protected from rain and snow and inflow of surface water, frost and freezing conditions. They should also be protected from drying out in hot dry weather.

Groundwater monitoring indicates a shallow groundwater table. Alternative methods of groundwater control may be required as fast groundwater ingress is anticipated, which could result in softening of the ground and unstable excavations.

London Clay Formation is an over consolidated clay, which can swell and soften in contact with water. Therefore, care will be required to ensure that foundation excavations are kept as free of water as practicable. Foundation concrete should be poured as soon as practicable after excavation.

Subject to detailed geotechnical design, the permissible bearing pressures for foundations detailed in this report take into consideration the risk of shear failure of the ground (ultimate limit state). However, they do not assess acceptable limits of settlement (serviceability limit state). Serviceability limit state assessment will need to be undertaken as part of the separate geotechnical design.

6.5.2 *Ground improvement*

In order to be able to use the London Clay as Engineering Fill) underneath the structures it can be treated with hydraulic binders to form a suitable Class 9 fill. The exact sub-class under Class 9 will depend on the hydraulic binder used. This will be subject to detailed design by a specialist Contractor.

6.6 **Ground floor slabs**

Floor slabs may be ground bearing or suspended as required, however consideration will need to be given to potential for shrinkable clay soils in accordance with BRE guidelines.

Subject to geotechnical design and on the basis that excavation and replacement of the softer soils will be undertaken and all structural fill will be placed strictly in accordance with an appropriate Earthworks Specification, then ground bearing floor slabs may be adopted with an allowable bearing pressure of 100kN/m².

The floor slab should be designed by a structural engineer and a limit state assessment undertaken as part of the geotechnical detail design.

Prior to the placement of the founding materials and the construction of the ground bearing floor slab, the sub-formation and formation will need to be inspected and checked by a competent person to ensure the ground conditions at time of construction are consistent with the Specification and the design parameters derived from this ground investigation. Testing should be undertaken in accordance with The Concrete Society Technical Report 34 (The Concrete Society 2013) and CD 625. It is recommended that the verification of the sub-formation and formation include, as a minimum, the measurement of subgrade surface modulus, E determined by static plate load testing.

6.7 Roads and pavements

Based on the test results, which are summarised in Table 5.12, and subject to in situ testing during construction, it is considered likely an equilibrium CBR of 5% will be achievable within the Made Ground and natural soils across the entire site (plots 500, 501 and 502), as a general rule, a minimum CBR of 5% should be used for design across the whole site.

Proof rolling of the formation level will be required and any loose or soft spots should be removed and replaced with an engineered fill, in accordance with a suitable Specification. The formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

Prior to the placement of the founding materials and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. All testing should be carried out in accordance with CD 625 confirm that the ground conditions at time of construction are consistent with the previous design parameters.

6.8 Drainage

Indicative infiltration rates for the ground investigation are presented in Appendix D and are summarised in Table 5.4.

Soakaways are considered unsuitable for the site based on the low infiltration rates obtained from testing (negligible infiltration).

6.9 Buried concrete

Based on guidelines provided in BRE Special Digest 1 (BRE 2005) and the information presented in Section 5.5.9 (Table 5.13):

- The shallow soils (Made Ground, Bognor Sand Member and London Clay Formation (weathered) can be classified as Design Sulfate Class DS-1 and ACEC Class AC-1.
- The deeper soils (clays of the London Clay Formation) can be classified as Design Sulfate Class DS-4m and ACEC Class AC-4m for strip / trench fill / pad foundations.

This equates to a Design Chemical Class¹ of:

- DC-1 for the shallow soils (Made Ground, Bognor Sand Member and London Clay Formation (weathered); and

¹ The calculated ACEC class can be used in accordance with BS 8500-1+A2 (2019), Table A.9 to select the Designated Concrete (DC) class for an intended working life of 50 years. However, the designer is referred to BS 8500-1+A2 (2019), for full details and notes to Table A.9, including any Additional Protective Measures (APMs).

- DC-4 for the deeper soils (clays of the London Clay Formation)

If using a piled foundation design solution, the Design Sulphate Class can be reduced to DS-2 due to reduced potential for oxidation of soils.

The designer should check and confirm the classification of concrete using the information presented in Appendix C and Appendix D during the design.

7. GEO-ENVIRONMENTAL ASSESSMENT

7.1 Updated conceptual model

7.1.1 Updated ground model

The preliminary ground model developed from the desk study and field reconnaissance survey (Section 3) has been updated using the findings of the ground investigation and is presented in Section 5. This ground model is the basis for the geo-environmental assessment presented in this section.

7.1.2 Updated exposure model

Following the ground investigation, the plausible contaminant sources, receptors and pathways identified in the preliminary geo-environmental exposure model (Section 3.4), have been updated or confirmed as follows.

7.1.2.1 Sources

No potential sources have been removed from, or added to, the exposure model.

7.1.2.2 Receptors

No potential receptors have been removed from, or added to, the exposure model.

7.1.2.3 Pathways

The following potential pathway has been removed from the exposure model:

- VOC and petroleum hydrocarbon vapour ingress via permeable soils and/or construction gaps, as no evidence of VOC or petroleum hydrocarbons were encountered during intrusive ground investigation.

Using the updated ground model and updated exposure model, generic risk assessment is undertaken as presented below.

7.2 Risk assessment approach

Generic risk assessments have been undertaken in accordance with the principles of LCRM (Environment Agency, 2021) using the CSM that has been updated following the ground investigation.

Firstly, the risks associated with the identified potential contaminant linkages have been estimated using standardised methods (typically involving comparison of site data with published 'screening values'). Secondly, where screening values are exceeded, the result has been evaluated in an authoritative review of the findings with other pertinent information to determine whether or not the exceedance is, or is not acceptable in the site-specific circumstances.

The data sets used in the assessment comprise the analytical results obtained by Hydrock as listed in Section 4.

In cases where unacceptable risks are indicated, actions such as more advanced stages of risk assessment or remediation are proposed in Section 7.10.

7.3 Human health risk assessment

This is a Tier 2 assessment using soil screening values applicable to commercial / industrial CLEA land use scenario.

The soil screening values used are generic assessment criteria (GAC). It should be noted that Category 4 Screening Levels (C4SL) for lead have been used as there is no recognised GAC for lead and the use of the term ‘GAC’ in this report includes the C4SL for lead.

Statistical testing is used where data sets are suitable. The critical issue is sample numbers. For data sets with low sample numbers and / or where sampling is targeted at specific areas, individual sample test results are compared directly with the screening values. Larger and non-targeted data sets are subject to statistical testing.

The phrase ‘further assessment required’ is used to denote soil concentrations that are equal to, or exceed, a GAC. This does not necessarily mean that the soil is ‘contaminated’ or not otherwise suitable for use. The assessment and any mitigation required are to ensure the site does not pose an ‘unacceptable risk’.

The results of the assessment are presented in Appendix F.

7.3.1 Averaging areas

The ‘averaging area’ used in this report is based on the conceptual model and the proposed development, and is taken to be the entire area of the site, with the data separated into Made Ground, Topsoil and natural soils.

7.3.2 Risk estimation

7.3.2.1 Hydrock default list of determinands

Based on individual test results that exceed the GAC, the chemicals of potential concern which require further assessment are summarised in Table 7.1.

Table 7.1: Chemicals of potential concern for which further assessment is required (human health)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	No. samples exceeding generic criterion
Made Ground						
No Exceedances						
Natural soils						
No Exceedances						

7.3.2.2 Asbestos

There was not visual evidence of Asbestos Containing Materials (ACM) in any of the exploratory hole locations during intrusive ground investigation works. The laboratory results confirm the absence of Asbestos Containing Materials (ACM) or fibres in all samples submitted for testing.

7.3.2.3 Petroleum hydrocarbons (PHC)

No evidence of the presence of petroleum hydrocarbons was encountered during intrusive ground investigation works. Laboratory testing confirm the absence of petroleum hydrocarbons on all samples submitted for testing.

7.3.3 Risk evaluation

The screening exercise has not identified any the presence of asbestos containing materials, or exceedance of any determinands for chemicals of potential concern to human health. Therefore, no mitigation measures are required.

7.4 Plant life risk assessment

7.4.1 Risk estimation

Priority phytotoxic chemical concentrations have been screened against published values to determine the likely risk to plant growth and the findings presented in Appendix F. As with human health, statistical testing is used where data sets are suitable, otherwise individual sample test results are compared directly with the screening values.

Based on test results that exceed the GAC, the chemicals of potential concern which require further assessment are summarised in Table 7.2.

Table 7.2: Chemicals of potential concern for which further assessment is required (risk to plants)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	No. samples exceeding generic criterion
Made Ground						
No Exceedances						
Natural Soils						
No Exceedances						

7.4.2 Risk evaluation

No exceedances were detected in any of the samples submitted for laboratory testing. Therefore, no further considerations are required in relation to chemicals of potential concern to plant life.

Notwithstanding the above, should areas of the site be proposed for planting and soft landscaping, it is likely that import of chemically and physically suitable growing medium will be required, as soils presently at surface level are not considered likely to support less hardy vegetation.

7.5 Pollution of controlled waters risk assessment

7.5.1 Risk estimation

The risks to groundwater and surface water from contaminants on site have been assessed in accordance with the Environment Agency (2006) Remedial Targets Methodology (RTM).

Site contaminant loadings are compared with relevant screening values (Water Quality Targets), which are linked to the Conceptual Model.

Acceptable WQT are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)).

As related specifically to this site, the data are compared with criteria selected. This methodology involves selecting which of several alternative risk scenarios apply in this case. The assessment is presented in Table 7.3 below, with the justification for the scenarios selected explained in the following text:

- The Bognor Sand Member is a secondary Aquifer A and may provide base flow to the Hermitage Stream located at the southwest boundary of the site.
- There is a low risk of surface water runoff or contaminants leached from the Made Ground entering the secondary Aquifer A of the Bognor Sand Member.
- Although there are no groundwater abstractions within 2km of the site, and the nearest surface water abstraction located at 1.5km of the site corresponds to spray irrigation, a conservative scenario is used to compare water samples with Drinking Water Standards.

Table 7.3: Summary of water quality risk assessment protocol

Hydrock scenario	Water body receptors	Secondary receptors	Example contaminant linkages	RTM level and data used	Water quality targets
D	Groundwater	Human health (abstraction)	Contaminants from site leach or seep into a groundwater body that feeds inland surface water by base flow. The surface water may be used for human consumption and is an aquatic ecosystem.	RTM Level 2 - Groundwater. Direct comparison of surface water samples	DWS EQS (inland)
	Surface water	Aquatic ecosystem			

Notes:

Some EQS are water hardness dependent. This is measured either in the receiving surface water or in groundwater (if it is part of the pathway), or is estimated from national maps.

Inland waters EQS applicable to freshwater, 'other' waters EQS applicable to coastal or transitional waters.

This table and the results of the assessment are considered as a first screening for potential risks of pollution of Controlled Waters. More specific requirements may be stipulated by the relevant Agency.

The results of the screening assessment are presented in Appendix F and are summarised in Table 7.4.

There are no WQT for petroleum hydrocarbon fractions in water. However, because of the sensitivity of the water environment to petroleum hydrocarbons, an initial screening exercise is also included in Table 7.4 irrespective of the assessment scenario(s) stated in Table 7.3.

In some instances, the reporting limit (or detection limit) quoted by the laboratory may be greater than the WQT that it is being assessed against. As the current exercise is an initial screening assessment, further assessment of these elements has not been undertaken.

Table 7.4: Chemicals of potential concern for which further assessment is required (controlled waters)

Chemical of potential concern	Water quality target (WQT) (µg/l)	Basis for water quality target	No. samples	No. samples above LoD	Min. (µg/l)	Max. (µg/l)	No. samples exceeding WQT and above LoD
Shallow groundwater in the London Clay Formation (weathered)							
Aluminium	200	DWS	6	6	1.4	260	1
Manganese	50	DWS	6	6	8.9	260	3
Groundwater in the London Clay Formation							
Arsenic	10	DWS	2	2	3.51	32.6	1
Cobalt	3.0	EQS	2	2	0.3	4.6	1
Manganese	50	DWS	2	2	46	210	1
Nickel	20	DWS	2	2	1.6	77	1
Selenium	10	DWS	2	1	<0.6	13	1
Ammonium	500	DWS	2	2	47	7300	1
Ammoniacal nitrogen as N	300	EQS	2	2	37	5700	1
Phenol	7.7	EQS	2	2	2.5	9400	1
Aro>EC7 -EC8	10	EQS	2	1	<1	32	1
Note: the maximum recorded value is compared with the water quality target. * The Water Supply Regulations 1989 and the Private Water Supply Regulations 1991 both contained a prescribed concentration of 10 µg/l for 'dissolved or emulsified hydrocarbons (after extraction with petroleum ether); mineral oils'. This was removed when these Regulations were updated in 2000 (consolidated 2007) and 2009, respectively. However, 10 µg/l is used in this report as an initial screening assessment as it is frequently the preferred approach of the Environment Agency. † The inland waters EQS for copper, manganese, nickel and zinc are based on the bioavailable fraction, and because bioavailability has not been calculated for these metals the assessment is conservative, as it is based on the assumption of 100% bioavailability. As there is no evidence of artificial accumulations of these substances on the site, it is considered that they originate from the natural geology and therefore, they do not represent a significant risk.							

7.5.2 Risk evaluation

In regards to shallow groundwater within the London Clay Formation (weathered), it is considered that:

- Aluminium has been detected at location WS5.08 (260µg/l compared to DWS of 200µg/l). Elevated concentrations of Manganese were detected at locations BH5.02, WS5.04 and WS5.08 (values of 110, 120 and 260 µg/l respectively when compared to a DWS of 50 µg/l). However, there are no registered groundwater abstractions for drinking water purposes within 2km of the site, and the nearest surface abstraction is located at 1.5km from the site. Therefore, these exceedances are not considered to pose a significant risk.

In regards to groundwater within the London Clay Formation, it is considered that:

- Results from location WS5.02, present significant concentrations of Arsenic (32.6µg/l compared to DWS of 10 µg/l), cobalt (4.6µg/l compared to EQS of 3.0µg/l), manganese (210µg/l compared to DWS of 50µg/l), nickel (77µg/l compared to DWS of 20µg/l), selenium (13µg/l compared to DWS of 10µg/l); however, as there are no registered groundwater abstractions for drinking water purposes within 2km of the site, and the nearest surface abstraction is located at 1.5km from the site, these exceedances are not considered to pose a significant risk.

- High concentrations of ammonium (7300µg/l compared to DWS of 500µg/l), ammoniacal nitrogen (5700µg/l compared to EQS of 300µg/l), phenol (9400µg/l compared to EQS of 7.7µg/l) and ARO>EC7-EC8 (32µg/l compared to EQS of 10µg/l) were detected in this location. However, groundwater samples collected down gradient (BH5.03, BH5.05, WS5.04 and WS5.08) have shown no exceedances in these determinands, indicating contamination is not migrating through the ground and in consequence, it does not pose a risk neither to groundwater body nor to the Hermitage Stream located in the southwest of the site.

Given the above, it is considered that there are multiple lines of evidence supporting the fact that even though there are exceedances of the water quality targets, these are generally not considered to represent a significant risk of pollution of Controlled Waters because these observations were made within strata classified as unproductive, there is no identified source for such contaminants on site other than the reworking of site won soils or placement of engineered fill, and results from ground samples collected down gradient did not present any exceedances. This conclusion will require agreement from the Environment Agency.

7.6 Ground gases risk assessment

7.6.1 Data

It is judged from the available evidence that the gas generation potential at the site is very low to low (due to site being subject to earthworks) and that the sensitivity of the development is low (due to its proposed commercial use). Consequently, and in accordance with CIRIA C665 (Table 5.5a and 5.5b), an appropriate minimum monitoring regime is 6 readings over 2 months. However, monitoring has not been undertaken during periods of falling and low atmospheric pressure since these were not readily available during the monitoring programme (lowest atmospheric pressure during site visit was 1011atm). As such, the conclusions presented below are considered interim, and supplementary ground gas monitoring is recommended.

7.6.2 Assessment

The risks associated with the ground gases methane (CH₄) and carbon dioxide (CO₂) have been assessed using BS 8485:2015 +A1:2019, which cites the guidelines published by CIRIA (Wilson et al 2007) (known as Situation A).

The assessment guidelines published by CIRIA are based on interpretation of the gas concentrations and the gas flow rates, amongst other variables, and are compliant with the model procedures of LCRM. The modified Wilson and Card assessment has been used by comparing the maximum gas concentrations and gas screening values (GSV²) in Appendix D with the published table (CIRIA Table 8.5) and the assessment is summarised in Table 7.5. The assessment is presented in Appendix E.

Table 7.5: Ground gas risk assessment

	Min	Max	Typical ⁽ⁱ⁾	Comment
Steady Flow Rate (l/hr)	-11.7	4.5	<0.01	It is considered likely that the range in flow rates observed are as a function of fluctuation within the water table causing a "piston effect" within the monitoring wells.

² Note: GSV is synonymous with 'site characteristic hazardous gas flow rate' (Q_{hgs}) of BS 8485:2015 +A1:2019 Table.

	Min	Max	Typical ⁽ⁱ⁾	Comment
Methane (%)	0.0	4.2	<5	Methane concentrations were not detected or below 0.4% in all locations with the exception of WS5.02, where methane concentrations were recorded between 2.6% and 4.2%
Carbon Dioxide (%)	0.0	1.2	<1	Highest concentrations of CO ₂ were detected at location WS5.05, with values up to 1.2%.
Carbon Monoxide (ppm)	0.0	4.0		Highest concentrations of CO were detected up to 7ppm.
Hydrogen Sulphide (ppm)	0.0	1.0		Concentration of H ₂ S were generally not detected or below 1ppm in all locations.
Oxygen (%)	4.4	20.8		-
Carbon Dioxide GSV (l/hr)	-0.0711	0.0045	<0.07	Generally, CS1 conditions.
Methane GSV (l/hr)	-0.2142	0.0000	<0.07	CS1
⁽ⁱ⁾ Hydrock assume that values are considered to be atypical if 95% or more of the remaining data are less than the value under consideration For the purposes of the calculation, where the recorded gas flow rate is below the manufacturer's limit of detection for the instrument used, the detection limit has been adopted for the gas flow rate.				

As indicated in Table 7.5, the calculated GSV for carbon dioxide and methane indicates CS1 conditions and methane and carbon dioxide at concentrations are 'typically' below 1% and 5% respectively. However, given the occasional concentrations of methane >1% that were recorded at locations WS5.02 and WS5.04, it is considered that, in accordance with a precautionary approach, an upgraded CS2 classification is appropriate for the site at this stage. Detailed gas risk assessment may be undertaken to investigate further.

The period over which monitoring was undertaken was generally of high atmospheric pressure with limited low pressure conditions. As such, worst case scenario has not been captured by monitoring to data and additional gas monitoring is recommended to achieve compliance with CIRIA C665.

Based on the data to date, mitigation measures are required. These are described in Section 7.10.

7.7 Construction materials risk assessment

7.7.1 Water pipelines

A formal water pipe investigation and risk assessment is beyond the scope of this report. However, the findings of this investigation have been compared to the threshold values in Water UK HBF (2014), Table 1 as far as is practicable, to give an indication of the possible restrictions to the use of plastic pipes for water supply to the site.

The site is previously undeveloped, with some recent earthwork and terracing across the site. The preliminary risk assessment and investigation has indicated no plausible contaminant sources. It is envisaged that standard pipework will be suitable for the site. However, confirmation should be sought from the water supply company at the earliest opportunity.

7.7.2 Other construction materials

Plastic pipes for drains and sewers are manufactured from unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) or polyethylene (PE). These materials may be affected by the presence of organic compounds in the soil.

In accordance with the British Plastics Federation Guidance (August, 2018), as the concentrations of PAH, and BTEX are below 100mg/kg and the concentrations of petroleum hydrocarbons (TPH) are below 200 mg/kg, PVC-U, PP or PE pipework is considered suitable.

The implications for buried concrete are discussed in Section 6.9.

7.8 Contamination risks to ground workers

7.8.1 Introduction

Whilst risks to construction workers are not discussed in detail, the following section discusses potential risks that should be considered.

Information presented in this document is provided to assist in managing the risk associated with contamination in soil and groundwater at the site but is not definitive. The Contractors are responsible for undertaking their own assessments and assessing what risks are present and what control measures are required.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and, if required, RPE should be provided and utilised.

7.8.2 Metals, metalloids, PAH and petroleum hydrocarbons

The soils do not contain significantly elevated concentrations of metals, metalloids, PAH or petroleum hydrocarbons and standard PPE is considered suitable for the handling of soils.

7.8.3 Ground Gas

It is noted that concentrations of carbon dioxide (an asphyxiant) in the soil exceed HSE Workplace Exposure Limits for personnel in the working environment of 1.5% for short term (15 minutes) exposure and / or 0.5% for long term exposure. Furthermore, soil concentrations of oxygen are below the HSE recommendations of 18%.

Soil gas concentrations are not necessarily reflected by those in the breathing zone, as such, all Contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

7.8.4 Asbestos

As no clearly identifiable ACM has been seen during the site walkover or during the ground investigation and no fibres have been detected in soil samples analysed by laboratory testing, CAR2012 does not apply. However, there is always the possibility of unexpected contamination and the Contractors should undertake a watching brief during the works. If any suspect material is encountered, works in that area of the site should stop, the area fenced off and Hydrock should be notified.

7.9 Findings of the generic contamination risk assessments

The potential sources, pathways and receptors identified in the desk study (Section 2) have been investigated (Sections 4 and 5) and assessed (Sections 7.2 to 7.7). A Source-Pathway-Receptor linkage assessment has been undertaken and is presented in Appendix I (Table I.2).

The final Conceptual Model is illustrated on Hydrock Drawing 19453-HYD-XX-XX-DR-GE-1008 in Appendix A.

A summary of the Source-Pathway-Receptor (SPR) contaminant linkages for which the risks may be unacceptable and require mitigation (those that are moderate or higher) are discussed in Table 7.6.

Table 7.6 assumes the following SPR linkages which have been discounted (subject to agreement) at the risk evaluation stage are confirmed by the regulators as not requiring further consideration (mitigation). If these assumptions are not agreed during regulatory discussions, the conclusions as noted in Table 7.6 will need to be updated:

- Elevated concentrations ammonium, ammoniacal nitrogen, phenol and aromatic petroleum hydrocarbons band EC7-EC8 in groundwater at WS5.02.
- Methane concentrations up to 4.2% at WS5.02 and WS5.04.

Table 7.6: Residual risks following risk evaluation

Contaminant Linkage				Comments	
Pollutant Linkage	Sources	Pathways	Receptors	General	Mitigation
P 1 L	Concentrations of ammonium, ammoniacal nitrogen, phenol and aromatics above WQT in water at WS5.02.	Leaching through unsaturated zone.	Groundwater and possible abstractors.	DWS exceeded. The groundwater is a Secondary A Aquifer. However, no groundwater abstractions are recorded within 2km from site.	No mitigation considered necessary since the site is not situated within a sensitive water resource area and cohesive strata are likely to mitigate any potential migration to the surface water course to the south.
P 2 L	Concentrations of ammonium, ammoniacal nitrogen, phenol and aromatics above GAC in water at WS5.02.	Direct contact	Water supply pipes.	No plausible contaminant sources where identified during site works.	It is envisaged that standard pipework will be suitable for the site.

Contaminant Linkage				Comments	
Pollutant Linkage	Sources	Pathways	Receptors	General	Mitigation
P 3 L	Concentrations of methane up to 4.2% at WS5.02 and WS5.04	Migration through soils or groundwater to indoor air.	End users of new buildings (asphyxiation).	Characteristic Situation 2.	Gas protection measures to CS2 designed in accordance with BS8485.
			New buildings (damage by explosion).		
			Neighbouring properties (damage by explosion).		

7.10 Mitigation measures

The outline remediation strategy presented below is provided for guidance only, and does not represent a 'Remediation Options Appraisal', or a 'Remediation Strategy', prepared in accordance with LCRM (2021).

As shown in Table 7.6, Hydrock consider the following mitigation is required to ensure the site is suitable for use for the proposed end use. The mitigation measures include:

- No mitigation recommended, however agreement with Environment Agency required. (PL1)
- Standard pipework will be suitable for the site. confirmation should be sought from the water supply company at the earliest opportunity (PL2).
- Installation of ground gas protection measures to comply with CS2 conditions (as described in Section 7.10.1) (PL3).

The methodology for the remediation should be set out in a Remediation Strategy (which will include the 'Implementation Plan', the 'Verification Plan' and the 'Long Term Monitoring and Maintenance Plan'), which will need to be submitted to the regulatory authorities for approval.

In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site in accordance with waste regulations.

Verification reports by a competent independent geo-environmental specialist will be required following completion of any remedial works (including ground gas membrane installation).

7.10.1 Gas protection measures

Mitigation of the risk from ground gases needs to be undertaken in accordance with BRE 414, CIRIA 665, BS 8485:2015 +A1:2019 and CIRIA C735. In accordance with BS 8485:2015 +A1:2019, the design of gas protection measures needs to be undertaken in accordance with the Characteristic Situation and the building type:

- The site is provisionally classified as Characteristic Situation 2.
- Offices are classified as Type C buildings, warehouse parts of the buildings are classified as Type D buildings.

As such, the offices require 2.5 points of protection and the warehouses require 1.5 points of protection. This is illustrated in Table 7.7.

Table 7.7: Gas protection score by CS and type of building (after BS 8485:2015 +A1:2019)

Characteristic Situation	Minimum gas protection score (points)			
	High risk		Medium risk	Low risk
	Type A building	Type B building	Type C building	Type D building
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5 ^(A)	5.5 ^(A)	4.5	3.5
5	— ^(B)	6.0 ^(A)	5.5	4.5
6	— ^(B)	— ^(B)	— ^(B)	6.0

A) Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.

B) The gas hazard is too high for this empirical method to be used to define the gas protection measures.

The final design of ground gas protection measures is to be specified by the designer (in accordance with CIRIA 665 and BS 8485:2015 +A1:2019) and the protection will need to be achieved by a combination of two or more of the following three types of protection measures:

- the structural barrier of the floor slab,
- ventilation measures; and
- gas resistant membrane.

Where design elements are required to meet certain standards to qualify for the protection points (e.g. cast *in situ* monolithic reinforced floor slab), it is up to the designer to ensure the minimum requirements of the standards are met.

Where used, gas resistant membranes should be:

- sufficiently impervious to methane and carbon dioxide;
- capable, after installation, of providing a complete barrier to the entry of the relevant gas;
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- sufficiently strong to withstand in service stresses (e.g. due to ground settlement if placed below a floor slab);
- sufficiently strong to withstand the installation process and following construction activities until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, and dropping tools); and

- chemically resistant to degradation by other contaminants that might be present.

As preliminary guidance, Hydrock would suggest the following:

For CS2 - Type C - 2.5 points

Either:

- Beam and block or pre-cast concrete floor slab (0 points);
- passive sub floor ventilation e.g. void (good performance 1.5 points); and
- 2000g gas resistant membrane (2.0 points).

Or:

- Cast *in situ* ground-bearing floor slab (with only nominal mesh reinforcement) (0.5 points);
- 2000g gas resistant membrane (2.0 points).

For CS2 - Type D – 1.5 points

Either:

- Pressure relief pathway (layer of low fines gravel or a geocomposite blanket or strips terminating in a gravel trench external to the building) (0.5 points);
- Cast *in situ* monolithic reinforced ground bearing raft or reinforced cast *in situ* suspended floor slab with minimal penetrations (1 point); and
- 2000g DPM (0 points).
- Or:
- Cast *in situ* ground-bearing floor slab (with only nominal mesh reinforcement) (0.5 points);
- 2000g gas resistant membrane (2.0 points).

Other variations are possible. It is up to the designer to design and specify ground gas protection measures.

Where a gas resistant membrane is required as part of the design, all joints and penetrations are to be sealed and the installation is to be verified in accordance with CIRIA C735 (Mallet et al 2014) or it will score zero points and will not be deemed to afford any protection. This verification will involve verification by the Contractor and independent verification on a selected number of plots by Hydrock or alternative qualified independent third-party.

Whilst tape can be utilised to seal the seams Hydrock would recommend the membranes are sealed using welded seams and the use of specialist seals around penetrations (top hats etc.). The installer is to present an installation methodology and a QA/QC plan for installation to Hydrock for comment, with particular attention given to sealing the membrane.

In order to achieve the points specified for ventilation, the architect is to design passive ventilation to meet at least 'good performance', as described in Annex B of BS 8485:2015 +A1:2019.

8. WASTE AND MATERIALS MANAGEMENT

8.1 Introduction

The Waste Framework Directive (WFD) (2009/98/EC) defines waste as ‘*any substance which the holder discards or intends to discard.*’ In a geo-environmental context, the waste is most often ‘soil’ and the two main scenarios are offsite disposal of the material as a waste and/or reuse of the material on site. For cost and sustainability reasons, reuse is preferred to off-site disposal.

Section 8.2 below describes the key issues relating to off-site disposal to landfill and Section 8.3 considers requirements relating to reuse of soils and materials management.

8.2 Waste disposal

8.2.1 Principles

Based on the WFD, any material excavated on site may be classified as waste and it is the responsibility of the producer of a material to determine whether or not it is waste. Where off-site disposal is undertaken, the following guidance applies.

Classification is a staged process:

- A hazardous waste is defined under the WFD as one which possesses one or more of fifteen defined hazardous properties. If a waste is not defined as hazardous, then it is non-hazardous.
- Where the materials are soil, it is then be assigned using the ‘List of Waste Codes’, which classifies the material as either:
 - » hazardous (17-05-03), which is defined as “*soil and stones containing hazardous substances*”; or
 - » non-hazardous (17-05-04), which is defined as “*soil and stones other than those mentioned in 17-05-03*”.
 - » Hydrock utilise the proprietary assessment tool, HazWasteOnline™ to undertake this assessment.
- Waste Acceptance Criteria (WAC) testing is then undertaken if required, and are only applicable following classification of the waste, and only where the waste is destined for disposal to landfill. The WAC are both qualitative and quantitative. The WAC and the associated laboratory analyses (leaching tests) are not suitable for use in the determination of whether a waste is hazardous or non-hazardous.

It should be noted that some non-hazardous wastes may be suitable for disposal at an inert landfill as non-hazardous waste, subject to meeting the appropriate waste acceptance criteria.

It should be noted that classification must be undertaken on the waste produced, by the waste producer. Necessary sampling frequency to adequately characterise a soil population is defined within WM3.

Further discussion with regards to the characterisation process for different scenarios and waste types is provided below.

Topsoil and Peat

Topsoil and peat are biodegradable, therefore if they are surplus to requirements and cannot be re-used in accordance with a Materials Management Plan, they cannot be classified as inert. As such, topsoil and peat need to be classified by a staged assessment and sampling process and would either be classified as hazardous or non-hazardous, depending upon the results of the assessment.

Greenfield Sites

Waste from completely greenfield sites may be accepted at a landfill as inert waste if it meets the requirements of paragraph 10 (wastes acceptable without testing at landfills for inert waste) of the Landfill (England and Wales) (Amendment) Regulations (2005) ('the Regulations') can be met. Paragraph 10 of the Regulations states, "*soils may be able to be classified as inert waste without testing, if:*

- *they are single stream waste of a single waste type;*
- *there is no suspicion of contamination and they do not contain other material or substances such as metals, asbestos, plastics, chemicals, etc....."*

As such, where the site is greenfield and the waste producer is confident about the quality of a soil (i.e. naturally occurring and uncontaminated), further sampling and laboratory testing is not necessary for the Basic Characterisation and this can be undertaken on qualitative Waste Acceptance Criteria testing.

In this instance the waste producer can characterise the waste based on visual assessment and written description of the waste in addition to supporting evidence such as a desk study assessment of the greenfield status. However, it should be noted this characterisation is subject to agreement by the landfill operator who may require testing to be undertaken to confirm classification.

Contaminated or potentially contaminated sites

If the site is brownfield, contaminated or potentially contaminated, the waste must undergo an initial waste classification exercise using background information on the source and origin of the waste and assessment of chemical test data in accordance with Environment Agency Technical Guidance WM3.

If following the initial waste classification exercise, the soils are acceptable for disposal to a non-hazardous landfill, further qualitative Waste Acceptance Criteria (WAC) testing is not required.

However, if soils are potentially able to be disposed to an inert landfill as non-hazardous waste, or require testing to determine if they can be disposed of to a stable non-reactive hazardous or hazardous class of landfill, the next stage of assessment is to undertake qualitative WAC testing. This will determine the Basic Characterisation and the landfill category at which the soils can be accepted.

Hazardous material must be subjected to WAC testing to determine whether it requires treatment before it can be accepted at the hazardous landfill, while non-hazardous material can be tested to determine whether it may be suitable for placement in an inert landfill.

8.2.2 HazWasteOnline™ assessment

As the site has been subject to recent earthworks and terracing, in order to inform the preliminary waste characterisation process, Hydrock has undertaken an exercise using the proprietary web-based tool HazWasteOnline™. The output of the HazWasteOnline™ assessment is provided in Appendix G and a summary of the preliminary waste classification is provided below in Section 8.2.4.

A total of 19 soil samples were assessed as part of the HazWasteOnline™. Results indicate that 18 samples are classified as non-hazardous, and 1 sample is classed as 'Hazardous' due to high pH (11.5), hazard properties 'HP 8: corrosive, waste which on application can cause skin corrosion' (SA101 at 0.30m bgl).

8.2.3 WAC Testing

The qualitative WAC tests are provided in Appendix G and a summary of the preliminary disposal options are provided below in in Section 8.2.4.

A total of 4 soil samples between 0.10m bgl to 1.50m bgl were analysed. All of the samples were classed as suitable for disposal as 'Inert Landfill Waste', with exception of one sample with concentration of Total Dissolved Solids (TDS) of 6200mg/kg, classed as 'stable non-reactive hazardous waste in non-hazardous landfill'.

8.2.4 Preliminary waste disposal options

The site is brownfield and based on the site history, WAC testing and the HazWasteOnline™ assessment, if suitable segregation of different types of waste is put in place, for soils to be disposed of, it is considered that:

- The natural uncontaminated subsoils are likely to be classified as 'inert' waste and based on the WAC testing should be able to be disposed of at an inert landfill.
- The Made Ground is likely to be classified as non-hazardous waste.
- Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous.

8.2.5 General waste comments

It should be noted that:

- It is the waste producer's responsibility to segregate the waste at source and waste producers must not mix waste materials/streams or dilute hazardous components, for example by mixing with less or non-hazardous waste on site to meet WAC limit values.
- The above preliminary assessment has been made on the basis of the soils tested as part of the ground investigation, using WAC testing and the HazWasteOnline™ assessment. However, the formal classification of waste can only be undertaken on the material to be disposed of, and by the waste producer and the receiving landfill as license conditions vary from landfill to landfill.
- Basic Characterisation should be undertaken in accordance with Environment Agency guidance by the waste producer. Hydrock can assist if required and this report will assist the characterisation. However, Basic Characterisation does not form part of the current commission and would require further assessment and testing on the wastes actually to be disposed.

- Once the waste producer has undertaken an initial Basic Characterisation on each waste stream, they can manage the soils as part of the on-site processing programme (for example, stockpiling, treatment, screening and separation). The waste producer and landfill operator will then need to agree the suite of compliance testing for regularly generated waste to demonstrate compliance with the initial Basic Characterisation prior to disposal.
- At the time of disposal, additional testing on the excavated soils to be disposed of, will likely be necessary.
- Non-hazardous and hazardous soils require pre-treatment (separation, sorting and screening) prior to disposal.
- The costs for disposal of non-hazardous and hazardous soils are significant compared to disposal of inert material.
- In addition to disposal costs, landfill tax will be applicable. Non-hazardous and hazardous waste will generally be subject to the Standard Rate Landfill Tax. Inert or inactive waste will generally be subject to the Lower Rate Landfill Tax. The landfill tax value changes each April and can be found at <https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013>.
- Before a waste producer can move waste to a landfill site for disposal, they need to check the landfill site has the appropriate permit and must have completed the following³:
 - » Duty of care transfer note / Hazardous Waste consignment note, including comment as to if pre-treatment has been undertaken; and
 - » Basic Characterisation of the waste, to include: description of the waste; waste code (using list of wastes); composition of the waste (by testing, if necessary) and; WAC testing (if required).

8.3 Materials management

8.3.1 Introduction

Soils that are to remain on site, should be managed and reused in accordance with a Materials Management Plan (MMP), prepared in accordance with 'The Definition of Waste: Development Industry Code of Practice', Version 2 (CL:AIRE), known as the DoWCoP. Where all aspects of the DoWCoP are followed the soils are considered not to be waste, because they were never discarded in the first place.

Version 2 of the DoWCoP clearly sets out the principles and an outline of the requirements of a MMP. The following compliance criteria must be seen to apply to the MMP for the site:

- Factor 1: Protection of human health and protection of the environment.
- Factor 2: Suitability for use, without further treatment.
- Factor 3: Certainty of Use.
- Factor 4: Fixed Quantity of Material.

The reuse of soils at sites should be considered during the planning and development design process so that compliance with issues such as fixed quantity and certainty of use clearly relate to agreed site levels. Suitability of Use is normally evident from the remediation strategy or the design statement,

³ ENVIRONMENT AGENCY. November 2010. Guidance on waste acceptance procedures and criteria. Waste acceptance at landfills. The Environment Agency.

which form an integral part of a MMP. However, some soils may need to be tested post-excavation to prove they are suitable for use.

Once the MMP is finalised, it must be declared by a Qualified Person (QP). The Declaration is an on-line submission as part of which the QP is required to confirm that the declaration is being made before the relevant works have commenced (i.e. it is not a retrospective application).

Once all material movements have been completed in accordance with the MMP a verification report must be produced, kept for 2 years and provided to the EA on request.

It should be noted that failure to comply with the requirements of the DoWCoP when re-using materials has potentially significant consequences for the waste holder. The risk is that the reused materials are still regarded as a waste that has been illegally deposited. From 1 April 2018, the scope of Landfill Tax has been extended to sites operating without the appropriate environmental disposal permit, and operators of illegal waste sites will now be liable for Landfill Tax. Further information is available at: <https://www.gov.uk/government/publications/landfill-tax-disposals-not-made-at-landfill-sites/landfill-tax-disposals-not-made-at-landfill-sites>.

If soils are excavated and reused on sites (or moved to another site) without a MMP, exemption, or appropriate Permit in place, anyone who knowingly facilitates the disposal may be '*jointly and severally liable*' to any assessment of tax, fines or prosecution.

8.3.2 *Materials management scenarios*

The materials management scenarios present on site are discussed below.

It should be noted that more than one scenario may apply, dependent upon where the soils are proposed for reuse.

8.3.2.1 *Made Ground and other contaminated soils*

On sites where Made Ground or contaminated soils are present, any soils excavated will be a waste as soon as they are excavated (even if they are clean, naturally occurring materials), unless they are subject to reuse in accordance with the DoWCoP. As such, for any brownfield site or a site where Made Ground is present and soils are being moved and reused, the materials could be deemed a waste, subject to either:

- a Materials Management Plan (MMP), to prevent the material being classified as a waste following reuse; or
- an exemption (for limited volumes); or
- an environmental permit, dependant on its status.

Other commonly occurring circumstances are:

If Made Ground is being moved between sites, it must be ensured that appropriate permits are in place to ensure the soils are not classified as a waste. Made Ground cannot be moved between sites under DoWCoP alone and would require relevant permits as part of the MMP documentation for the Hub site the material is being treated at.

All recycled materials (6F2 etc.) must be produced under the 2013 WRAP 'Quality Protocol: Aggregates from inert waste', whether on site or off-site. If they are not, they will be deemed a waste and can only be used on site under a permit. More information can be found at

<https://www.gov.uk/government/publications/quality-protocol-production-of-aggregates-from-inert-waste>.

8.3.2.2 Geotechnical improvement requirements

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties e.g. lime / cement modification, are not generally regarded as waste treatment operations and do not require a permit.

However, should processing be needed (such as screening, treatment or improvement), that would constitute a waste activity and require a mobile treatment permit. This may be as simple as removing oversize material with an excavator bucket, to using a riddle bucket to remove hardcore to full mechanical screening.

9. UNCERTAINTIES AND LIMITATIONS

9.1 Site-specific comments

The scheduled monitoring is complete but is insufficient at this stage to fully characterise the site in accordance with CIRIA Report 665. Whilst the monitoring completed to date provides a preliminary indication of the gas regime, additional monitoring is recommended and the conclusions of this report will need to be updated following completion of the additional monitoring.

9.2 General comments

Hydrock Consultants Limited (Hydrock) has prepared this report in accordance with the instructions of Portsmouth City Council (the Client), by PO3004424 dated 12/07/2021 under the terms of appointment for Hydrock, for the sole and specific use of the Client and parties commissioned by them to undertake work where reliance is placed on this report. Any third parties who use the information contained herein do so at their own risk. Hydrock shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared or for use of the report by any parties not defined in Hydrock's appointment.

This report details the findings of work carried out between July and August 2021. The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, not all potential environmental constraints or liabilities associated with the site may have been revealed.

Hydrock has used reasonable skill, care and diligence in the design of the investigation of the site and in its interpretation of the information obtained. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred.

Groundwater data are only representative of the dates on which they were obtained and both levels and quality may vary.

Unless otherwise stated, the recommendations in this report assume that ground levels will remain as existing. If there is to be any re-profiling (e.g. to create development platforms or for flood alleviation) then the recommendations may not apply.

Information provided by third parties has been used in good faith and is taken at face value; however, Hydrock cannot guarantee its accuracy or completeness.

Where the existing report(s) prepared by others have been provided by the Client, it is assumed that these have been either commissioned by the Client, or can be assigned to the Client, and can be relied upon by Hydrock. Should this not be the case Hydrock should be informed immediately as additional work may be required. Hydrock is not responsible for any factual errors or omissions in the supplied data, or for the opinions and recommendations of others. It is possible that the conditions described may have since changed through natural processes or later activities.

The work has been carried out in general accordance with recognised best practice. Unless otherwise stated, no assessment has been made for the presence of radioactive substances or unexploded ordnance. Where the phrase 'suitable for use' is used in this report, it is in keeping with the terminology used in planning control and does not imply any specific warranty or guarantee offered by Hydrock.

The chemical analyses reported were scheduled for the purposes of risk assessment with respect to human health, plant life and controlled waters as discussed in the report. Whilst the results may be useful in applying the Hazardous Waste Assessment Methodology given in Environment Agency Technical Guidance WM3, they are not primarily intended for that purpose and additional analysis will be required at the time of disposal to fully classify waste. Discussion and comment with regards to waste classification are preliminary and do not form the requirements of 'Basic Characterisation' as required.

Assessment and testing for the presence of coal tar has only been completed at the locations of exploratory holes undertaken for risk assessment purposes. This investigation is not designed to provide a definitive assessment of the risk from coal tar, nor the waste classification for bituminous bound pavement arisings at the site.

Unless otherwise stated, at the time of this investigation the future routes of water supply pipes had not been established. This investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling and chemical testing may be required at a later date once the routes of the supply pipes are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

Whilst the preliminary risk assessment process has identified potential risks to construction workers, consideration of occupational health and safety issues is beyond the scope of this report.

Please note that notwithstanding any site observations concerning the presence or otherwise of archaeological sites, asbestos-containing materials or invasive weeds, this report does not constitute a formal survey of these potential constraints and specialist advice should be sought.

Any site boundary line depicted on plans does not imply legal ownership of land.

10. RECOMMENDATIONS FOR FURTHER WORK

Following the ground investigation works undertaken to date, the following further works will be required:

- supplementary gas monitoring, in periods of low atmospheric pressure with detailed gas risk assessment to further assess concentrations of methane up to 4.2% at WS5.02 and WS5.04.
- collection of surface groundwater sample from Hermitage Stream to assess risk from contaminant migration via surface water.
- discussion and agreement with utility providers regarding the materials suitable for pipework;
- provision of geotechnical design for the Category 2 structures (earthworks, retaining, floor slabs, foundations etc.);
- production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies);
- production of a Materials Management Plan for reuse of soils at the site (if required);
- remediation and mitigation works; and
- verification of the earthworks, remediation and mitigation works.

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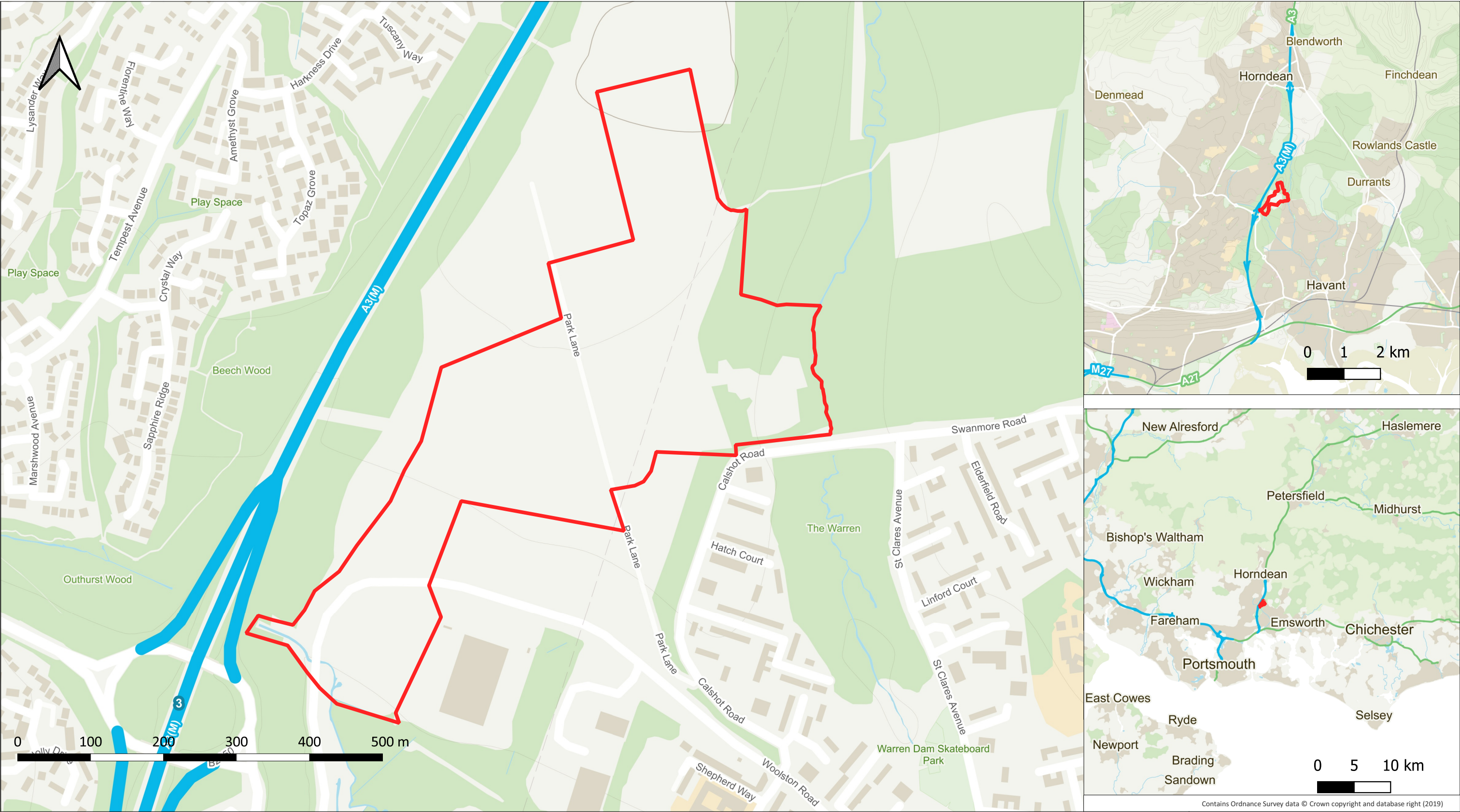
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Appendix A Drawings



KEY PLAN

Site Boundary

NOTES

REVISIONS				
P01	FIRST ISSUE EXAMPLE			
	DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	03/06/2021
REV.	REVISION NOTES/COMMENTS			
	DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	03/06/2021



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CLIENT
Portsmouth City Council

PROJECT
DUNSBURY PARK, PORTSMOUTH

TITLE Site Location Plan			
HYDROCK PROJECT NO. 19453-GELO		SCALE @ A3 1:1	
PURPOSE OF ISSUE SUITABLE FOR INFORMATION			STATUS S2
DRAWING NO. 19453-HYD-XX-XX-DR-GE-1001			REVISION P01

Dimensions are in millimeters, unless stated otherwise.
It is the recipient's responsibility to print this document to the correct scale.
All relevant drawings and specifications should be read in conjunction with this drawing.



SCHEDULE OF ACCOMMODATION
(Gross Internal Area)

PLOT 1

Unit 100	-	29,000 sq ft (2,694m ²)
Warehouse Area	-	6,000 sq ft (557m ²)
Office (2 storey)	-	35,000 sq ft (3,251m ²)
Total Area	-	

Level Access	-	4
Car Parking	-	40

Plot 1 Area	-	2.52 Acres (1.02 Hectares)
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PLOT 4

Unit 400	-	141,750 sq ft (13,169m ²)
Warehouse Area	-	7,460 sq ft (693m ²)
Office (First Floor)	-	
(Incl. GF Core)	-	149,210 sq ft (13,862m ²)
Total Area	-	

Level Access	-	2
Dock Loading	-	14
HGV Parking	-	34
Car Parking	-	155

Plot 4 Area	-	8.05 Acres (3.26 Hectares)
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PLOT 5

Unit 500	-	39,110 sq ft (3,633m ²)
Total Area	-	

Unit 501	-	25,000 sq ft (2,323m ²)
Total Area	-	

Unit 502	-	17,760 sq ft (1,650m ²)
Total Area	-	

Plot 5a & b Area	-	4.85 Acres (1.96 Hectares)
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PLOT 6

Unit 600	-	21,750 sq ft (2,021m ²)
Warehouse Area	-	2,415 sq ft (224m ²)
Office (First Floor)	-	
(Incl. GF Core)	-	24,165 sq ft (2,245m ²)
Total Area	-	

Level Access	-	3
Car Parking	-	36

Unit 601	-	95,000 sq ft (8,826m ²)
Warehouse Area	-	5,000 sq ft (465m ²)
Office (First Floor)	-	
(Incl. GF Core)	-	100,000 sq ft (9,290m ²)
Total Area	-	

Loading Docks	-	8
Level Access	-	2
Car Parking	-	100

Plot 6 Area	-	7.62 Acres (3.08 Hectares)
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PLOT 7

Unit 700	-	142,500 sq ft (13,239m ²)
Warehouse Area	-	7,500 sq ft (697m ²)
Office (Two Storey)	-	
(Incl. GF Core)	-	150,000 sq ft (13,935m ²)
Total Area	-	

Level Access	-	2
Dock Loading	-	15
HGV Parking	-	28
Car Parking	-	178

Plot 7 Area	-	18.42 Acres (7.46 Hectares)
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Total GIA	-	540,245 sq ft (50,189m ²)
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Total Plot Area	-	41.46 Acres (16.78 Hectares)
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OPTION 07

rev	amendments	by	ckd	date
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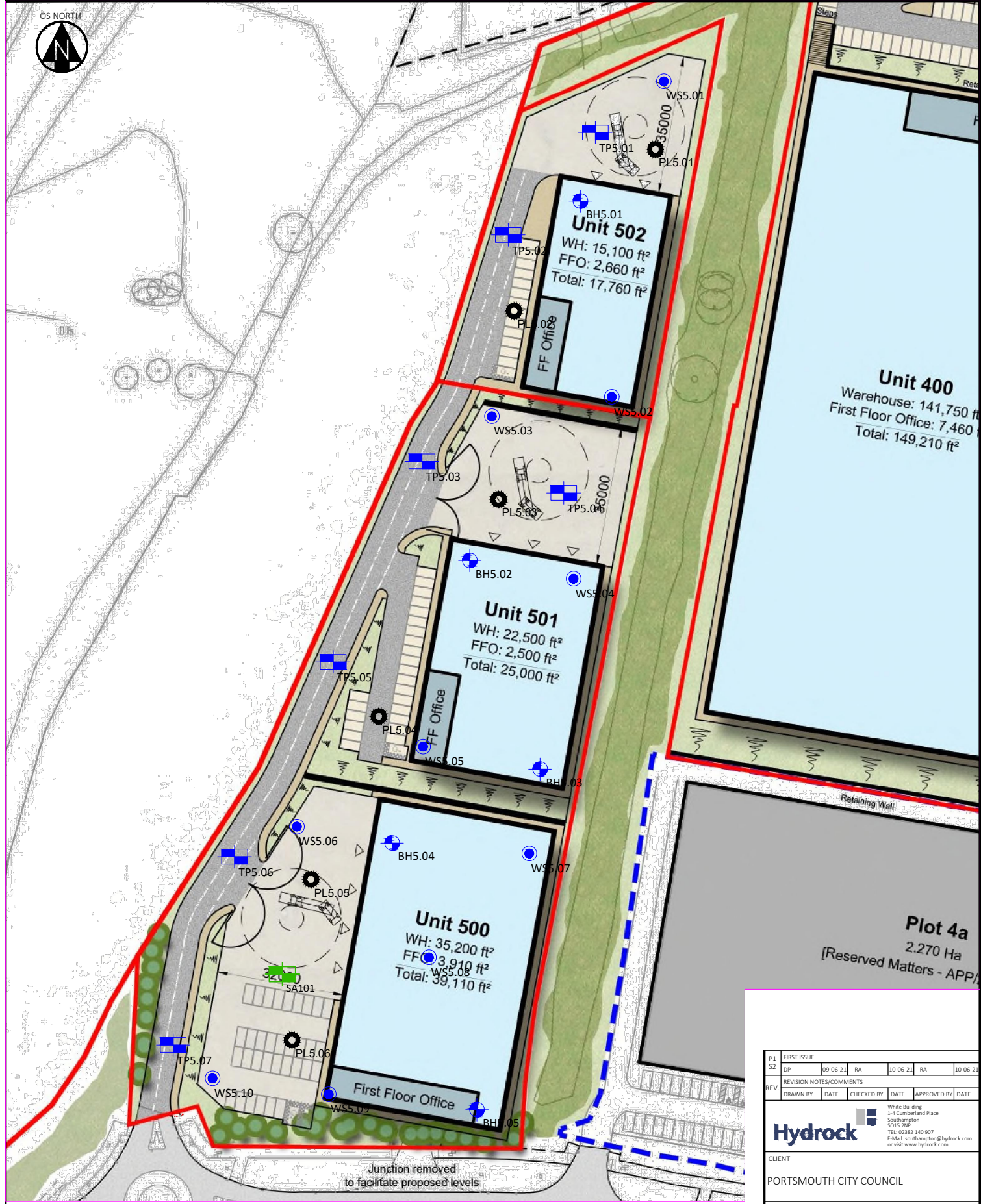
Dunsbury Park Masterplan,
Portsmouth
Masterplan



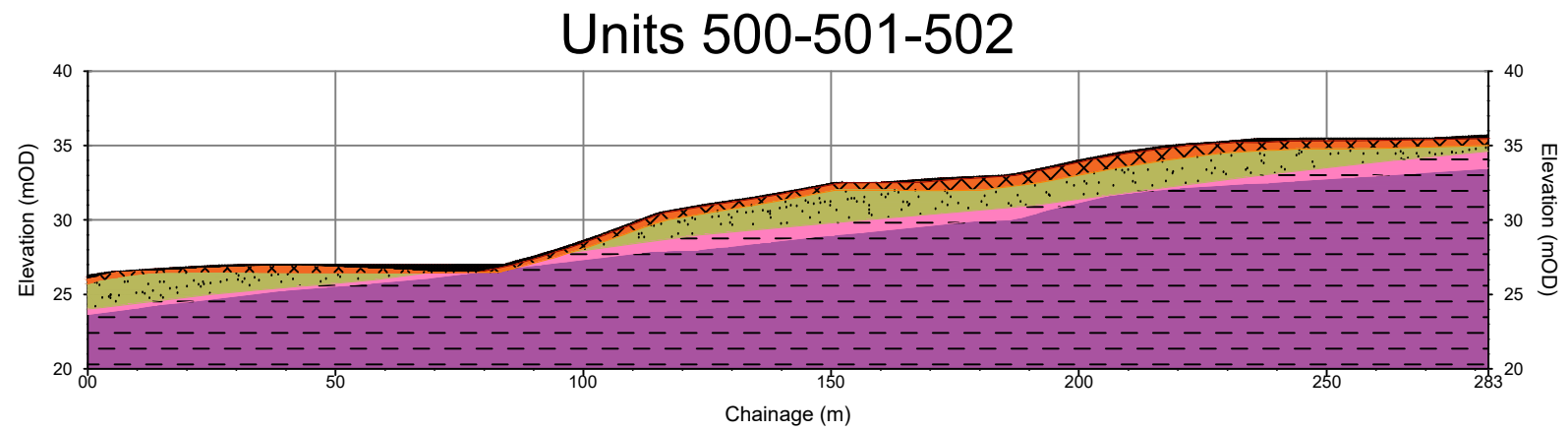
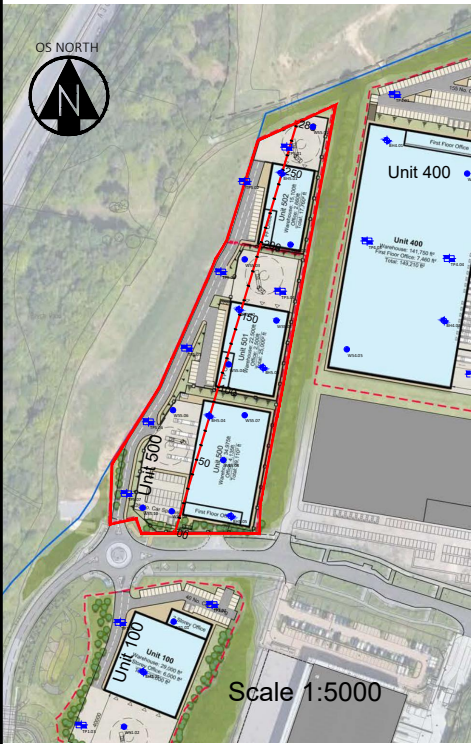
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Drawing Status:	Feasibility
Drawn / Checked:	DS / MDS
Date:	14.06.2021
Scale:	1:1,500 A0

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P1	FIRST ISSUE			
S2	DP	29-06-21	RA	10-06-21
REVISION NOTES/COMMENTS				
REV	DRAWN BY	DATE	CHECKED BY	DATE
Hydrock				
CLIENT				
PORTSMOUTH CITY COUNCIL				
PROJECT				
DUNSBURY PARK				
TITLE				
EXPLORATORY HOLE LOCATION PLAN - Plot 500-502				
HYDROCK PROJECT NO. 19453			SCALE @ A4 NTS	
PURPOSE OF ISSUE SUITABLE FOR INFORMATION				STATUS S2
DRAWING NO. (PROJECT - ORIGINATOR/VOLUME LEVEL-TYPE-ROLE-NUMBER) 19453-HYD-XX-XX-DR-GE-1002				REVISION P1

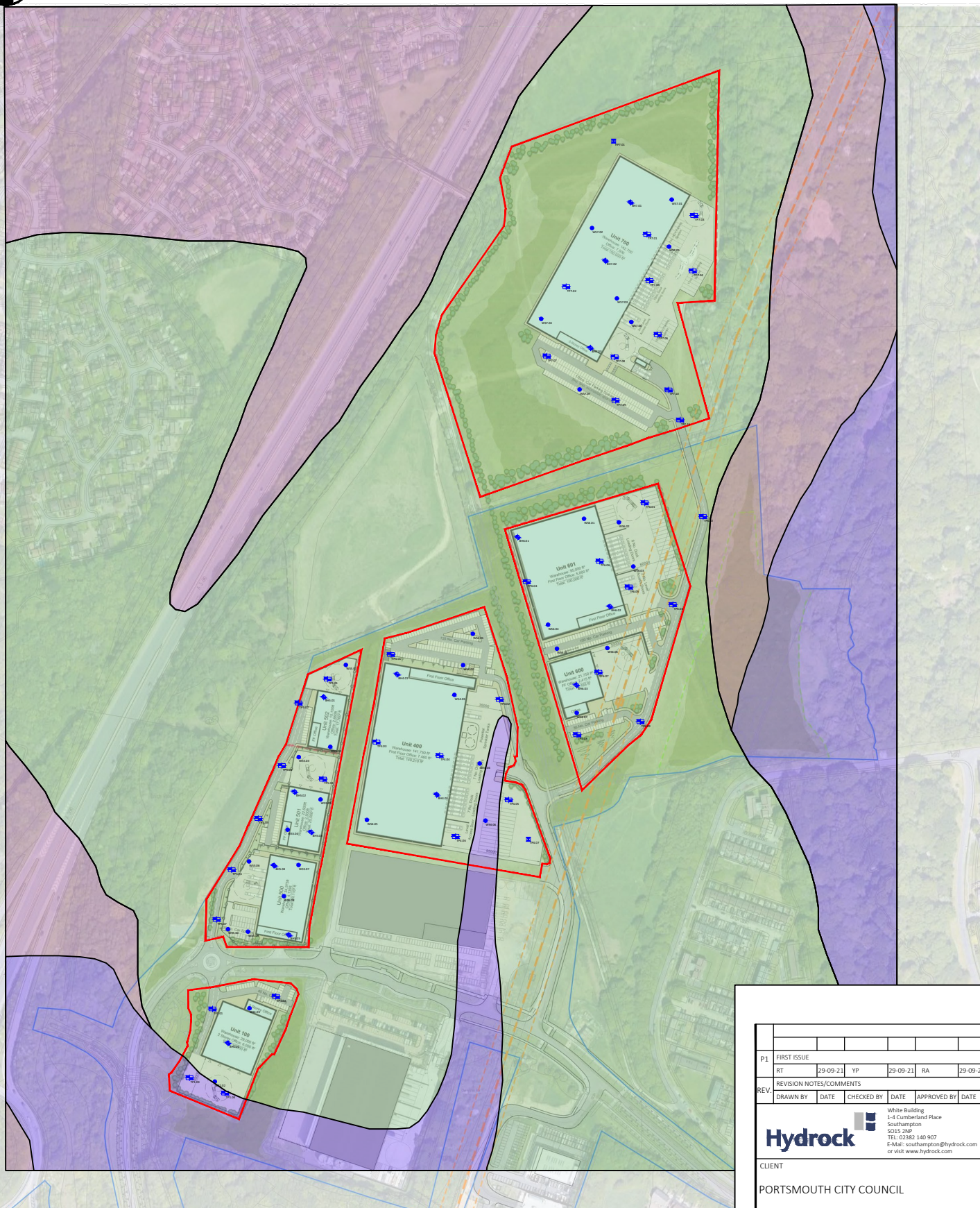


Key:

-  Borehole
BH##
-  Windowless sampler borehole
WS##
-  Trial pit - mechanically excavated
TP##

-  Surface Made ground
-  Made ground
-  Bognor sand member
-  London Clay weathered
-  London Clay

P1	FIRST ISSUE				
S2	RT	28-09-21	YP	28-09-21	RA 10-06-21
REVISION NOTES/COMMENTS					
REV.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY DATE
 White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com					
CLIENT					
Portsmouth City Council					
PROJECT					
Dunsbury Park					
TITLE					
INDICATIVE CROSS SECTION - Plot 500					
HYDROCK PROJECT NO.				SCALE @ A4	
19453				1:1500	
PURPOSE OF ISSUE					STATUS
SUITABLE FOR INFORMATION					S2
DRAWING NO.					REVISION
19453-HYD-XX-XX-DR-GE-1006					P1

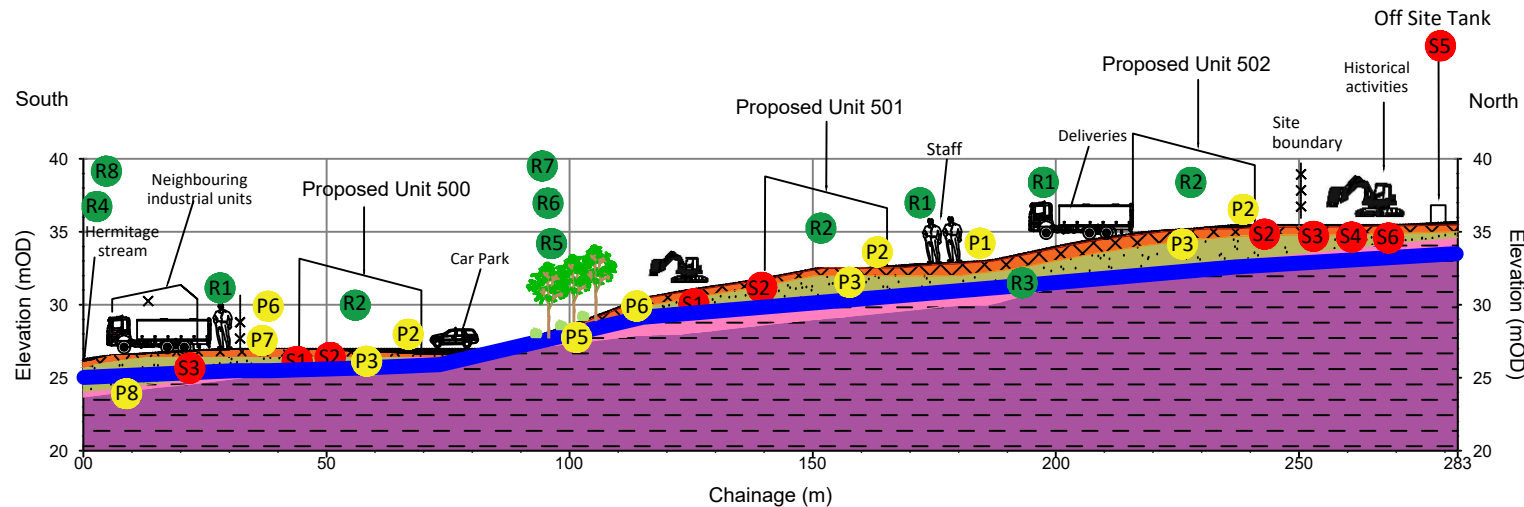


Key:

- | | |
|------------------------------------|--------------------|
| Borehole | Head |
| Windowless sampler borehole | Bognor sand member |
| Trial pit - mechanically excavated | London Clay |
| Trial pit - hand dug pit | |

P1	FIRST ISSUE				
RT	29-09-21	YP	29-09-21	RA	29-09-21
REVISION NOTES/COMMENTS					
REV	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY
White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com					
CLIENT					
PORTSMOUTH CITY COUNCIL					
PROJECT					
DUNSBUARY PARK					
TITLE					
GEOLOGICAL MAP - BGS					
HYDROCK PROJECT NO. 19453			SCALE @ A4 1:5000		
PURPOSE OF ISSUE SUITABLE FOR INFORMATION					STATUS S2
DRAWING NO. (PROJECT - ORIGINATOR/VOLUME LEVEL-TYPE-ROLE-NUMBER) 19453-HYD-XX-XX-DR-GE-1007					REVISION P1

Unit 500-501-502



LEGEND

- S SOURCE
- P PATHWAY
- R RECEPTOR

NOTE

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing is indicative only.

Potential on-site sources of contamination

- Made Ground, associated with current earthworks/construction works, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S01).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / earthworks (S02).

Potential off-site sources of contamination

- Made Ground, associated with historical mining activities (old clay pit, brick and tile works), possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S03).
- Made Ground, associated with earthworks for the construction of A3 (M) in the west boundary on the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S04).
- Hydrocarbon vapours from potential VOC and petroleum hydrocarbon spillages/leaks from unspecified tank located at 110m N of the site. (S05).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / backfilled clay pits/brick works. (S06).

Potential receptors

- People (neighbours, site end users) (R01).
- Development end use (buildings, utilities) (R02).
- Groundwater: Secondary A aquifer status of the Bognor Sand Member (R03).
- Surface water: off-site Hermitage Stream at south east of the site (R04).
- Soft landscaping areas (R05)
- Ecology: Habitat Creation Area at the west side of the site (R06).
- Ecology: Designated Ancient and Seminal Woodland / Ancient Replanted Woodland in the surrounding areas of the site (R07).
- Aquatic ecosystem in the Hermitage Stream (R08).

Potential pathways

- Ingestion, skin contact, inhalation of dust and outdoor air by people (P01).
- Direct contact with substances deleterious to building materials (P02).
- Ground gas (Methane, carbon dioxide, etc.) ingress via permeable soils and/or construction gaps (P03).
- Root uptake by plant (P05).
- Migration of contaminant via leachate migration through the unsaturated zone in Bognor Sand Member (P06).
- Surface water via overland flow (P07).
- Surface water, via drainage discharge (P08).
- Surface water via base flow from groundwater (P09).

P1	FIRST ISSUE				
S2	YP	28-09-21	AJ	28-09-21	AJ
REV.	REVISION NOTES/COMMENTS				
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY
Hydrock White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com					
CLIENT Portsmouth City Council					
PROJECT Dunsbury Park					
TITLE Conceptual Site Model - Plot 500					
HYDROCK PROJECT NO. 19453			SCALE @ A4 1:1500		
PURPOSE OF ISSUE SUITABLE FOR INFORMATION					STATUS S2
DRAWING NO. 19453-HYD-XX-XX-DR-GE-1008					REVISION P1

Appendix B Previous Desk Study Information



1ST LINE DEFENCE



Detailed Unexploded Ordnance (UXO) Risk Assessment

Project Name	Dunsbury Park, Portsmouth
Client	Avison Young Holdings Limited
Site Address	Dunsbury Park, Fitzwygram Way, Portsmouth, Hampshire, PO9 4EE
Report Reference	DA13636-00
Date	22/07/2021
Originator	HF





Executive Summary

Site Location and Description

The site is located in Portsmouth, Hampshire. It is bordered by open land to the north, open land and multiple residential structures with their associated gardens and access ways to the east and south, and open land and the A3(M) to the west.

Recent aerial imagery dated 2020 indicates that the site comprises green-field land, hardstanding ground, access ways and structures associated with Dunsbury Park.

The site is approximately centred on the OS grid reference: **SU 69889 09144**.

Proposed Works

Information provided by the client indicates that proposed intrusive works will comprise a number of boreholes and trial pits on site. The overall scope of works is understood to include the construction of multiple structures, and associated parking areas, which are pictures on the site plan presented on **Annex C**.

Geology and Bomb Penetration Depth

The British Geological Survey (BGS) map shows the southern section of the site to be underlain by London Clay Formation - clay, silt and sand. Sedimentary Bedrock formed in the Palaeogene Period. Superficial deposits are recorded as Head - clay, silt, sand and gravel. Superficial Deposits formed in the Quaternary Period. The northern section of the site appears to be underlain by Bognor Sand Member - sand. Sedimentary Bedrock formed in the Palaeogene Period. No superficial deposits are attributed to the northern section of the site.

Site-specific geotechnical information was not available to 1st Line Defence at the time of the production of this report. An assessment of maximum bomb penetration depth can be made once such data becomes available, or by a UXO specialist during on-site support.

It should be noted that the maximum depth that a bomb could reach may vary across a site and will be largely dependent on the specific underlying geological strata and its density.

UXO Risk Assessment

1st Line Defence has assessed that there is a **Low-Medium Risk** from items of German aerial delivered UXO and Low from Allied UXO across the site. This assessment is based on the following factors:

Risk from German Aerial Delivered Ordnance:

- During WWII, the proposed site was situated within both the Rural District of Petersfield and the Urban District of Havant and Waterloo. Official Home Office bombing statistics indicate that these districts sustained an overall very low and low-moderate density of bombing, with an average of 8.8 and 35.4 items of ordnance recorded per 1,000 acres, respectively. Despite this low overall density of the wider region, the nearby area is anticipated to have sustained a relatively high density of bombing, potentially due to the nearby military camps and the proximity of Luftwaffe targets in Portsmouth.
- Reference was found to five HE bombs, a number of incendiaries, and an additional crater being found at 'Middle Park Farm', one and a half miles north-west of Havant, in October of 1940. Historic OS mapping indicates that the Middle Park farmhouse was located immediately south-east of the site, with attached open land located within and around the southern section of the boundary. However, exactly how much of the site comprised land associated with this farm is unknown, and the specific localities of incident within available records has not been provided. As such, it's conceivable that some, or all, of these incidents occurred within the site itself, and/or across the nearby area.
- Additional sporadic bombing incidents are also recorded across the wider area, including at Leigh Park to the east and at Hewetts Copse approximately 800m to the north-west.
- There are no obvious signs of bomb damage, such as craters, within the boundary in available aerial photography. Although, it should be noted that this image was taken in the mid-war period, so additional incident could conceivable have occurred after the image was taken.
- Open areas of varying degrees of vegetation are generally not considered to be favourable to the detection of UXO, as evidence, such as entry holes or craters, may be more easily obscured under vegetation, which is liable to grow and shift. Likewise, due to the sites largely open composition, access is thought to have been mostly limited to agricultural use by

**UXO Risk Assessment**

those cultivating the land. Such access is generally thought to have been infrequent and seasonal, although the roadways on and surrounding the site may have also provided the site with a degree of monitor. Unfavourable ground condition and infrequent access may increase the likelihood that indicators, such as entry holes, would have gone unnoticed and unreported.

- In summary, evidence was found to indicate that bombing occurred across the immediate site area, including multiple bombing incidents within a farm understood to have been partially located within the southern section of the boundary. However, owing to the limitations of the available record set, how many of these incidents, if any, occurred within the site is unknown; it has not been possible to determine exactly how much of the boundary comprised land associated with Middle Park Farm, and the specific localities of incident within available records has not been provided. Although, conceivably some or all of these incidents may have directly affected the site. Wartime conditions within the proposed boundary are also not thought to have been particularly favourable to the detection of UXO indicators, which may be more likely to go unnoticed and unreported in open, infrequently accessed conditions.
- In light of these factors, the risk of German aerial delivered and anti-aircraft ordnance on site is deemed to be higher than the 'background level' for the region; particularly in and around the south-eastern section of the site, which may have comprised open land. Accordingly, it is strongly advised that ground personnel conducting intrusive works are given UXO awareness briefings, and a UXO risk management plan is put in place, to make them aware of the history of the site, what to look out for, and what to do in the event that a suspected item is found.

Risk from Allied Ordnance:

- According to an in-house geo dataset several D-Day marshalling camps were located west of the site location, at Stakes and Cowplain. Published information also indicates the presence of naval camp at Stockheath, south-east of the site around Riders Lane.¹ Though these camps may have been indicative of a larger military presence in the wider area, they are not believed to have directly affected the site boundary itself.
- The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding aerial delivered ordnance.

Post-war Redevelopment

- The majority of the site was subject to some post-WWII developments with the construction of all areas of hardstanding ground, roadways and structures associated with Dunsbury Park. The wider area was also subject to much development with the construction of multiple areas of residential housing, and the A3(M) to the west.
- The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

Recommended Risk Mitigation Measures

The following risk mitigation measures are recommended to support the proposed works at Dunsbury Park, Portsmouth:

All Works

- UXO Risk Management Plan
- Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

¹ Hind, R., *The Naval Camps of Bedhampton and Leigh Park*



Glossary

Abbreviation	Definition
AA	Anti-Aircraft
AFS	Auxiliary Fire Service
AP	Anti-Personnel
ARP	Air Raid Precautions
DA	Delay-action
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
FP	Fire Pot
GM	G Mine (Parachute mine)
HAA	Heavy Anti-Aircraft
HE	High Explosive
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operation Centre
LAA	Light Anti-Aircraft
LCC	London County Council
LRRB	Long Range Rocket Bomb (V-2)
LSA	Land Service Ammunition
NFF	National Filling Factory
OB	Oil Bomb
PAC	Pilotless Aircraft (V-1)
PB	Phosphorous Bomb
PM	Parachute Mine
POW	Prisoner Of War
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RFC	Royal Flying Corps
RNAS	Royal Naval Air Service
ROF	Royal Ordnance Factory
SA	Small Arms
SAA	Small Arms Ammunition
SD2	Anti-personnel "Butterfly Bomb"
SIP	Self-Igniting Phosphorous
U/C	Unclassified bomb
UP	Unrotated Projectile (rocket)
USAAF	United States Army Air Force
UX	Unexploded
UXAA	Unexploded Anti-Aircraft
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	Flying Bomb (Doodlebug)
V-2	Long Range Rocket
WAAF	Women's Auxiliary Air Force
X	Exploded



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1st Line Defence Limited

Detailed Unexploded Ordnance (UXO) Risk Assessment

Site: Dunsbury Park, Portsmouth
Client: Avison Young Holdings Limited

1. Introduction

1.1. Background

1st Line Defence has been commissioned by Avison Young Holdings Ltd to conduct a Detailed Unexploded Ordnance (UXO) Risk Assessment for the works proposed at Dunsbury Park, Portsmouth.

Buried UXO can present a significant risk to construction works and development projects. The discovery of a suspect device during works can cause considerable disruption to operations as well as cause unwanted delays and expense.

UXO in the UK can originate from three principal sources:

1. Munitions resulting from wartime activities including German bombing in WWI and WWII, long range shelling, and defensive activities.
2. Munitions deposited as a result of military training and exercises.
3. Munitions lost, burnt, buried or otherwise discarded either deliberately, accidentally, or ineffectively.

This report will assess the potential factors that may contribute to the risk of UXO contamination. If an elevated risk is identified at the site, this report will recommend appropriate mitigation measures, in order to reduce the risk to as low as is reasonably practicable. Detailed analysis and evidence will be provided to ensure an understanding of the basis for the assessed risk level and any recommendations.

This report complies with the guidelines outlined in *CIRIA C681*, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry.'

2. Method Statement

2.1. Report Objectives

The aim of this report is to conduct a comprehensive assessment of the potential risk from UXO at Dunsbury Park, Portsmouth. The report will also recommend appropriate site and work-specific risk mitigation measures to reduce the risk from explosive ordnance during the envisaged works to a level that is as low as reasonably practicable.

2.2. Risk Assessment Process

1st Line Defence has undertaken a five-step process for assessing the risk of UXO contamination:

1. The likelihood that the site was contaminated with UXO.
2. The likelihood that UXO remains on the site.
3. The likelihood that UXO may be encountered during the proposed works.
4. The likelihood that UXO may be initiated.
5. The consequences of initiating or encountering UXO.

In order to address the above, 1st Line Defence has taken into consideration the following factors:

- Evidence of WWI and WWII German aerial delivered bombing as well as the legacy of Allied occupation.
- The nature and conditions of the site during WWII.
- The extent of post-war development and UXO clearance operations on site.
- The scope and nature of the proposed works and the maximum assessed bomb penetration depth.
- The nature of ordnance that may have contaminated the proposed site area.

2.3. Sources of Information

Every reasonable effort has been made to ensure that relevant evidence has been consulted and presented in order to produce a thorough and comprehensible report for the client. To achieve this the following, which includes military records and archive material held in the public domain, have been accessed:

- The National Archives and Hampshire Archives.
- Historical mapping datasets.
- Historic England National Monuments Record.
- Relevant information supplied by Avison Young Holdings Ltd.
- Available material from 33 Engineer Regiment (EOD) Archive (part of 29 Explosive Ordnance Disposal and Search Group).
- 1st Line Defence's extensive historical archives, library and UXO geo-datasets.
- Open sources such as published books and internet resources.

Research involved a visit to The National Archives and Hampshire Archives.

3. Background to Bombing Records

3.1. General Considerations of Historical Research

This desktop assessment is based largely upon analysis of historical evidence. Every reasonable effort has been made to locate and present significant and pertinent information. 1st Line Defence cannot be held accountable for any changes to the assessed risk level or risk mitigation measures, based on documentation or other data that may come to light at a later date, or which was not available to 1st Line Defence during the production of this report.

It is often problematic and sometimes impossible to verify the completeness and accuracy of WWII-era records. As a consequence, conclusions as to the exact location and nature of a UXO risk can rarely be quantified and are, to a degree, subjective. To counter this, a range of sources have been consulted, presented and analysed. The same methodology is applied to each report during the risk assessment process. 1st Line Defence cannot be held responsible for any inaccuracies or the incompleteness in available historical information.

3.2. German Bombing Records

During WWII, bombing records were generally gathered locally by the police, Air Raid Precaution (ARP) wardens and military personnel. These records typically contained information such as the date, the location, the amount of damage caused and the types of bombs that had fallen during an air raid. This information was made either through direct observation or post-raid surveys. The Ministry of Home Security Bomb Census Organisation would then receive this information, which was plotted onto maps, charts, and tracing sheets by regional technical officers. The collective record set (regional bomb census mapping and locally gathered incidents records) would then be processed and summarised into reports by the Ministry of Home Security Research and Experiments Branch. The latter were tasked with providing the government 'a complete picture of air raid patterns, types of weapons used and damage caused- in particular to strategic services and installations such as railways, shipyards, factories and public utilities.'²

The quality, detail and nature of record keeping could vary considerably between provincial towns, boroughs and cities. No two areas identically collated or recorded data. While some local authorities maintained records with a methodical approach, sources in certain areas can be considerably more vague, dispersed, and narrower in scope. In addition, the immediate priority was mostly focused on assisting casualties and minimising damage at the time. As a result, some records can be incomplete and contradictory. Furthermore, many records were even damaged or destroyed in subsequent air raids. Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are therefore not always reliable. Whereas records of attacks on military or strategic targets were often maintained separately and have not always survived.

3.3. Allied Records

During WWII, considerable areas of land were requisitioned by the War Office for the purpose of defence, training, munitions production and the construction of airfields. Records relating to military features vary and some may remain censored. Within urban environments datasets will be consulted detailing the location of munition production as well as wartime air and land defences. In rural locations it may be possible to obtain plans of military establishments, such as airfields, as well as training logs, record books, plans and personal memoirs. As with bombing records, every reasonable effort will be made to access records of, and ascertain any evidence of, military land use. However, there are occasions where such evidence is not available, as records may not be accessible, have been lost/destroyed, or simply were not kept in the first place.

² <http://www.nationalarchives.gov.uk/help-with-your-research/research-guides/bomb-census-survey-records-1940-1945/>.

4. UK Regulatory Environment and Guidelines

4.1. General

There is no formal obligation requiring a UXO risk assessment to be undertaken for construction projects in the UK, nor is there any specific legislation stipulating the management or mitigation of UXO risk. However, it is implicit in the legislation outlined below that those responsible for intrusive works (archaeology, site investigation, drilling, piling, excavation etc.) should undertake a comprehensive and robust assessment of the potential risks to employees and that mitigation measures are implemented to address any identified hazards.

4.2. CDM Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM 2015) define the responsibilities of parties involved in the construction of temporary or permanent structures.

The CDM 2015 establishes a duty of care extending from clients, principle co-ordinators, designers, and contractors to those working on, or affected by, a project. Those responsible for construction projects may therefore be accountable for the personal or proprietary loss of third parties, if correct health and safety procedure has not been applied.

Although the CDM does not specifically reference UXO, the risk presented by such items is both within the scope and purpose of the legislation. It is therefore implied that there is an obligation for parties to:

- Provide an appropriate assessment of potential UXO risks at the site (or ensure such an assessment is completed by others).
- Put in place appropriate risk mitigation measures if necessary.
- Supply all parties with information relevant to the risks presented by the project.
- Ensure the preparation of a suitably robust emergency response plan.

4.3. The 1974 Health and Safety at Work etc. Act

All employers have a responsibility under the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999, to ensure the health and safety of their employees and third parties, so far as is reasonably practicable and conduct suitable and sufficient risk assessments.

4.4. CIRIA C681

In 2009, the Construction Industry Research and Information Association (CIRIA) produced a guide to the risk posed by UXO to the UK construction industry (CIRIA C681). CIRIA is a neutral, independent and not-for-profit body, linking organisations with common interests and facilitating a range of collaborative activities that help improve the industry.

The publication provides the UK construction industry with a defined process for the management of risks associated with UXO from WWI and WWII aerial bombardment. It is also broadly applicable to the risks from other forms of UXO that might be encountered. It focuses on construction professionals' needs, particularly if there is a suspected item of UXO on site, and covers issues such as what to expect from a UXO specialist. The guidance also helps clients to fulfil their legal duty under CDM 2015 to provide designers and contractors with project specific health and safety information needed to identify hazards and risks associated with the design and construction work. This report conforms to this CIRIA guidance and to the various recommendations for good practice referenced therein. It is

recommended that this document is acquired and studied where possible to allow a better understanding of the background to both the risk assessment process and the UXO issue in the UK in general.

4.5. Additional Legislation

In the event of a casualty resulting from the failure of an employer/client to address the risks relating to UXO, the organisation may be criminally liable under the Corporate Manslaughter and Corporate Homicide Act 2007.

5. The Role of Commercial UXO Contractors and The Authorities

5.1. Commercial UXO Specialists

The role of a UXO Specialist (often referred to as UXO Consultant or UXO Contractor) such as 1st Line Defence, is defined in CIRIA C681 as the provision of expert knowledge and guidance to the client on the most appropriate and cost-effective approach to UXO risk management at a site.

The principal role of UXO Specialists is to provide the client with an appropriate assessment of the risk posed by UXO for a specific project, and identify and carry out suitable methodology for the mitigation of any identified risks to reduce them to an acceptable level.

The requirement for a UXO Specialist should ideally be identified in the initial stages of a project, and it is recommended that this occur prior to the start of any detailed design. This will enable the client to budget for expenditure that may be required to address the risks from UXO, and may enable the project team to identify appropriate techniques to eliminate or reduce potential risks through considered design, without the need for UXO specific mitigation measures. The UXO Specialist should have suitable qualifications, levels of competency and insurances.

Please note 1st Line Defence has the capability to provide a complete range of required UXO risk mitigation services, in order to reduce a risk to as low as reasonably practicable. This can involve the provision of both ground investigation, and where appropriate, UXO clearance services.

5.2. The Authorities

The police have a responsibility to co-ordinate the emergency services in the event of an ordnance-related incident at a construction site. Upon inspection they may impose a safety cordon, order an evacuation, and call the military authorities Joint Services Explosive Ordnance Disposal Operation Centre (JSEODOC) to arrange for investigation and/or disposal. Within the Metropolitan Police Operational Area, SO15 EOD will be tasked to any discovery of suspected UXO. The request for Explosive Officer (Expo) support is well understood and practiced by all Metropolitan Boroughs. The requirement for any additional assets will then be coordinated by the Expo if required.

In the absence of a UXO specialist, police officers will usually employ such precautionary safety measures, thereby causing works to cease, and possibly requiring the evacuation of neighbouring businesses and properties.

The priority given to the police request will depend on the EOD teams' judgement of the nature of the UXO risk, the location, people and assets at risk, as well as the availability of resources. The speed of response varies; authorities may respond immediately or in some cases it may take several days for the item of ordnance to be dealt with. Depending on the on-site risk assessment the item of ordnance may be removed from the site and/or destroyed by a controlled explosion.

Following the removal of an item of UXO, the military authorities will only undertake further investigations or clearances in high-risk situations. If there are regular UXO finds on a site the JSEODOC may not treat each occurrence as an emergency and will recommend the construction company puts in place alternative procedures, such as the appointment of a commercial contractor to manage the situation.

6. The Site

6.1. Site Location

The site is located in Portsmouth, Hampshire. It is bordered by open land to the north, open land and multiple residential structures with their associated gardens and access ways to the east and south, and open land and the A3(M) to the west.

The site is approximately centred on the OS grid reference: **SU 69889 09144**.

Site location maps are presented in **Annex A**.

6.2. Site Description

Recent aerial imagery dated 2020 indicates that the site comprises green-field land, hardstanding ground, access ways and structures associated with Dunsbury Park.

A recent aerial photograph and site plan are presented in **Annex B** and **Annex C** respectively.

7. Scope of the Proposed Works

7.1. General

Information provided by the client indicates that proposed intrusive works will comprise a number of boreholes and trial pits on site. The overall scope of works is understood to include the construction of multiple structures, and associated parking areas, which are pictures on the site plan presented on **Annex C**.

8. Ground Conditions

8.1. General Geology

The British Geological Survey (BGS) map shows the southern section of the site to be underlain by London Clay Formation - clay, silt and sand. Sedimentary Bedrock formed in the Palaeogene Period. Superficial deposits are recorded as Head - clay, silt, sand and gravel. Superficial Deposits formed in the Quaternary Period. The northern section of the site appears to be underlain by Bognor Sand Member - sand. Sedimentary Bedrock formed in the Palaeogene Period. No superficial deposits are attributed to the northern section of the site.

8.2. Site Specific Geology

Site-specific geotechnical data was not provided by the client during the production of this report.

9. Site History

9.1. Introduction

The purpose of this section is to identify the composition of the site pre and post-WWII. It is important to establish the historical use of the site, as this may indicate the site's relation to potential sources of UXO as well as help with determining factors such as the land use, groundcover, likely frequency of access and signs of bomb damage.

9.2. Ordnance Survey Historical Maps

Relevant historical maps were obtained for this report and are presented in **Annex D**. See below for a summary of the site history shown on acquired mapping.

Pre-WWII		
Date	Scale	Description
1932	1;2,500	The site largely comprised open land and dense vegetation, with woodlands in the south-west corner and part of <i>Dunsbury Hill Farm</i> in the north. An access way ran north to south across the north-eastern section of the site, labelled as <i>Park Lane</i> , with another in the south-west, labelled as <i>Hulbert Road</i> . It was bordered by open land and dense vegetation to the north, east and south, with woodland to the west. <i>Middle Park Farm</i> is recorded to the east, just outside the boundary, though this cannot be seen in available mapping presented in Annex D1 .

Post-WWII		
Date	Scale	Description
1963	1;10,000	The site does not appear to have been subject to significant levels of change since the previous OS mapping edition. One structure south of the site appears to have been demolished, with residential development noted further beyond. <i>Middle Park Farm</i> is still recorded to the east.

10. Introduction to German Aerial Delivered Ordnance

10.1. General

During WWI and WWII, the UK was subjected to bombing which often resulted in extensive damage to city centres, docks, rail infrastructure and industrial areas. The poor accuracy of WWII targeting technology and the nature of bombing techniques often resulted in neighbouring areas to targets sustaining collateral damage.

In addition to raids which concentrated on specific targets, indiscriminate bombing of large areas also took place. This occurred most prominently in the London 'Blitz', though affected many other towns and cities. As discussed in the following sections, a proportion of the bombs dropped on the UK did not detonate as designed. Although extensive efforts were made to locate and deal with these UXBs at the time, many still remain buried and can present a potential risk to construction projects.

The main focus of research for this section of the report will concern German aerial delivered ordnance dropped during WWII, although WWI bombing will also be considered.

10.2. Generic Types of WWII German Aerial Delivered Ordnance

To provide an informed assessment of the hazards posed by any items of unexploded ordnance that may remain in situ on site, the table below provides information on the types of German aerial delivered ordnance most commonly used by the Luftwaffe during WWII. Images and brief summaries of the characteristics of these items of ordnance are listed in **Appendices i-iii**.

Generic Types of WWII German Aerial Delivered Ordnance		
Type	Frequency	Likelihood of detection
High Explosive (HE) bombs	In terms of weight of ordnance dropped, HE bombs were the most frequently deployed by the Luftwaffe during WWII.	Although efforts were made to identify the presence of unexploded ordnance following an air raid, often the damage and destruction caused by detonated bombs made observation of UXB entry holes impossible. The entry hole of an unexploded bomb can be as little as 20cm in diameter and was easily overlooked in certain ground conditions (see Appendices i-iii). Furthermore, ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded smaller bomb. UXBs therefore present the greatest risk to present-day intrusive works.
1kg Incendiary bombs (IB)	In terms of the number of weapons dropped, small IBs were the most numerous. Millions of these were dropped throughout WWII.	IBs had very limited penetration capability and in urban areas would often have been located in post-raid surveys. If they failed to initiate and fell in water, on soft vegetated ground, or bombed rubble, they could easily go unnoticed.
Large Incendiary bombs (IB)	These were not as common as the 1kg IBs, although they were more frequently deployed than PMs and AP bomblets.	If large IBs did penetrate the ground, complete combustion did not always occur and in such cases they could remain a risk to intrusive works.
Aerial or Parachute mines (PM)	These were deployed less frequently than HE and IBs due to size, cost and the difficulty of deployment.	If functioning correctly, PMs would generally have had a slow rate of descent and were very unlikely to have penetrated the ground. Where the parachute failed, mines would have simply shattered on impact if the main charge failed to explode. There have been extreme cases when these items have been found unexploded. However, in these scenarios, the ground was either extremely soft or the munition fell into water.
Anti-personnel (AP) bomblets	These were not commonly used and are generally considered to pose a low risk to most works in the UK.	SD2 bomblets were packed into containers holding between 6 and 108 submunitions. They had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.

10.3. Failure Rate of German Aerial Delivered Ordnance

It has been estimated that 10% of WWII German aerial delivered HE bombs failed to explode as designed. Reasons for why such weapons might have failed to function as designed include:

- Malfunction of the fuze or gain mechanism (manufacturing fault, sabotage by forced labour or faulty installation).
- Many were fitted with a clockwork mechanism that could become immobilised on impact.
- Failure of the bomber aircraft to arm the bombs due to human error or an equipment defect.
- Jettisoning the bomb before it was armed or from a very low altitude. This most likely occurred if the bomber aircraft was under attack or crashing.

From 1940 to 1945, bomb disposal teams reportedly dealt with a total of 50,000 explosive items of 50kg, over 7,000 anti-aircraft projectiles and 300,000 beach mines. Unexploded ordnance is still regularly encountered across the UK, see press articles in **Annex F**.

10.4. UXB Ground Penetration

An important consideration when assessing the risk from a UXB is the likely maximum depth of burial. There are several factors which determine the depth that an unexploded bomb will penetrate:

- Mass and shape of bomb.
- Height of release.
- Velocity and angle of bomb.
- Nature of the ground cover.
- Underlying geology.

Geology is perhaps the most important variable. If the ground is soft, there is a greater potential of deeper penetration. For example, peat and alluvium are easier to penetrate than gravel and sand, whereas layers of hard strata will significantly retard and may stop the trajectory of a UXB.

10.4.1. The J-Curve Effect Principle

J-curve is the term used to describe the characteristic curve commonly followed by an aerial delivered bomb dropped from height after it penetrates the ground. Typically, as the bomb is slowed by its passage through underlying soils, its trajectory curves towards the surface. Many UXBs are found with their nose cone pointing upwards as a result of this effect. More importantly, however, is the resulting horizontal offset from the point of entry. This is typically a distance of about one third of the bomb's penetration depth, but can be higher in certain conditions (see **Annex E**).

10.4.2. WWII UXB Ground Penetration Studies

During WWII the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1,328 bombs as reported by bomb disposal (BD) teams. Conclusions were drawn predicting the likely average and maximum depths of penetration of different sized bombs in different geological strata.

For example, the largest common German bomb (500kg) had a likely concluded penetration depth of 6m in sand or gravel but 11m in clay. The maximum observed depth for a 500kg bomb was 11.4m and for a 1,000kg bomb 12.8m. Theoretical calculations suggested that significantly greater penetration depths were probable.

10.4.3. Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the site of proposed works the following parameters have been used:

- WWII geology – Bognor Sand Member in the north and London Clay Formation in the south.
- Impact angle and velocity – 10-15° from vertical and 270 metres per second.
- Bomb mass and configuration – The 500kg SC HE bomb, without retarder units or armour piercing nose (this was the largest of the common bombs used against Britain).

It has not been possible to determine maximum bomb penetration capabilities at this stage due to the limitations of site-specific geotechnical information provided for the purpose of this report. An assessment can be made once further information becomes available or by an UXO Specialist on-site.

10.5. V-Weapons

Hitler's 'V-weapon' campaign began from mid-1944. It used newly developed unmanned cruise missiles and rockets. The V-1, known as the *flying bomb* or *pilotless aircraft*, and the V-2, a long range rocket, were launched from bases in Germany and occupied Europe. A total of 9,251 V-1s and 1,115 V-2s were recorded in the United Kingdom.

Although these weapons caused considerable damage, their relatively low numbers allowed accurate records of strikes to be maintained. These records have mostly survived. There is a negligible risk from unexploded V-weapons on land today. Even if the 1000kg warhead failed to explode, the weapons are so large that they would have been observed and dealt with at the time. Therefore, V-weapons are referenced in this report not as a viable risk factor, but primarily in order to help account for evidence of damage and clearance reported.

11. The Likelihood of Contamination from German Aerial Delivered UXBs

11.1. World War I

During WWI Britain was targeted and bombed by Zeppelin Airships as well as Gotha and Giant fixed-wing aircraft. The objective of these raids was to unnerve the British public, to destroy strategic targets and to ultimately attempt to coerce Britain's capitulation from the war. A WWI map of air raids and naval bombardments across the UK was consulted, see **Annex G**. This source does not record any WWI bombing incidents to have affected the site area.

WWI bombs were generally smaller and dropped from a lower altitude than those used in WWII. This resulted in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress. For these reasons there is a limited risk that UXBs passed undiscovered in the urban environment. When combined with the relative infrequency of attacks and an overall low bombing density, the risk from WWI UXBs is considered low and will not be further addressed in this report.

11.2. World War II Bombing of the Petersfield, and Havant and Waterloo

The Luftwaffe's main objective for the attacks on Britain was to inhibit the country's economic and military capability. To achieve this they targeted airfields, depots, docks, warehouses, wharves, railway lines, factories, and power stations. As the war progressed the Luftwaffe bombing campaign expanded to include the indiscriminate bombing of civilian areas in an attempt to subvert public morale.

During WWII the site was located within both the Rural District of Petersfield and the Urban District of Havant and Waterloo, each of which sustained an overall very-low and low-moderate density of bombing respectively. Any bombing can be attributed in part to the proximity of Havant to Portsmouth (see **Annex H**), which became a strategic target for Luftwaffe bombing, due its position as the foremost port of the Royal Navy. Portsmouth was not only the home of many of the battleships of the Royal Navy, such as HMS Iron Duke and the destroyer flotilla, but also was headquarters for several operations throughout the war such as Operation Dynamo, the evacuation of Dunkirk and Operation Overlord, the Normandy invasion.

Portsmouth endured a particularly heavy bombing campaign, with especially heavy raids taking place on 10th January, 10th March and 27th April 1941. Neighbouring areas would often be affected by the presence of such targets, largely due to the inaccuracy of aerial bombing on adjacent areas to avoid having to return to base with ordnance still on board – known as 'tip and run' raids. Much of the bombing on the region can be attributed to these targets in the proximity and any bombing inflicted upon the surrounding civilian population.

Records of bombing incidents in the civilian areas of Petersfield, and Havant and Waterloo were typically collected by Air Raid Precautions wardens and collated by Civil Defence personnel. Some other organisations, such as port and railway authorities, maintained separate records. Records would be in the form of typed or hand written incident notes, maps and statistics. Bombing data was carefully analysed, not only due to the requirement to identify those parts of the country most needing assistance, but also in an attempt to find patterns in the Germans' bombing strategy in order to predict where future raids might take place.

Records of bombing incidents are presented in the following sections.

11.3. WWII Home Office Bombing Statistics

The following table summarises the quantity of German aerial delivered bombs (excluding 1kg incendiaries and anti-personnel bombs) dropped on the Rural District of Petersfield and the Urban District of Havant and Waterloo between 1940 and 1945.

Record of German Ordnance Dropped on the Rural District of Petersfield		
Area Acreage		56,389
Weapons	High Explosive bombs (all types)	457
	Parachute mines	9
	Oil bombs	19
	Phosphorus bombs	7
	Fire pots	0
	Pilotless aircraft (V-1)	3
	Long range rocket bombs (V-2)	0
Total		495
Number of Items per 1,000 acres		8.8

Record of German Ordnance Dropped on the Urban District of Havant & Waterloo		
Area Acreage		12,074
Weapons	High Explosive bombs (all types)	375
	Parachute mines	39
	Oil bombs	9
	Phosphorus bombs	4
	Fire pots	0
	Pilotless aircraft (V-1)	1
	Long range rocket bombs (V-2)	0
Total		428
Number of Items per 1,000 acres		35.4

Source: Home Office Statistics

This table does not include UXO found during or after WWII.

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. Although the risk relating to IBs is lesser than that relating to larger HE bombs, they were similarly designed to inflict damage and injury. Anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous. Although Home Office statistics did not record these types of ordnance, both should not be overlooked when assessing the general risk to personnel and equipment.

11.4. Hampshire County Records

The records discussed in the sections below cover the entire County of Hampshire in which the whole site resides.

11.4.1. Hampshire Archives County Incident Records

This record set is from the Hampshire Record Office and details information such as date, time, type and damage caused by bombing incidents across the various districts of Hampshire. The records cover the dates July 1940 to April 1945. Relevant records are presented in **Annex I** and transcribed below.

Hampshire Archives County Incident Records		
Date	Type of bomb	Comments
11/09/1940	HE	1 HE bomb fell and exploded at Leigh Park. No casualties, no damage. <i>This was located approximately 1.3km south-east of the site boundary.</i>
27/10/1940	HE & IB	5 HE and some IB at Middle Park Farm. No damage, no casualties. The farm is 1 ½ miles NW of Havant. 1 additional crater found. <i>This was located approximately 50m east of the site boundary.</i>
29/10/1940	HE & UXB	Six HE at Leigh Park. 1 UXB in field W of Havant-Rowlands Castle road. <i>These strikes were located approximately 1.3km south-east of the site boundary.</i>
29/04/1941	HE	1 HE in woods to west of Rowlands Castle.

11.4.2. Hampshire Bomb Census Reports

Bomb census reports compiled by the Research and Experiments Branch of the Ministry of Home Security during WWII were consulted at The National Archives. These reports recorded information such as the date, time, type and damage caused by bomb incidents for a selected time period in the region and are therefore not often comprehensive. No records pertaining to the site or its immediate vicinity were found.

11.4.3. Hampshire UXO Register

Written incident records of unexploded bombs in Hampshire were obtained from Hampshire Archives and Local Studies Office. This record set was checked, and no references to the site were found within it.

11.5. Petersfield Records

The majority of the site was located within Petersfield during WWII. The section below detail the records available for Petersfield.

11.5.1. Petersfield Air Raid Damage Files

Written ARP Incident Records were obtained from the National Archives. This record was compiled by local Air Raid Precaution (ARP) personnel and volunteers during the war and records the location, date and time of bombing raids, as well as the types of bomb used and the damage caused. This record set was checked, and no references to the site were found within it.

11.6. Havant and Waterloo Records

The south-western section of the site was located in Havant and Waterloo during WWII. The below sections present the records acquired for that section of the site.

11.6.1. Incident Records

A diary of Air Raid incidents compiled by Havant and Waterloo authorities during WWII were consulted at Hampshire Record Office, Winchester. These reports recorded information such as the date, time, type and damage caused by major bomb incidents in Havant and are therefore not often comprehensive. Whilst no incidents could be found that affected the site area, recorded incidents in proximity to the site are highlighted in the table below.

Havant and Waterloo District Air Raid Diary 1939-1944	
Date	Comments
7 th December 1940	Two unexploded bombs dropped the previous night north of Havant exploded at 1315 and 1900 respectively, the latter causing slight damage. <i>The exact locations of these strikes are unknown.</i>
16 th January 1941	HE junction London Road + Park Lane, Cowplain. <i>This strike was located approximately 1.4km north-west of the site boundary.</i>
17 th January 1941	UXB Hewetts Copse, Park Lane, Cowplain. <i>This strike was located approximately 800m north-west of the site boundary.</i>
	Craters junction London Road + Park Lane, Cowplain. <i>This strike was located approximately 1.4km north-west of the site boundary.</i>
17 th April 1941	At 22.05 magnetic mine in the Queen's Enclosure London Road Cowplain, a quarter mile south-east of Cowplain police station. Damage to properties on Park Lane and London Road. <i>This strike was located approximately 1.4km north-west of the site boundary.</i>
29 th April 1941	Large UXB fallen north of Havant and south of Rowlands Castle, nothing found 'so far' <i>The exact locations of this strike is unknown.</i>

11.6.2. Havant and Waterloo Air Raid Damage Files

Written ARP Incident Records were obtained from the National Archives. This record was compiled by local Air Raid Precaution (ARP) personnel and volunteers during the war and records the location, date and time of bombing raids, as well as the types of bomb used and the damage caused. This record set was checked, and no references to the site were found within it.

11.7. Havant and Waterloo ARP Incident Records

Bomb incident records specifically for Havant were obtained from the Hampshire Record Office. This record was compiled by local Air Raid Precaution (ARP) personnel and volunteers during the war. No record could be found that directly refers to the site area.

11.8. Miscellaneous Internet Sources

Throughout the research phase of this report, a variety of online resources were consulted and used in conjunction with official documents and records. Relevant entries have been transcribed in the table below.

Miscellaneous Internet Sources		
Date	Source	Description
Consolidated	The Early Years of the Leigh Park Housing Estate ³	'The only damage suffered by Leigh Park in the war was a few bomb craters.'
4 th December 1940	Cosham War Diaries ⁴	'A bomb on a house in Park Lane. This was at first assumed to be a UXB but it turned out to be a delayed action bomb, so the house and nearby properties were evacuated and 24 hours later the bomb exploded demolishing this house.'

11.9. WWII-Era Aerial Photography

WWII-era aerial photography for the site area was obtained from the National Collection of Aerial Photography (NCAP). This photography provides a record of the potential composition of the site during the war, as well as its condition immediately following the war (see Annex K).

WWII-Era Aerial Photography	
Date	Description
27 th June 1943	This photo was taken just over half way through WWII, and confirms the site's wartime nature as fields and dense vegetation. There are no obvious indicators of bomb damage such as bomb craters or scattered earth visible on site, and none of the structures visible in the photo appear damaged or ruined.

11.10. Abandoned Bombs

A post air-raid survey of buildings, facilities, and installations would have included a search for evidence of bomb entry holes. If evidence of an entry hole was encountered, Bomb Disposal Officer Teams would normally have been requested to attempt to locate, render safe, and dispose of the bomb. Occasionally, evidence of UXBs was discovered but due to a relatively benign position, access problems, or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an 'abandoned bomb'.

Given the inaccuracy of WWII records, and the fact that these bombs were 'abandoned', their locations cannot be considered definitive or the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded.

1st Line Defence holds no records of officially registered abandoned bombs at or near the site of the proposed works.

11.11. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (now part of 29 EOD & Search Group) is currently facing considerable delay. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. A database of known disposal/clearance tasks has been referred to which does not make reference to such instances occurring within the site of proposed works. If any relevant information is received at a later date, Avison Young Holdings Ltd will be advised.

³ <https://thespring.co.uk/wp-content/uploads/2021/06/b-no-69-the-early-years-of-the-leigh-park-housing-estate.pdf>

⁴ http://www.portsdown-tunnels.org.uk/events/cosham_war_diaries.html

11.12. Evaluation of German Aerial Delivered UXO Records

Factors	Conclusion
Density of Bombing <i>It is important to consider the bombing density when assessing the possibility that UXBs remain in an area. High bombing density could allow for error in record keeping due to extreme damage caused to the area.</i>	During WWII, the proposed site was situated within both the Rural District of Petersfield and the Urban District of Havant and Waterloo. Official Home Office bombing statistics indicate that these districts sustained an overall very low and low-moderate density of bombing, with an average of 8.8 and 35.4 items of ordnance recorded per 1,000 acres, respectively. Despite this low overall density, the localised site area is anticipated to have sustained a relatively high density of bombing, potentially due to the nearby military camps and proximity to Luftwaffe targets in Portsmouth. Reference was found to five HE bombs, a number of incendiaries and an additional crater being found at 'Middle Park Farm', one and a half miles north-west of Havant, in October of 1940. Historic OS mapping indicates that the Middle Park Farm farmhouse was located immediately south-east of the site, with surrounding open land located within and around the southern section of the boundary. However, exactly how much of the site comprised land associated with this farm is unknown, and the specific localities of incident within available records has not been provided. As such, it's conceivable that some, or all, of these incidents occurred within the site itself. Additional sporadic incidents were also recorded across the wider area, including at Leigh Park to the east, and Hewetts Copse approximately 800m to the north-west.
Damage <i>If buildings or structures on a site sustained bomb or fire damage, any resulting rubble and debris could have obscured the entry holes of unexploded bombs dropped during the same or later raids. Similarly, a high explosive bomb strike in an area of open agricultural land will have caused soil disturbance, increasing the risk that a UXB entry hole would be overlooked.</i>	There are no obvious signs of bomb damage, such as craters, within the boundary in available wartime aerial photography. Although, it should be noted that this image was taken in the mid-war period, so additional incident could conceivable have occurred after the image was taken.
Ground Cover <i>The nature of the ground cover present during WWII would have a substantial influence on any visual indication that may indicate UXO being present.</i>	Open areas of varying degrees of vegetation are generally not considered to be favourable ground conditions as signs of UXO, such as entry holes or craters, may be easily obscured under vegetation which is liable to grow and shift.
Access Frequency <i>UXO in locations where access was irregular would have a greater chance of passing unnoticed than at those that were regularly occupied. The importance of a site to the war effort is also an important consideration as such sites are likely to have been both frequently visited and subject to post-raid checks for evidence of UXO.</i>	Due to the lack of structures recorded across the majority of the site, as well as its largely open composition, access is likely to have been mostly limited to agricultural use by those cultivating the land. Agricultural access is generally thought to have been infrequent and seasonal, although the roadways on and surrounding the site may have also provided the site with a degree of monitor.
Bomb Failure Rate	There is no evidence to suggest that the bomb failure rate in the locality of the site would have been dissimilar to the 10% normally used.
Abandoned Bombs	1st Line Defence holds no records of abandoned bombs at or within the site vicinity.



Bombing Decoy sites	1 st Line Defence could find no evidence of bombing decoy sites within the site vicinity.
Bomb Disposal Tasks	1 st Line Defence could find no evidence of bomb disposal tasks within the site boundary and immediate area.

12. Introduction to Allied Ordnance

12.1. General

Many areas across the UK may be at risk from Allied UXO because of both wartime and peacetime military use. Typical military activities and uses that may have led to a legacy of military UXO at a site include former minefields, home guard positions, anti-aircraft emplacements, training and firing ranges, military camps, as well as weapons manufacture and storage areas.

Although land formerly used by the military was usually subject to clearance before returned to civilian use, items of UXO are sometimes discovered and can present a potential risk to construction projects.

It should be highlighted that there is no evidence that the site formerly had any military occupation or usage that could have led to contamination with such items of Allied ordnance. Despite this, urban areas, such as the location of the site, can be at risk from buried unexploded anti-aircraft projectiles fired during WWII – as addressed below.

12.2. Defending the UK From Aerial Attack

During WWII the War Office employed a number of defence tactics against the Luftwaffe from bombing major towns, cities, manufacturing areas, ports and airfields. These can be divided into passive and active defences (examples are provided in the table below).

Active Defences	Passive Defences
• Anti-aircraft gun emplacements to engage enemy aircraft. • Fighter aircraft to act as interceptors. • Rockets and missiles were used later during WWII.	• Blackouts and camouflaging to hinder the identification of Luftwaffe targets. • Decoy sites were located away from targets and used dummy buildings and lighting to replicate urban, military, or industrial areas. • Barrage balloons forced enemy aircraft to greater altitudes. • Searchlights were often used to track and divert adversary bomber crews during night raids.

Active defences such as anti-aircraft artillery present a greater risk of UXO contamination than passive defences. Unexploded ordnance resulting from dogfights and fighter interceptors is rarely encountered and difficult to accurately qualify.

12.2.1. Anti-Aircraft Artillery (AAA)

During WWII three main types of gun sites existed: heavy anti-aircraft (HAA), light anti-aircraft (LAA) and 'Z' batteries (ZAA). If the projectiles and rockets fired from these guns failed to explode or strike an aircraft they would descend back to land. The table below provides further information on the operation and ordnance associated with these type of weapons.

Anti-Aircraft Artillery				
Item	Description			
HAA	These large calibre guns such as the 3.7" QF (Quick Firing) were used to engage high flying enemy bombers. They often fired large HE projectiles, which were usually initiated by integral fuzes, triggered by impact, area, time delay or a combination of aforementioned mechanisms.			
LAA	These mobile guns were intended to engage fast, low flying aircraft. They were typically rotated between locations on the perimeters of towns and strategically important industrial works. As they could be moved to new positions with relative ease when required, records of their locations are limited. The most numerous of these were the 40mm Bofors gun which could fire up to 120 x 40mm HE projectiles per minute to over 1,800m.			
Variations in HAA and LSA Ammunition	Gun type	Calibre	Shell Weight	Shell Dimensions
	3.0 Inch	76mm	7.3kg	76mm x 356mm
	3.7 Inch	94mm	12.7kg	94mm x 438mm
	4.5 Inch	114mm	24.7kg	114mm x 578mm
	40mm	40mm	0.9kg	40mm x 311mm
Z-AA	The three inch unrotated rocket/projectile known as the UP-3 had initially been developed for the Royal Navy. The UP-3 was also used in ground-based single and 128-round launchers known as "Z" batteries. The rocket, containing a high explosive warhead was often propelled by cordite.			

The conditions in which anti-aircraft projectiles may have fallen unnoticed within a site area are analogous to those regarding aerial delivered ordnance. Unexploded anti-aircraft projectiles could essentially have fallen indiscriminately anywhere within range of the guns. The chance of such items being observed, reported and removed during the war depends on factors such as land use, ground cover, damage and frequency of access – the same factors that govern whether evidence of a UXB is likely to have been noted. More information about these factors with regards to this particular site can be found in the German Aerial Delivered Ordnance section of this report.

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at **Appendix iv**.

13. The Likelihood of Contamination from Allied Ordnance

13.1. Introduction

There are several factors that may serve to either affirm, increase, or decrease the level of risk within a site with a history of military usage. Such factors are typically dependent upon the proximity of the proposed area of works to training activities, munition productions and storage, as well as its function across the years.

This section will examine the history of the proposed site and assess to what degree, if any, the site could have become contaminated as a result of the military use of the surrounding area.

13.2. D-Day Marshalling Camps in the Wider Site Area

Evidence indicates several Marshalling Area 'A' camps were located around the vicinity of the site. Stakes Hill Camp was located approximately 500m south-west of the site boundary. Troops based here included the 1st Battalion, Kings Own Scottish Borderers. The camp could hold 2,500 men and 250 vehicles.⁵ Additional camps were also located at Queen's Inclosure, at Padnell and Cowplain, approximately 900m north-west of the site. Troops based here included the 1st Battalion, South Lancashire Regiment (Camp A5) and 2nd Battalion, East Yorkshire Regiment (Camp A6). The two camps could hold 3,000 men and 430 vehicles.⁶

Marshalling Area 'A' camps were a group of temporary camps near Portsmouth. Most of these camps were hidden in wooded areas as to avoid detection by Luftwaffe planes. They were designed to hold several thousand men, and was used by Allied forces before D-Day. Troops were based at many of these camps for weeks or even several months. At the end of May, the camps were sealed, so that the troops inside were not allowed to leave. This was a step to minimise the risk that enemy spies, or the British public, might realise that D-Day was drawing very near. These troops were at the camp for several weeks before D-Day, and from 31st May 1944, they began to make their way down the coast and board ships that would take them to Normandy.

13.3. Stockheath Naval Camp

A Naval Camp was created approximately 1.3km east of the site boundary during WWII as an overflow camp to Victory Barracks, now HMS Nelson at Portsea in Portsmouth. It was designed to hold several thousand men, mostly in Nissen huts and bell tents. The camp is believed to have been opened in early 1941 and is anticipated to have been approximately 200 acres. The camp was mostly built to be 'woven' into the woodland and the canopy of the trees to prevent the majority of the camp being seen, although, the Wrens' (Women's Royal Navy Service) quarters were out in the open.

As the war progressed the camp also became a survivor's camp for the crew of ships that had been sunk. Men would arrive in poor conditions having been saved from sunken ships. Stockheath was used as the initial camp for the survivors where they were issued new kit and ID cards and reviewed by doctors. As the camp was a survivors camp it has been mentioned that it was more relaxed compared to normal military camps of the time.

There was a small detachment of Royal Marines based at the camp who would carry out training exercises. Additionally, the camp was reportedly used to provide a 'flying column' for use in case of an invasion, which consisted of approximately 100 fully-armed ratings with an officer and petty officers in charge. Training exercises were carried out throughout the camp's time, including an anti-invasion

⁵ <https://thedaystory.com/markers/d-day-marshalling-area-camp-a7-stakes-hill/>

⁶ <https://thedaystory.com/markers/d-day-marshalling-area-camps-a5-and-a6-padnell-and-cowplain/>

exercise, which also had the army and Home Guard involved and was noted to have used rifles with live ammunition.⁷

13.4. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (EOD) (now 29 Regt) is currently facing considerable delay. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. The closest known task was undertaken at The Queens Enclosure, Cowplain, approximately 800m north-west of the site boundary around the location of a known D-Day Camp. An in-house database of known disposal/clearance tasks does not hold any further information regarding this task.

It should be known that the technology available in the post-war period was limited, meaning it was not uncommon for UXO, particularly certain items and at certain depths, to avoid detection. On occasion such tasks were also insufficiently undertaken, and 1st Line Defence has experience in encountering ordnance at former military sites, where clearance certificates have previously been issued. If any further relevant information is received at a later date, Avison Young Holdings Ltd will be advised.

13.5. Evaluation of Contamination Risk from Allied UXO

1st Line Defence has considered the following potential sources of Allied ordnance contamination:

Sources of Allied UXO Contamination	Conclusion
Military Camps <i>Military camps present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training.</i>	According to an in-house geo dataset several D-Day marshalling camps were located west of the site location, at Stakes and Cowplain. Published information also indicates the presence of naval camp at Stockheath, south-east of the site around Riders Lane.⁸ Though these camps may have been indicative of a larger military presence in the wider area, they are not believed to have directly affected the site boundary itself.
Anti-Aircraft Defences <i>Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.</i>	1st Line Defence could find no evidence of Anti-Aircraft defences such as a HAA or LAA gun emplacement occupying or bordering the site. The closest HAA was located approximately 1.6km south-west of the site, in the vicinity of Delphi Way. Despite this distance the maximum effective range of an AA projectile can be up to 15km. The conditions in which HAA or LAA projectiles may have fallen unnoticed within a site footprint are analogous to those regarding German aerial delivered ordnance.
Home Guard Activity <i>The Home Guard regularly undertook training and ordnance practice in open areas, as well as burying ordnance as part of anti-invasion defences.</i>	Evidence of Home Guard activity is often difficult to locate, owing to the ad-hoc nature of Home Guard activity within each local area. Such training was often conducted on a small scale at the discretion of individual commanders and as such was seldom recorded officially. As such, no positive evidence could be found to confirm the presence of HG units within proximity to the site.

⁷Hind, R., *The Naval Camps of Bedhampton and Leigh Park*

⁸ *ibid*



Defensive Positions <i>Defensive positions suggest the presence of military activity, which is often indicative of ordnance storage, usage or disposal.</i>	There is no evidence of any pillbox, emplacement or other defensive features formerly located on or bordering the site footprint.
Training or firing ranges <i>Areas of ordnance training saw historical ordnance usage in large numbers, often with inadequate disposal of expended and live items. The presence of these ranges significantly impact on the risk of encountering items of ordnance in their vicinity.</i>	No evidence of training or firing ranges could be found within the site or surrounding area.
Defensive Minefields <i>Minefields were placed in strategic areas to defend the country in the event of a German invasion. Minefields were not always cleared with an appropriate level of vigilance.</i>	There is no evidence of defensive minefields affecting the site.
Ordnance Manufacture <i>Ordnance manufacture indicates an increased chance that items of ordnance were stored, or disposed of, within a location.</i>	No information of ordnance being stored, produced, or disposed of within the proposed site could be found.
Military Related Airfields <i>Military airfields present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training or bombing practice.</i>	The site was not situated within the perimeters or vicinity of a military airfield.

14. The Likelihood of UXO Contamination Summary

The following table assesses the likelihood that the site was contaminated by items of German aerial delivered and Allied ordnance. Factors such as the risk of UXO initiation, remaining, and encountering will be discussed later in the report.

UXO Contamination Summary	
Quality of the Historical Record	The research has evaluated pre- and post-WWII Ordnance Survey maps, Luftwaffe reconnaissance imagery, Hampshire Archive County Incident Records, Havant and Waterloo District Air Raid Diary 1939-1944, Havant ARP Incident Records, WWII-era aerial photography, a Hampshire UXO Register, Petersfield, Havant and Waterloo air raid damage files, Hampshire bomb census reports, in-house data, and online anecdotal accounts. The overall record set is generally of a good standard as the records are substantial and have several references to bombing in the area, as expected. However, none of the record sets consulted are considered comprehensive, and there were no visual records of bombing, such as bomb census mapping, available.
German Aerial Delivered Ordnance	- During WWII, the proposed site was situated within both the Rural District of Petersfield and the Urban District of Havant and Waterloo. Official Home Office bombing statistics indicate that these districts sustained an overall very low and low-moderate density of bombing, with an average of 8.8 and 35.4 items of ordnance recorded per 1,000 acres, respectively. Despite this low overall density of the wider region, the nearby area is anticipated to have sustained a relatively high density of bombing, potentially due to the nearby military camps and the proximity of Luftwaffe targets in Portsmouth. - Reference was found to five HE bombs, a number of incendiaries, and an additional crater being found at 'Middle Park Farm', one and a half miles north-west of Havant, in October of 1940. Historic OS mapping indicates that the Middle Park farmhouse was located immediately south-east of the site, with attached open land located within and around the southern section of the boundary. However, exactly how much of the site comprised land associated with this farm is unknown, and the specific localities of incident within available records has not been provided. As such, it's conceivable that some, or all, of these incidents occurred within the site itself, and/or across the nearby area. - Additional sporadic bombing incidents are also recorded across the wider area, including at Leigh Park to the east and at Hewetts Copse approximately 800m to the north-west. - There are no obvious signs of bomb damage, such as craters, within the boundary in available aerial photography. Although, it should be noted that this image was taken in the mid-war period, so additional incident could conceivable have occurred after the image was taken. - Open areas of varying degrees of vegetation are generally not considered to be favourable to the detection of UXO, as evidence, such as entry holes or craters, may be more easily obscured under vegetation, which is liable to grow and shift. Likewise, due to the sites largely open composition, access is thought to have been mostly limited to agricultural use by those cultivating the land. Such access is generally thought to have been infrequent and seasonal, although the roadways on and surrounding the site may have also provided the site with a degree of monitor. Unfavourable ground condition and infrequent access may increase the likelihood that indicators, such as entry holes, would have gone unnoticed and unreported. - In summary, evidence was found to indicate that bombing occurred across the immediate site area, including multiple bombing incidents within a farm



	understood to have been partially located within the southern section of the boundary. However, owing to the limitations of the available record set, how many of these incidents, if any, occurred within the site is unknown; it has not been possible to determine exactly how much of the boundary comprised land associated with Middle Park Farm, and the specific localities of incident within available records has not been provided. Although, conceivably some or all of these incidents may have directly affected the site. Wartime conditions within the proposed boundary are also not thought to have been particularly favourable to the detection of UXO indicators, which may be more likely to go unnoticed and unreported in open, infrequently accessed conditions. • In light of these factors, the risk of German aerial delivered and anti-aircraft ordnance on site is deemed to be higher than the 'background level' for the region; particularly in and around the south-eastern section of the site, which may have comprised open land. Accordingly, it is strongly advised that ground personnel conducting intrusive works are given UXO awareness briefings, and a UXO risk management plan is put in place, to make them aware of the history of the site, what to look out for, and what to do in the event that a suspected item is found.
Allied Ordnance	• According to an in-house geo dataset several D-Day marshalling camps were located west of the site location, at Stakes and Cowplain. Published information also indicates the presence of naval camp at Stockheath, south-east of the site around Riders Lane.⁹ Though these camps may have been indicative of a larger military presence in the wider area, they are not believed to have directly affected the site boundary itself. • The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding aerial delivered ordnance.

⁹ Hind, R., *The Naval Camps of Bedhampton and Leigh Park*

15. The Likelihood that UXO Remains

15.1. Introduction

It is important to consider the extent to which any explosive ordnance clearance (EOC) activities or extensive ground works have occurred on site. This may indicate previous ordnance contamination or reduce the risk that ordnance remains undiscovered.

15.2. UXO Clearance

1st Line Defence has found no evidence in the public domain or within internal records that any official ordnance clearance operations have taken place on site. Note however that we have not received confirmation of this fact from the 33 EOD Regiment Archive (now part of 29 EOD & Search Group). It should also be noted that in addition to 29 EOD & Search Group archival information, 1st Line Defence also do not currently have access to data that may be relevant including 5131(BD)SQN Archive, SD Training Technical Advisory Section (TAS) and MACA Records (bomb disposal callouts).

If such information is available at a later date, it is recommended that it be reviewed as it will assist with understanding both levels and types of contamination likely to be present, and may indicate risk reduction in certain areas.

15.3. Post-War Redevelopment

The majority of the site was subject to some post-WWII developments with the construction of all areas of hardstanding ground, roadways and structures associated with Dunsbury Park. The wider area was also subject to much development with the construction of multiple areas of residential housing, and the A3(M) to the west.

The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

16. The Likelihood of UXO Encounter

16.1. Introduction

For UXO to pose a risk at a site, there should be a means by which any potential UXO might be encountered on that site.

The likelihood of encountering UXO on the site of proposed works would depend on various factors, such as the type of UXO that might be present and the intrusive works planned on site. In most cases, UXO is more likely to be present below surface (buried) than on surface.

In general, the greater the extent and depth of intrusive works, the greater the risk of encountering. The most likely scenarios under which items of UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Generally speaking, the risk of encountering any type of UXO will be minimal for any works planned within the footprint and down to the depth of post-war foundations and excavations.

16.2. Encountering Aerial Delivered Ordnance

Since an aerial delivered bomb may come to rest at any depth between just below ground level and its maximum penetration depth, there is a chance that such an item (if present) could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level as well as at depth.

17. The Likelihood of UXO Initiation

17.1. Introduction

UXO does not spontaneously explode. Older UXO devices will require an external event/energy to create the conditions for detonation to occur. The likelihood that a device will function can depend on a number of factors including the type of weaponry, its age and the amount of energy it is struck with.

17.2. Initiating Aerial Delivered Ordnance

Unexploded bombs do not spontaneously explode. All high explosive filling requires significant energy to create the conditions for detonation to occur.

In recent decades, there have been a number of incidents in Europe where Allied UXBs have detonated, and incidents where fatalities have resulted. There have been several hypotheses as to the reason why the issue is more prevalent in mainland Europe – reasons could include the significantly greater number of bombs dropped by the Allied forces on occupied Europe, the preferred use by the Allies of mechanical rather than electrical fuzes, and perhaps just good fortune. The risk from UXO in the UK is also being treated very seriously in many sectors of the construction industry, and proactive risk mitigation efforts will also have affected the lack of detonations in the UK.

There are certain construction activities which make initiation more likely, and several potential initiation mechanisms must be considered:

UXB Initiation	
Direct Impact	Unless the fuze or fuze pocket is struck, there needs to be a significant impact e.g. from piling or large and violent mechanical excavation, onto the main body of the weapon to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.
Re- starting the Clock	A small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion would have taken place within the fuze mechanism over the last 70+ years that would prevent clockwork mechanisms from functioning. Nevertheless, it was reported that the clockwork fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-start.
Friction Impact	The most likely scenario resulting in the detonation of a UXB is friction impact initiating the shock-sensitive fuze explosive. The combined effects of seasonal changes in temperature and general degradation over time can cause explosive compounds to crystallise and extrude out from the main body of the bomb. It may only require a limited amount of energy to initiate the extruded explosive which could detonate the main charge.

18. Consequences of Initiation/Encounter

18.1. Introduction

The repercussions of the inadvertent detonation of UXO during intrusive ground works, or if an item or ordnance is interfered with or disturbed, are potentially profound, both in terms of human and financial cost. A serious risk to life and limb, damage to plant and total site shutdown during follow-up investigations are potential outcomes. However, if appropriate risk mitigation measures are put in place, the chances of initiating an item of UXO during ground works is comparatively low.

The consequences of encountering UXO can be particularly notable in the case of high-profile sites (such as airports and train stations) where it is necessary to evacuate the public from the surrounding area. A site may be closed for anything from a few hours to a week with potentially significant cost in lost time. It should be noted that even the discovery of suspected or possible item of UXO during intrusive works (if handled solely through the authorities), may also involve significant loss of production

18.2. Consequences of Detonation

When considering the potential consequences of a detonation, it is necessary to identify the significant receptors that may be affected. The receptors that may potentially be at risk from a UXO detonation on a construction site will vary depending on the site specific conditions but can be summarised as follows:

- People – site workers, local residents and general public.
- Plant and equipment – construction plant on site.
- Services – subsurface gas, electricity, telecommunications.
- Structures – not only visible damage to above ground buildings, but potentially damage to foundations and the weakening of support structures.
- Environment – introduction of potentially contaminating materials.

19. 1st Line Defence Risk Assessment

19.1. Risk Assessment Stages

Taking into account the quality of the historical evidence, the assessment of the overall risk from unexploded ordnance is based on the following five considerations:

1. That the site was contaminated with unexploded ordnance.
2. That unexploded ordnance remains on site.
3. That such items will be encountered during the proposed works.
4. That ordnance may be initiated by the works operations.
5. The consequences of encountering or initiating ordnance.

19.2. Assessed Risk Level

1st Line Defence has assessed that there is an overall **Low-Medium Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is also an assessed **Low Risk** from Allied LSA/SAA ordnance.

Ordnance Type	Risk Level			
	Negligible	Low	Medium	High
German Unexploded HE Bombs		✓		
German 1kg Incendiary Bombs		✓		
Anti-Aircraft Artillery Projectiles		✓		
Allied Land Service and Small Arms Ammunition		✓		

Please note – although the risk from unexploded ordnance on this site has been assessed as ‘Low-Medium’ and ‘Low’, this does not mean there is ‘no’ risk of encountering UXO. This report has been undertaken with due diligence, and all reasonable care has been taken to access and analyse relevant historical information. By necessity, when dealing historical evidence, and when making assessments of UXO risk, various assumptions have to be made which we have discussed and justified throughout this report. Our reports take a common-sense and practical approach to the assessment of risk, and we strive to be reasonable and pragmatic in our conclusions.

It should however be stressed that if any suspect items are encountered during the proposed works, 1st Line Defence should be contacted for advice/assistance, and to re-assess the risk where necessary. The mitigation measures outlined in the next section are recommended as a minimum precaution to alert ground personnel to the history of the site, what to look out for, and what measures to take in the event that a suspect item is encountered. It should also be noted that the conclusions of this report are based on the scope of works outlined in the ‘Proposed Works’ section of this report. Should the scope of works change or additional works be proposed, 1st Line Defence should be contacted to re-evaluate the risk.

20. Proposed Risk Mitigation Methodology

20.1. General

The following risk mitigation measures are recommended to support the proposed works at Dunsbury Park, Portsmouth:

Type of Work	Recommended Mitigation Measure
All Works	UXO Risk Management Plan It is recommended that a site-specific plan for the management of UXO risk be written for this site. This plan should be kept on site and be referred to in the event that a suspect item of UXO is encountered at any stage of the project. It should detail the steps to be taken in the event of such a discovery, considering elements such as communication, raising the alarm, nominated responsible persons etc. Contact 1st Line Defence for help/more information. Site Specific UXO Awareness Briefings to all personnel conducting intrusive works. As a minimum precaution, all personnel working on the site should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.

In making this assessment and recommending these risk mitigation measures, if known, the works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, 1st Line Defence should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

1st Line Defence Limited

22/07/2021

This Report has been produced in compliance with the Construction Industry Research and Information Association (CIRIA) C681 guidelines for the writing of Detailed UXO Risk Assessments.

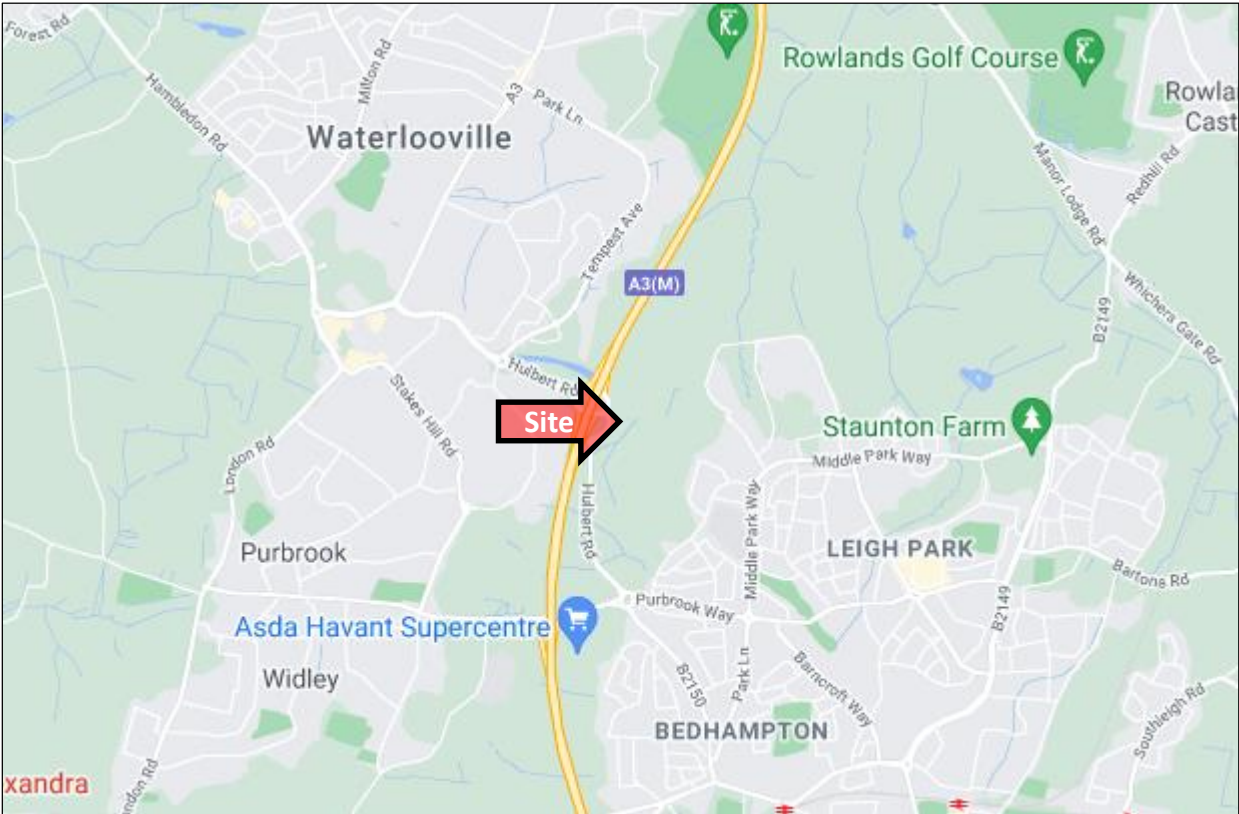
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Project: **Dunsbury Park, Portsmouth**

Ref: **DA13636-00**

Source: Google Maps

 **Approximate site boundary**





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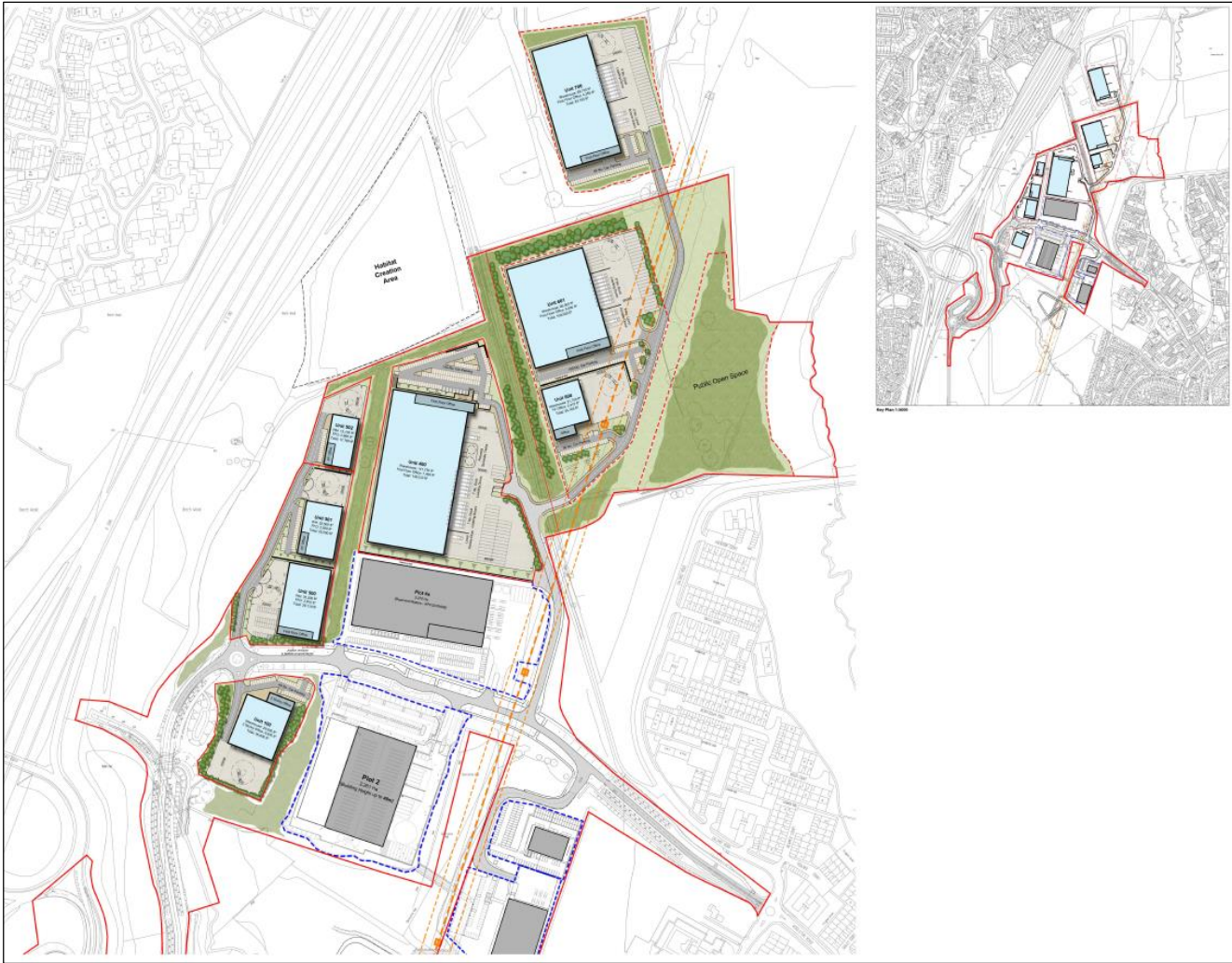
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Source: Google Earth™ Mapping Services

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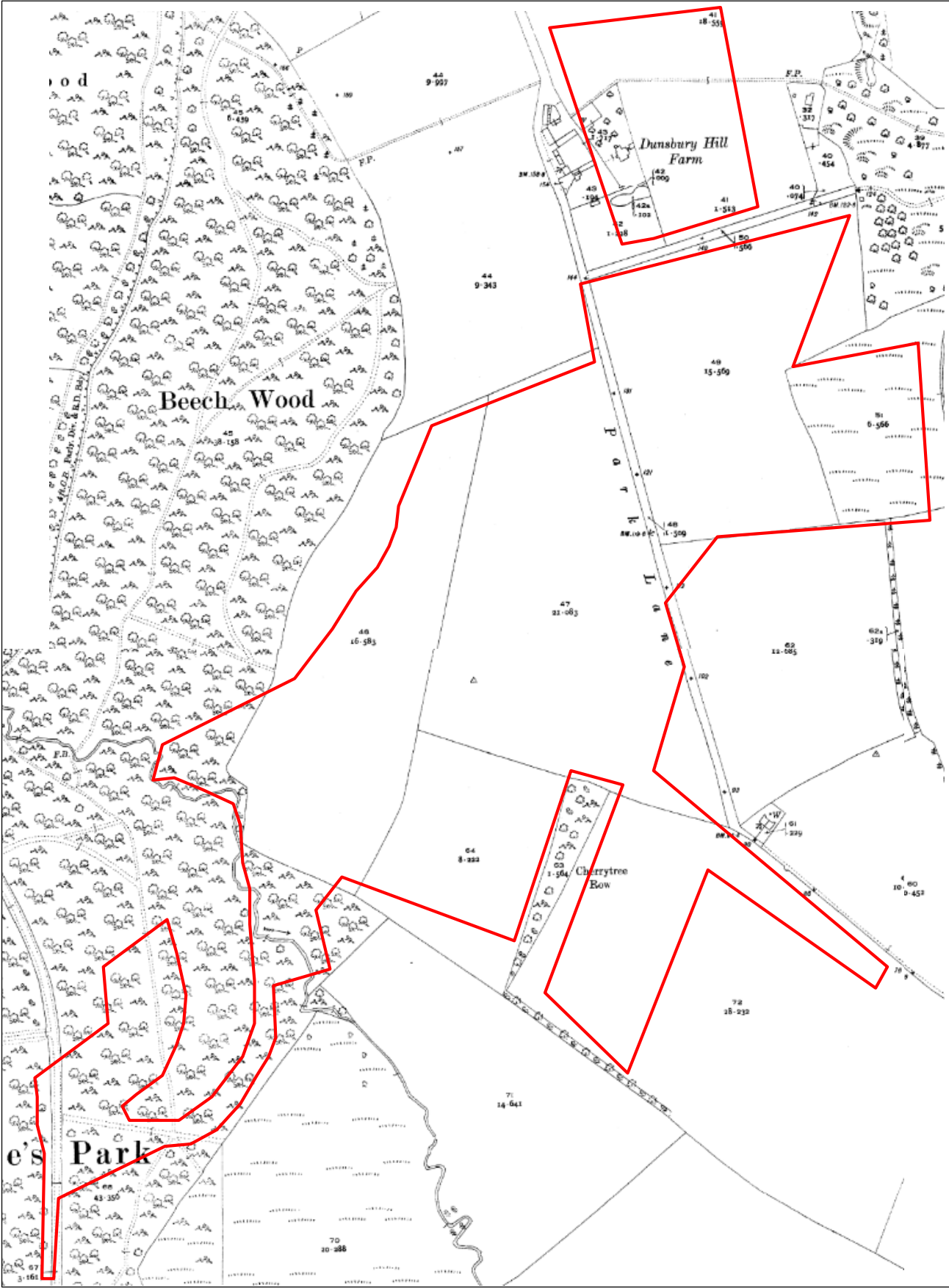
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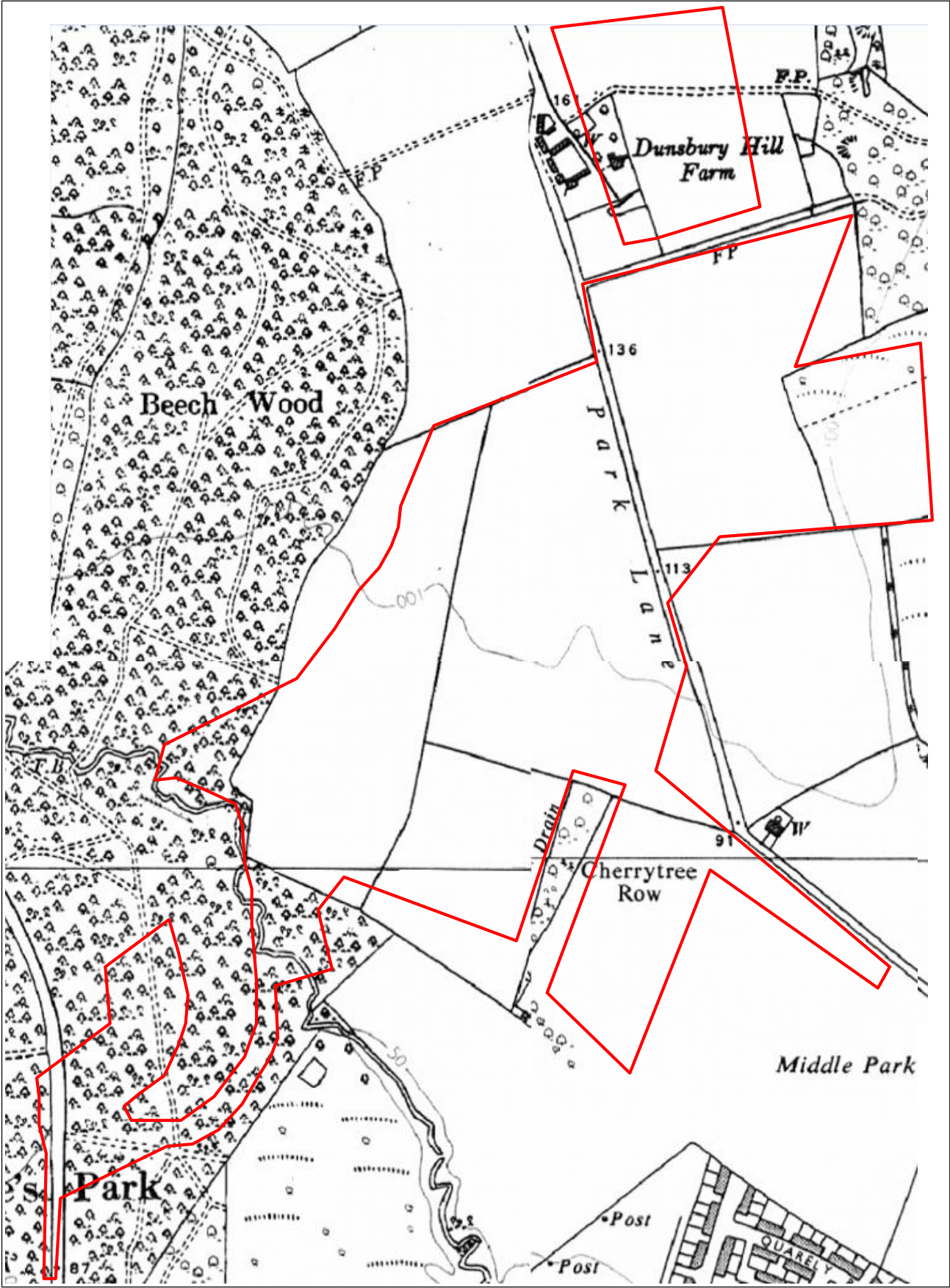
Project: **Dunsbury Park, Portsmouth**

Ref: **DA13636-00**

Source: **Landmark Maps**

 **Approximate site boundary**





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Client: **Avison Young Holdings Ltd**

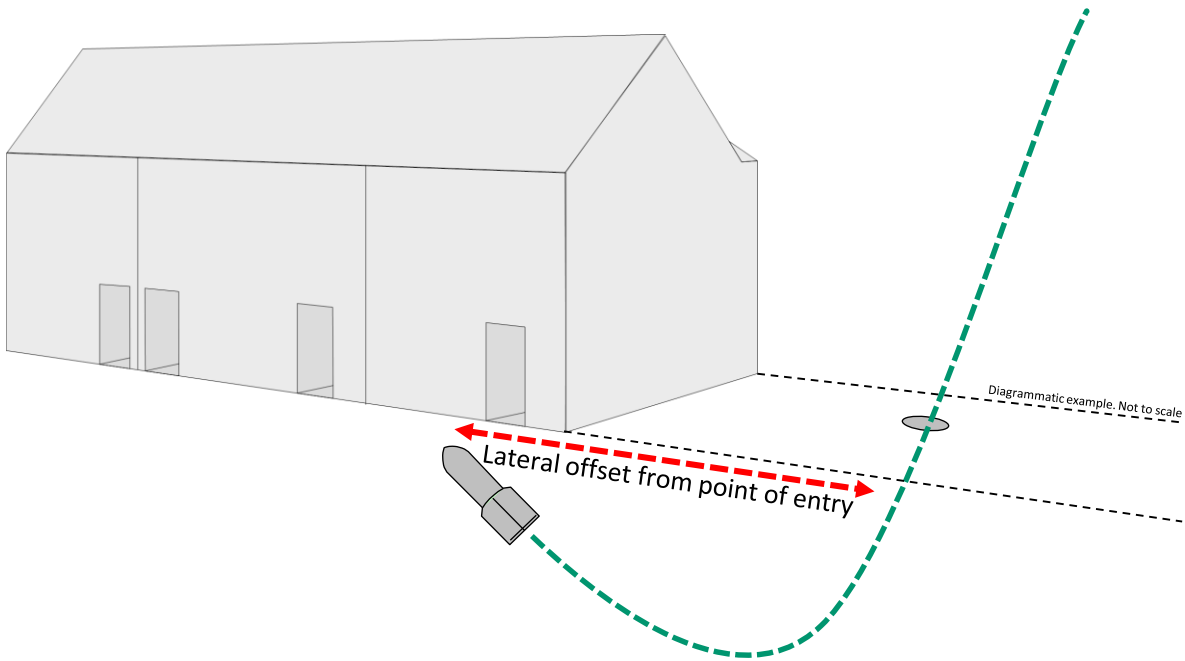
Project: **Dunsbury Park, Portsmouth**

Ref: **DA13636-00**

Source: **Landmark Maps**

— Approximate site boundary





Diagrammatic example. Not to scale

Lateral offset from point of entry



Top: J-curve Effect - Due to angle of entry, unexploded bombs would often end their trajectory at a lateral offset from point of entry, often ending up beneath adjacent extant structures/sites. The photograph above shows 250kg bomb found in Bermondsey pointing upwards, demonstrating ‘J-curve’

One of the most common scenarios for UXO going unnoticed was when a UXB fell into a ‘bomb site’ (such as the area shown **Top Left**), the entry hole of the bomb obscured by any debris and rubble present. Note that the entry hole of a 50kg UXB could be as little as 20cm in diameter (**Left**).





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Project: **Dunsbury Park, Portsmouth**

Ref: **DA13636-00**

Source: Various sources

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Bermondsey bomb: World War Two device safely removed



An unexploded World War Two bomb found in south London has been driven away safely under police and Army escort.

The 500lb (250kg) device was found on a building site in Grange Walk, Bermondsey on Monday.

March 2015



Bethnal Green WW2 bomb: Experts remove unexploded device



An unexploded World War Two bomb that prompted the evacuation of 700 people in east London has been made safe and removed by the military.

Families spent the night in a school hall after the 500lb bomb was found in the basement of a building site on Temple Street, in Bethnal Green, on Monday afternoon.

A 200m (650ft) exclusion zone was set up around the device.

August 2016



Bath WW2 bomb scare: Device defused, police say



A 500lb World War Two bomb found on the site of a former school in Bath has been defused and made safe.

The discovery of the bomb on Thursday led to the evacuation of hundreds of homes and many road closures in the Lansdown area of the city.

A cordon around the site was lifted on Friday evening, more than 24 hours after residents were asked to leave their homes.

May 2016



London City Airport reopens after WW2 bomb moved



London City Airport has reopened after an unexploded 500kg World War Two bomb was safely moved from the area.

The device was discovered at the King George V Dock on Sunday during planned work at the east London airport.

All flights were cancelled on Monday after an exclusion zone was put in place, with the closure affecting up to 16,000 passengers and nearby residents being evacuated from their homes.

May 2015



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Project: Dunsbury Park, Portsmouth

Ref: DA13636-00

Source: BBC News

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BASF has confirmed that an explosive device, most likely a World War II-era bomb, caused the blast that left one person injured Tuesday at a plant construction site in Germany.

The explosion was reported at BASF's Ludwigshafen toluene diisocyanate (TDI) plant, which recently broke ground for a 300,000 metric tons per year TDI production plant and other construction to expand its facilities.



BASF Provides Some Details

Responding to a request from *PaintSquare News* for more information on Wednesday (Feb. 27), BASF's manager of media relations and corporate communications Europe, Ursula von Stetten, wrote in an email, "So here [are] the facts: The detonation took place at 10:00 a.m. One person was injured; the injury is not serious. He will be kept in the hospital for some days.

"Cause of the detonation was an explosive device, presumably a bomb deriving from the Second World War. The device detonated when grounding work was done. No details on [a] delay [are] available. At the moment, the exact circumstances of the incident are [being] evaluated."

1st March 2013

SPIEGEL ONLINE

Blast Kills One
World War II Bomb Explodes on German Motorway

A highway construction worker in Germany accidentally struck an unexploded World War II bomb, causing an explosion which killed him and wrecked several passing cars.



A World War II bomb has exploded during construction work on a German highway, killing one worker and injuring several motorists who were driving past, police said.

The worker had been cutting through the road surface near the south-western town of Aschaffenburg when his machine struck the bomb and triggered it. Police said they weren't sure yet what type of bomb it was. "The explosion seems to have been too small for it to have been an aircraft bomb," a police spokesman said.

23rd October 2006

WWII bomb injures 17 at Hattingen construction site



Seventeen people were injured on Friday when a construction crew unwittingly detonated a buried World War II-era bomb in Hattingen.

An excavator apparently drove over a 250-kilogramme (550 pound) American bomb, damaging surrounding buildings. Most of the injured suffered auditory trauma from the blast, and the excavator operator suffered injuries to his hands, police in the German state of North Rhine-Westphalia said.

"The hole was astoundingly small for such a large bomb full of so many explosives," Armin Gebhard, head of the Arnsberg department for military ordnance removal, told The Local. "But of course it damaged all the surrounding buildings too. We are really happy it wasn't worse."

19th September 2013



World War II bomb kills three in Germany



A special commission is investigating the causes of the explosion, while prosecutors are considering whether the team leader should face charges of manslaughter through culpable negligence, the BBC's Oana Lungescu reports from Berlin.

The blast happened an hour before the defusing operation was due to start.

Officials said the three men who died were experienced sappers, or combat engineers, who over 20 years had defused up to 700 bombs.

More than 7,000 people were immediately evacuated when the 500kg bomb was found. Several schools, a kindergarten and local companies remain closed.

2nd June 2010



June 2006



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Client:	Avison Young Holdings Ltd		
Project:	Dunsbury Park, Portsmouth		
Ref:	DA13636-00	Source:	Various news sources
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Metal detectorist finds chemical mortar rounds at Farlington Marshes in Portsmouth

P portsmouth.co.uk/news/people/metal-detectorist-finds-chemical-mortar-rounds-farlington-marshes-portsmouth-1351972

Monday, 30th December 2019, 2:47 pm

Police were called to Farlington Marshes, along Solent Way, after the unexploded ordnance was discovered just before 11am yesterday.

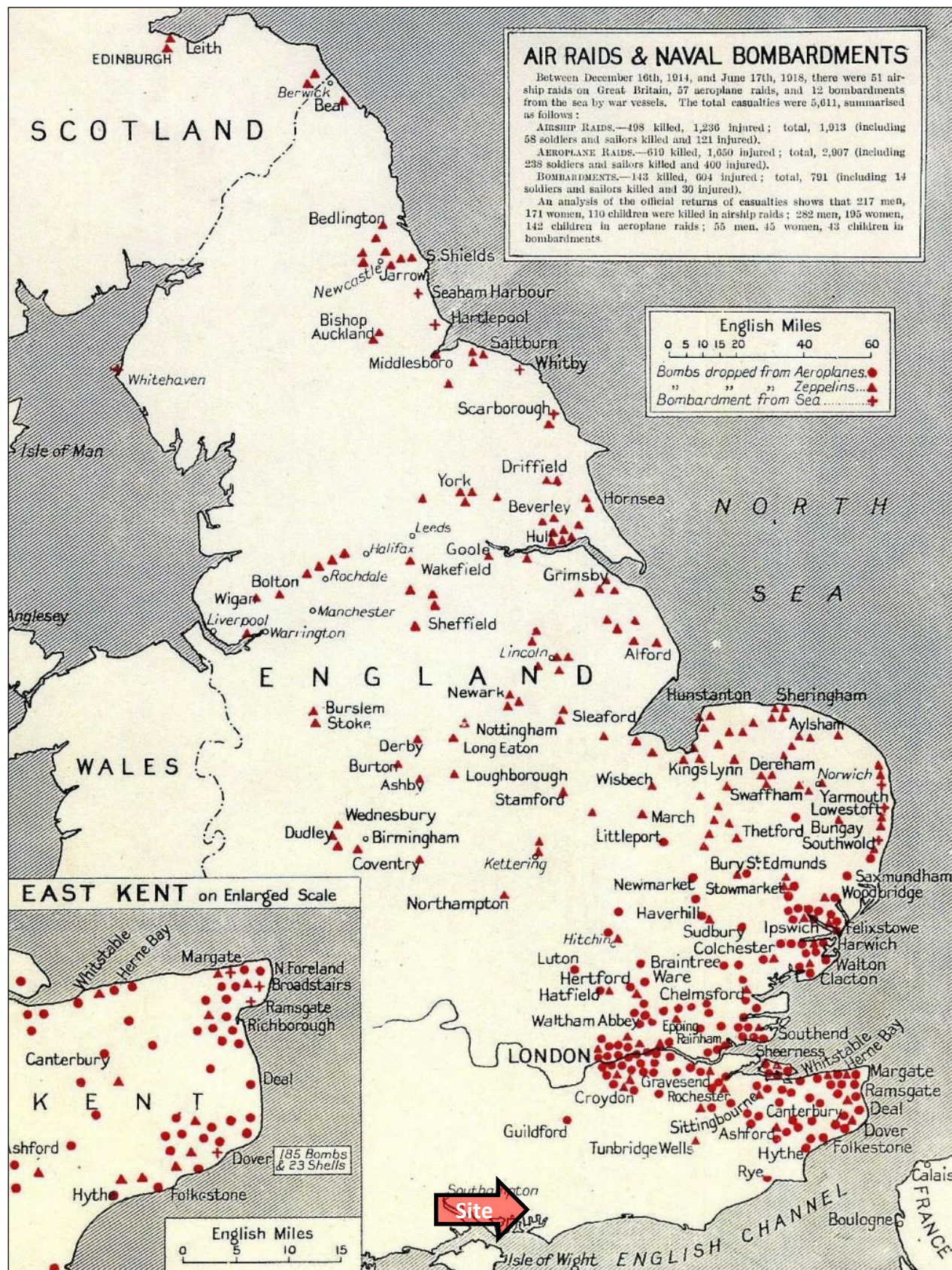
A spokesman for the Ministry of Defence said it was found by a local metal detectorist.

Royal Navy divers bomb disposal team were also sent to the scene.



Police at the entrance to Farlington Marshes, on Sunday, after unexploded ordnance was found at the site. Picture: Mel Legg

The spokesman said: 'The navy diving unit responded, packaged the items and sent them to the military chemical weapons facility for disposal.'


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Project: **Dunsbury Park, Portsmouth**

Ref: **DA13636-00**

Source: J. Morris, *German Air Raids on Britain*



Luftwaffe Photograph, 3rd September 1941



Portsmouth – Hilsea and Cosham

- GB 138 - Barracks
- GB 10 178 – Portsmouth Airfield
- GB 178 – Direction Finding System
- GB 41 31 – Designated Luftwaffe targets
- GB 52 32 – Hilsea Gasworks
- GB 74 40 – Hilsea airframe factory

The site located approximately 4.8km north-east of the closest Luftwaffe target.



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Ref: **DA13636-00**

Source: Nigel J. Clarke, "Adolf Hitler's Home Counties Holiday Snaps"



11th September 1940

11 : 9.40		TIME OF INCIDENT :— 2202/10.
1 0015 Petersfield	Leigh Park 2m N. of Havant	1 HE Bomb fell and exploded at Leigh Park No casualties, no damage.

27th October 1940

		TIME OF INCIDENT :— 1655/27
4 1024/27	Petersfield Rowlands Castle	5 HE and some JB at Middle Park Farm. No damage no casualties. The farm is 1/2 miles NW of Havant. 1 additional crater found

29th October 1940

2. 1300/29	Petersfield	Rowlands Castle	TIME OF INCIDENT :— 0141/29.	
✗			5 HE, at Leigh Park Farm 1/2 miles N. of Leigh Park. Havant - Rowlands Castle road. No casualties; garden wall blown down and greenhouse broken. 1 U.X.B. in field 400 Yds W. of Havant - Rowlands Castle road, hole in "ditch" + more HE 6" Sept. C. (also at Leigh Park Farm) 1553293.	6 1 1414/29 1418/29 ✓

29/04/1941

2/29	1322/29	Petersfield	Rowlands Castle	TIME OF INCIDENT :— 2324/28.
				1 HE. in woods to W of Rowlands Castle (153303).



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Source: Hampshire Archive

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7th December 1940

Two unexploded bombs dropped the previous night north of Havant exploded at 1315 and 1900 respectively, the latter causing slight damage.

16th – 17th January 1941

16-1-41 H.E. Junction London Rd & Park Lane Cowplain
16-1-41 Re to Polish Airman
16-1-41 Polish Airman landed Verner Common Hayling
17-1-41 H.E's Stockleath Lane
17-1-41 Crashed Plane Iye Farm North Hayling
17-1-41 UXB. Hewetts Copse Park Lane Cowplain
17-1-41 Craters Junction London Rd & Park Lane Cowplain

17th April 1941

COWPLAIN.

17. At 22.05 on 17. 4. 41 magnetic mine in the queen's Enclosure London Road, Cowpalin, auarter a mile South East of Cowplain Police Station. Square C. 3. On soft surface. Damage to properties in Park Lane and London Road, Cowplain. No casualties.

29th April 1941

29th April, 1941, Report No. 165.

At 2315 several I.B.s were dropped at Woodmancoote Westbourne, and 1. H.E. at Hambrook about two miles east of Westbourne damaging three houses but causing no casualties. At 2320 reports of a large UXB having fallen were received from Waterlooville, Havant and Emsworth all indicating a location North of Havant but although a search has been made over a wide area between Havant and Rowlands Castle nothing has so far been found.



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Project: **Dunsbury Park, Portsmouth**

Ref: **DA13636-00**

Source: GetMapping

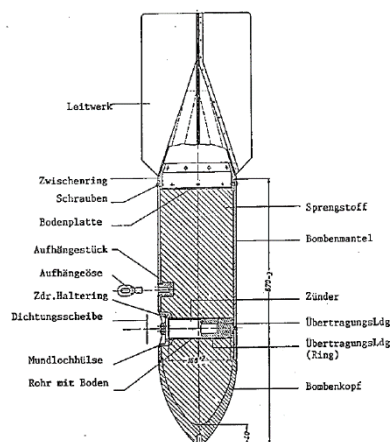
 **Approximate site boundary**



Examples of German Bombs - HE

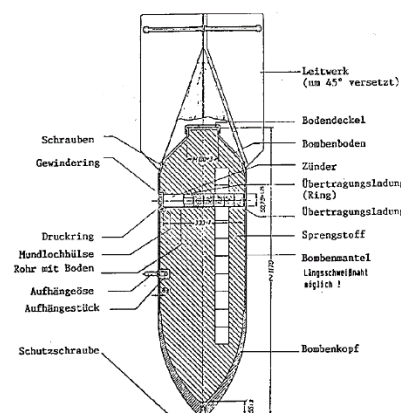
SC 50kg

Bomb Weight	40-54kg (110-119lb)
Explosive Weight	c25kg (55lb)
Fuze Type	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions	1,090 x 280mm (42.9 x 11.0in)
Body Diameter	200mm (7.87in)
Use	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.



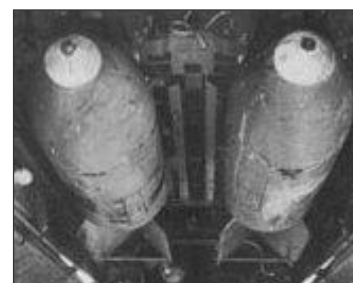
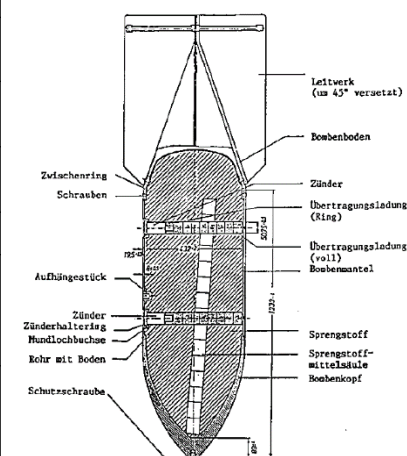
SC 250kg

Bomb Weight	245-256kg (540-564lb)
Explosive Weight	125-130kg (276-287lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)
Body Diameter	368mm (14.5in)
Use	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.
Remarks	It could be carried by almost all German bomber aircraft, and was used to notable effect by the Junkers Ju-87 Stuka (Sturzkampfflugzeug or dive-bomber).



SC 500kg

Bomb Weight	480-520kg (1,058-1,146lb)
Explosive Weight	250-260kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Bomb Dimensions	1957 x 640mm (77 x 25.2in)
Body Diameter	470mm (18.5in)
Use	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.
Remarks	40/60 or 50/50 Amatol TNT, trialene. Bombs recovered with Trialene filling have cylindrical paper wrapped pellets 1-15/16 in. in length and diameter forming



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Ref: **DA13636-00**

Source: Various sources

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Bomb Weight	2kg (4.41lb)
Explosive Weight	7.5oz (212.6 grams) of TNT surrounded by a layer of bituminous composition.
Fuze Type	41 fuze (time) , 67 fuze (clockwork time delay) or 70 fuze (anti-handling device)
Bomb Dimensions	Length 240 mm Width 140 mm Height 310 mm
Body Diameter	3in (7.62 cm) diameter, 3.1in (7.874) long
Use	It was designed as an anti-personnel/fragmentation weapon. They were delivered by air, being dropped in containers that opened at a predetermined height, thus scattering the bombs.
Remarks	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.

Bomb Weight	987.017kg (2176lb)		
Explosive Weight	125-130kg (276-287lb)		
Fuze Type	Impact/ Time delay / hydrostatic pressure fuze		
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)		
Body Diameter	368mm (14.5in)		
Use	Against civilian, military and industrial targets. Designed to detonate above ground level to maximise damage to a wider area.		
Remarks	Parachute Mines were normally carried by HE 115 (Naval operations), HE 111 and JU 88 aircraft types. Deployed a parachute when dropped in order to control its descent.		

Bomb Weight	996-1061kg (1,058-1,146lb)
Explosive Weight	530-620kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Filling	Mixture of 40% amatol and 60% TNT, but when used as an anti-shipping bomb it was filled with Trialen 105, a mixture of 15% RDX, 70% TNT and 15% aluminium powder.
Bomb Dimensions	2800 x 654mm (77 x 25.2in)
Body Diameter	654mm (18.5in)
Use	SC type bombs are General Purpose Bombs used primarily for general demolition work. Constructed of parallel walls with comparatively heavy noses. They are usually of three piece welded construction

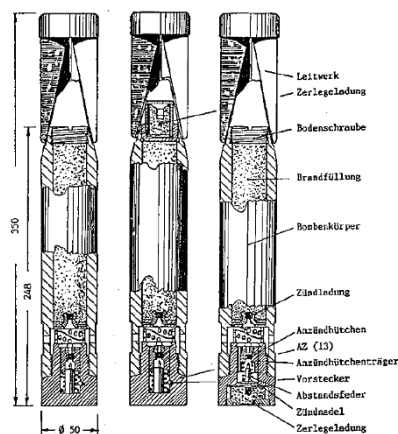


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Examples of German Bombs - Incendiary

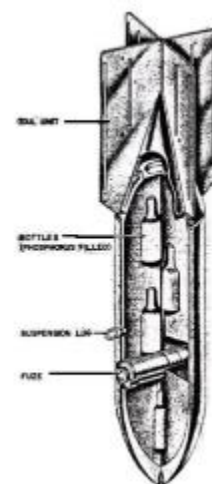
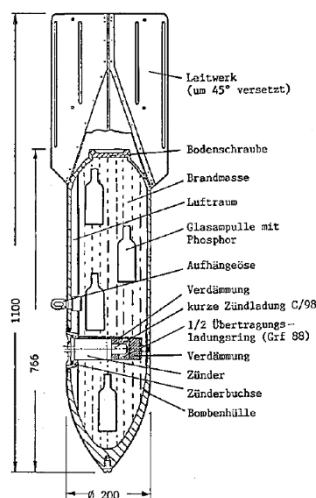
1kg Incendiary Bomb

Bomb Weight	1.0 and 1.3kg (2.2 and 2.87lb)
Explosive Weight	680gm (1.3lb) Thermite
Fuze Type	Impact fuze
Bomb Dimensions	350 x 50mm (13.8 x 1.97in)
Body Diameter	50mm (1.97in)
Use	As incendiary – dropped in clusters against towns and industrial complexes
Remarks	Magnesium alloy case. Sometimes fitted with high explosive charge. The body is a cylindrical alloy casting threaded internally at the nose to receive the fuze holder and fuze.



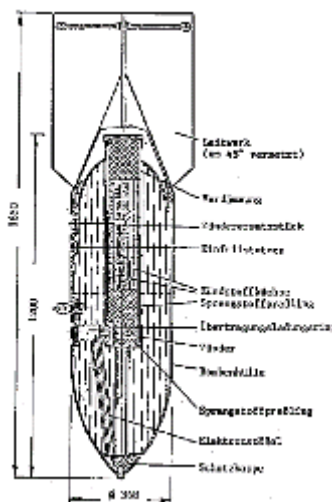
C50 A Incendiary Bomb

Bomb Weight	c41kg (90.4lb)
Explosive Weight	0.03kg (0.066lb)
Incendiary Filling	12kg (25.5lb) liquid filling with phosphor igniters in glass phials. Benzine 85%; Phosphorus 4%; Pure Rubber 10%
Fuze Type	Electrical impact fuze
Bomb Dimensions	1,100 x 280mm (43.2 x 8in)
Use	Against all targets where an incendiary effect is to be expected
Remarks	Early fill was a phosphorous/carbon disulphide incendiary mixture



Flam C-250 Oil Bomb

Bomb Weight	125kg (276lb)
Explosive Weight	1kg (2.2lb)
Fuze Type	Super-fast electrical impact fuze
Filling	Mixture of 30% petrol and 70% crude oil
Bomb Dimensions	1,650 x 512.2mm (65 x 20.2in)
Body Diameter	368mm (14.5in)
Use	Often used for surprise attacks on living targets, against troop barracks and industrial installations. Thin casing – not designed for ground penetration


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Project: **Dunsbury Park, Portsmouth**

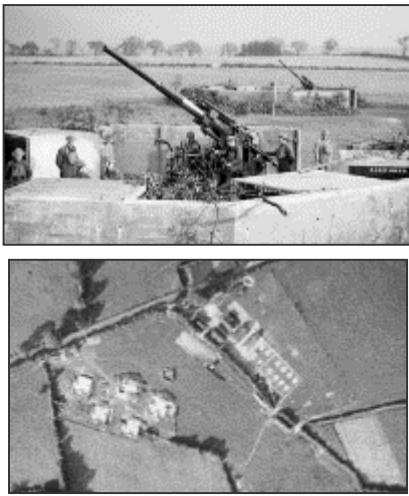
Ref: **DA13636-00**

Source: Various sources

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QF 3.7 Inch WWII Anti-Aircraft Projectile

Projectile Weight	28lb (12.6 kg)
Explosive Weight	2.52lbs
Fuze Type	Mechanical Time Fuze
Dimensions	3.7in x 14.7in (94mm x 360mm)
Rate of Fire	10 to 20 rounds per minute
Use	High Explosive Anti-Aircraft projectile. 4.5in projectiles were also used in this role.
Ceiling	30,000ft to 59,000ft



40mm Bofors Projectile

Projectile Weight	1.96lb (0.86kg)
Explosive Weight	300g (0.6lb)
Fuze Type	Proximity and Mechanical Time Fuze
Rate of Fire	120 rounds per minute
Projectile Dimensions	40mm x 310mm (1.6in x 12.2in)
Ceiling	23,000ft (7000m)



Unrotated Projectile (UP) – Z Battery

Projectile Weight	84lb (24.5kg)
Warhead Weight	4.28lb (1.94kg)
Warhead	Aerial Mine with a No. 700 / 720 fuze
Filling	High Explosive
Dimensions	1930mm x 82.6mm (76 x 3.25in)
Use	As a short range rocket-firing anti-aircraft weapon developed for the Royal Navy. It was used extensively by British ships during the early days of World War II. The UP was also used in ground-based single and 128-round launchers known as Z Batteries.



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Appendix C Exploratory Hole Logs and Photographs

		Project: Dunsbury Park				Borehole No BH5.01			
						Page No. 1 of 3			
Method: Cable Percussion		Date(s): 09/08/2021		Logged By: YP		Drilled By: SEDS			
Client: Portsmouth City Council		Co-ords: 469909.48, 109398.36		Checked By: DP		Flush:			
Hydrock Project No: 19453		Ground Level: 35.34m OD				Scale: 1:50			

Samples / Tests			Water- Stikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instru- ment station / Backfill
Depth (m)	Type	Results							
0.05	ES			Grass and aggregates over reddish/ pinkish brown, slightly silty sandy GRAVEL with abundant rootlets. Gravel is subangular fine to coarse of limestone aggregates. (MADE GROUND - SURFACE COVERING)	0.10	(0.10)	35.24		
0.30	ES				0.40	(0.30)	34.94		
0.50 - 1.00	B			Very compacted, yellowish brown, very sandy SILT. Sand is fine (possible soil stabilizer added). Recovered damp. (MADE GROUND - ENGINEERED FILL)					
0.60	B			Soft to firm, orangish brown slightly grey mottled, sandy silty CLAY. (LONDON CLAY FORMATION (WEATHERED))					
1.50	SPT	N=9 (1,1,2,2,2,3)		... From 1.50m bgl becoming firm.		(2.30)			
1.50	D								
2.00	D			... At 2.50m bgl rare dark brown/ black spots (possible organic matter degraded).					
2.50	SPT	N=10 (1,2,2,2,3,3)			2.70		32.64		
2.50	D			Loose, blueish/ dark grey very silty/clayey fine SAND with occasional white shells (broken and intact). Rare pyrite. Rare hard thin creamy white fragments of calcite (approximately 1mm thickness). (LONDON CLAY FORMATION)		(0.80)			
3.00	D								
3.00	U								
3.50	SPT	N=14 (2,3,3,3,4,4)		Firm to stiff, dark grey, sandy silty CLAY with occasional white shell fragments. Sand is fine. (LONDON CLAY FORMATION)	3.50		31.84		
3.50	D					(1.50)			
4.00	D								
4.50	U								
5.00	D			Stiff, dark grey sandy silty CLAY with rare white shell fragments. Sand is fine. (LONDON CLAY FORMATION)	5.00		30.34		
5.50	SPT	N=29 (3,4,6,8,7,8)							
5.50	D								
6.50	D			... At 6.50m bgl becoming friable. Occasional pockets of grey fine sand.					
7.00 - 7.45	U					(4.50)			
8.50	SPT	N=32 (3,5,6,7,9,10)		... At 8.50m bgl groundwater encountered.					
8.50	D								
9.50	D								
9.50	HSV	90kPa		Firm to stiff, dark grey sandy silty CLAY with rare white shell fragments. Sand is fine. (LONDON CLAY FORMATION)	9.50		25.84		
10.00 - 10.45	U				10				

Progress and Observations									Chiselling			General Remarks:
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	
			0.00	7.50								1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m bgl. 3. HSV tests were undertaken on intact samples recovered from the borehole. 4. Monitoring well installed to 10.00m bgl.



Method: Cable Percussion	Date(s): 09/08/2021	Logged By: YP	Drilled By: SEDS
Client: Portsmouth City Council	Co-ords: 469909.48, 109398.36	Checked By: DP	Flush:
Hydrock Project No: 19453	Ground Level: 35.34m OD		Scale: 1:50

Samples / Tests			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Depth (m)	Type	Results							
10.00 - 10.50	B			Firm to stiff, dark grey sandy silty CLAY with rare white shell fragments. Sand is fine. (LONDON CLAY FORMATION) ... At 9.50m bgl recovered wet.					
11.50	SPT	N=35 (3,5,7,8,10,10)				(4.00)			
11.50	D								
12.50	D								
13.00	U								
13.50	D				13.50		21.84		
14.50	SPT	N=37 (4,7,7,8,10,12)		Stiff to very stiff, dark grey slightly sandy CLAY. Occasional pockets/ partings of light grey fine sand. (LONDON CLAY FORMATION)					
14.50	D								
15.50	D								
16.00 - 16.20	U								
16.50	D								
16.50	HSV	124kPa				(6.95)			
17.50	SPT	N=40 (4,6,9,9,10,12)							
17.50	D								
19.00	D								
19.50	HSV	120kPa							
					20				

Progress and Observations									Chiselling			General Remarks:
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	
												1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m bgl. 3. HSV tests were undertaken on intact samples recovered from the borehole. 4. Monitoring well installed to 10.00m bgl.

				Project: Dunsbury Park				Borehole No BH5.01 Page No. 3 of 3					
Method: Cable Percussion				Date(s): 09/08/2021				Logged By: YP		Drilled By: SEDS			
Client: Portsmouth City Council				Co-ords: 469909.48, 109398.36				Checked By: DP		Flush:			
Hydrock Project No: 19453				Ground Level: 35.34m OD						Scale: 1:50			
Samples / Tests			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill				
Depth (m)	Type	Results											
20.00	SPT	N=43 (5,8,9,10,12,12)		Stiff to very stiff, dark grey slightly sandy CLAY. Occasional pockets/ partings of light grey fine sand. (LONDON CLAY FORMATION) <i>At 20.00m bgl occasional white shell fragments.</i> End of Borehole at 20.45m	20.45		14.88						
20.00	D												
					21								
					22								
					23								
					24								
					25								
					26								
					27								
					28								
					29								
					30								
Progress and Observations									Chiselling			General Remarks: 1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m bgl. 3. HSV tests were undertaken on intact samples recovered from the borehole. 4. Monitoring well installed to 10.00m bgl.	
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)		

Logged in general accordance with BS5930:2015

Method: Cable Percussion

Date(s): 10/08/2021

Logged By: YP

Drilled By: SEDS

Client: Portsmouth City Council

Co-ords: 469881.60, 109308.05

Checked By: DP

Flush:

Hydrock Project No: 19453

Ground Level: 32.68m OD

Scale: 1:50

Samples / Tests			Water- Stikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Depth (m)	Type	Results							
0.05	ES			Gravel aggregates over pinkish brown, slightly silty sandy GRAVEL with abundant rootlets. Gravel is subangular fine to coarse of limestone aggregates. (MADE GROUND - SURFACE COVERING)	0.10	(0.10)	32.58		
0.30	ES					(0.40)			
0.50 - 1.00	B			Very compacted, yellowish brown, very silty fine SAND (possible soil stabilizer added). Occasional subangular fine to coarse gravel of sandstone/ limestone. (MADE GROUND - ENGINEERED FILL)	0.50		32.18		
				Orangish brown, very sandy SILT with occasional pockets of orangish brown mottled light grey sandy CLAY. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))					
1.50	SPT	N=10 (1,2,2,3,2,3)		... From 1.50m bgl becoming very sandy clayey SILT. Rare weak sandstones.	1				
1.50	D					(2.60)			
2.00	D				2				
2.50	SPT	N=9 (1,1,2,2,2,3)		... From 2.50m bgl becoming less sandy with rare dark grey/ black spots (possible organic matter degraded).					
2.50	D				3				
3.10	D				3.10		29.58		
3.50 - 3.95	U			Firm to stiff, dark grey slightly sandy CLAY with rare white shell fragments. Sand is fine. (LONDON CLAY FORMATION)					
4.00	D				4				
4.50	SPT	N=20 (1,2,4,4,5,7)				(2.90)			
4.50	HSV	93kPa							
5.00	D				5				
5.50 - 5.95	U								
6.00	D				6		26.68		
				Stiff, dark grey sandy silty CLAY with occasional pockets/ partings of light grey fine sand. (LONDON CLAY FORMATION)					
7.00	SPT	N=26 (2,4,5,6,7,8)			7				
7.00	D					(2.50)			
8.00	D				8				
8.50 - 8.95	U				8.50		24.18		
8.50 - 9.00	B			Firm to stiff (locally soft - damp), dark grey sandy silty CLAY with occasional pockets of light grey fine sand. (LONDON CLAY FORMATION)					
					9				
					10				

Progress and Observations

Chiselling

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m bgl. 3. HSV tests were undertaken on intact samples recovered from the borehole. 4. Monitoring well installed to 5.00m bgl.

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)

Progress and Observations									Chiselling			General Remarks: 1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m bgl. 3. HSV tests were undertaken on intact samples recovered from the borehole. 4. Monitoring well installed to 5.00m bgl.
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	

Logged in general accordance with BS5930:2015

							Project: Dunsbury Park					Borehole No BH5.02 Page No. 3 of 3						
Method: Cable Percussion							Date(s): 10/08/2021				Logged By: YP			Drilled By: SEDS				
Client: Portsmouth City Council							Co-ords: 469881.60, 109308.05				Checked By: DP			Flush:				
Hydrock Project No: 19453							Ground Level: 32.68m OD							Scale: 1:50				
Samples / Tests						Water- Strikes	Stratum Description						Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill	
Depth (m)	Type	Results																
20.00	SPT	N=36 (3,5,8,8,9,11)		Stiff to very stiff, dark grey CLAY with rare white shell fragments. Occasional pockets of light grey fine sand. (LONDON CLAY FORMATION) End of Borehole at 20.45m						20.45		12.23						
20.00	D																	
													21					
													22					
													23					
													24					
													25					
													26					
													27					
													28					
													29					
													30					

Progress and Observations									Chiselling			General Remarks: 1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m bgl. 3. HSV tests were undertaken on intact samples recovered from the borehole. 4. Monitoring well installed to 5.00m bgl.
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	

Method: Cable Percussion

Date(s): 11/08/2021 - 12/08/2021

Logged By: YP

Drilled By: SEDS

Client: Portsmouth City Council

Co-ords: 469897.40, 109269.74

Checked By: DP

Flush:

Hydrock Project No: 19453

Ground Level: 30.71m OD

Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Depth (m)	Type	Results							
10.50	D			Stiff (friable), dark grey, sandy to very sandy CLAY with occasional white shell fragments. (LONDON CLAY FORMATION)	11				
11.50	SPT	N=29 (3,5,6,7,8,8)		... At 11.50m bgl frequent pearlescent white shell fragments.	11.80		18.91		
11.50	D			Stiff, dark grey, slightly sandy CLAY with rare white shell fragments. Occasional pockets of light grey fine sand. (LONDON CLAY FORMATION)	12				
12.50	D								
13.00	SPT	N=32 (4,6,7,8,8,9)			13	(2.20)			
13.00	D								
14.00	D			Stiff to very stiff, dark grey, extremely closely to very closely fissured CLAY occasional infilled with light grey fine sand. Rare white shell fragments. (LONDON CLAY FORMATION)	14		16.71		
14.00	HSV	90kPa							
14.50	SPT	N=35 (3,6,7,9,9,10)							
14.50	D								
15.00	D				15				
15.50	D								
15.50	HSV	130kPa							
16.00	SPT	N=37 (4,6,8,9,10,10)			16				
16.00	D								
17.00	D				17				
17.00	HSV	118kPa							
17.50 - 17.95	U								
18.00	D				18				
19.00	SPT	N=38 (5,7,8,9,10,11)			19				
19.00	D								
20.00	D				20	(11.50)			

Progress and Observations

Chiselling

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 5.50m and 8.80m bgl. 3. HSV tests were undertaken on in-tact samples recovered from the borehole. 4. Monitoring well installed to 10.00m bgl.

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)



Project: Dunsbury Park

Borehole No
BH5.03

Page No. 3 of 3

Method: Cable Percussion	Date(s): 11/08/2021 - 12/08/2021	Logged By: YP	Drilled By: SEDS
Client: Portsmouth City Council	Co-ords: 469897.40, 109269.74	Checked By: DP	Flush:
Hydrock Project No: 19453	Ground Level: 30.71m OD		Scale: 1:50

Samples / Tests			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Depth (m)	Type	Results							
20.00	HSV	150kPa		Stiff to very stiff, dark grey, extremely closely to very closely fissured CLAY occasional infilled with light grey fine sand. Rare white shell fragments. (LONDON CLAY FORMATION) ... From 20.00m bgl shell fragments absent.					
20.50	SPT	N=40 (3,7,9,9,11,11)							
20.50	D								
					21				
21.50	D								
22.00	SPT	N=45 (4,6,9,10,12,14)							
22.00	D								
					23				
23.00	D								
23.50	SPT	50/80mm (7,10,46,4)							
24.00 - 25.50	B			... Between 23.60m to 23.80m bgl claystone.					
					24				
25.00 - 25.45	U								
25.20	D								
					25				
				End of Borehole at 25.50m	25.50		5.21		
					26				
					27				
					28				
					29				
					30				

Progress and Observations									Chiselling			General Remarks:
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	
												1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 5.50m and 8.80m bgl. 3. HSV tests were undertaken on in-tact samples recovered from the borehole. 4. Monitoring well installed to 10.00m bgl.

							Project: Dunsbury Park					Borehole No BH5.04				
												Page No. 1 of 3				
Method: Cable Percussion							Date(s): 11/08/2021				Logged By: YP			Drilled By: SEDS		
Client: Portsmouth City Council							Co-ords: 469861.98, 109237.86				Checked By: DP			Flush:		
Hydrock Project No: 19453							Ground Level: 26.70m OD							Scale: 1:50		
Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill							
Depth (m)	Type	Results														
0.15	ES	N=19 (1,2,3,5,5,6)		Pinkish brown, sandy subangular medium to coarse GRAVEL of limestone aggregates. (MADE GROUND - SURFACE COVERING)	0.20	(0.20)	26.50									
0.50	D			Brownish grey and yellowish grey, silty slightly gravelly fine SAND with rare roots and rootlets. Gravel is subangular fine to coarse of aggregates and dessicated clay/mudstone. (MADE GROUND - ENGINEERED FILL)	0.40	(0.20)	26.30									
0.50	ES			Blueish grey, sandy SILT with frequent white shell fragments. Occasional pockets of firm sandy clay. (LONDON CLAY FORMATION)		(1.10)										
0.50 - 1.00	B															
1.50	SPT	N=22 (2,3,4,5,6,7)		Firm, dark grey sandy CLAY with occasional white shell fragments. (LONDON CLAY FORMATION)	1.50		25.20									
1.50	D															
2.00	D			... At 2.00m bgl intact white shell fragments.	2											
2.50 - 2.95	U															
3.00	D			... From 3.00m bgl becoming more sandy.	3											
3.50	SPT															
3.50	D															
4.00	D															
4.50 - 4.95	U															
5.00	D															
5.50	SPT															
5.50 - 6.00	B			Soft (damp), dark grey slightly sandy slightly gravelly SILT. (LONDON CLAY FORMATION)	5.50		21.20									
7.00 - 7.45	U			... At 6.00m bgl one cobble of mudstone (high dense) approximately 100x100x120mm.	6											
7.50	D															
8.50	SPT															
8.50	D															
9.50	D	N=28 (3,4,5,7,8,8)		Stiff to firm, dark grey slightly sandy silty CLAY with rare cream shell fragments. Occasional pockets of light grey fine sand. (LONDON CLAY FORMATION)	6.50		20.20									
10.00 - 10.45	U															
Progress and Observations				Chiselling			General Remarks:									
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 5.50m and 10.1m bgl. 3. HSV tests were undertaken on in-tact samples recovered from the borehole. 4. Borehole backfilled with arisings.				

Logged in general accordance with BS5930:2015

Method: Cable Percussion

Date(s): 11/08/2021

Logged By: YP

Drilled By: SEDS

Client: Portsmouth City Council

Co-ords: 469861.98, 109237.86

Checked By: DP

Flush:

Hydrock Project No: 19453

Ground Level: 26.70m OD

Scale: 1:50

Samples / Tests			Water- Strokes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Depth (m)	Type	Results							
10.00 - 10.50	B		☒	Stiff to firm, dark grey slightly sandy silty CLAY with rare cream shell fragments. Occasional pockets of light grey fine sand. (LONDON CLAY FORMATION) ... At 10.00m bgl becoming firm.					
11.50	SPT	N=32 (4,5,7,8,8,9)			11				
11.50	D								
12.50	D				12				
13.00 - 13.45	U				13				
13.50	D			Stiff to very stiff (friable) slightly sandy silty CLAY with rare pockets of light grey fine sand. (LONDON CLAY FORMATION)	13.30		13.40		
13.50	HSV	118kPa			14				
14.50	SPT	N=34 (3,6,7,8,9,10)			15				
15.50	D				16				
16.00 - 16.45	U				17	(5.70)			
16.50	D				18				
17.50	SPT	N=38 (4,7,9,9,10,10)			19				
17.50	D				20				
19.50	D			Very stiff, dark grey silty CLAY. (LONDON CLAY FORMATION)	19.00		7.70		
19.50 - 19.95	U					(1.45)			
20.00	D								

Progress and Observations

Chiselling

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 5.50m and 10.1m bgl. 3. HSV tests were undertaken on in-tact samples recovered from the borehole. 4. Borehole backfilled with arisings.

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)

							Project: Dunsbury Park					Borehole No BH5.04 Page No. 3 of 3				
Method: Cable Percussion							Date(s): 11/08/2021				Logged By: YP			Drilled By: SEDS		
Client: Portsmouth City Council							Co-ords: 469861.98, 109237.86				Checked By: DP			Flush:		
Hydrock Project No: 19453							Ground Level: 26.70m OD							Scale: 1:50		
Samples / Tests			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill							
Depth (m)	Type	Results														
				Very stiff, dark grey silty CLAY. (LONDON CLAY FORMATION)	20.45		6.25									
				End of Borehole at 20.45m												
					21											
					22											
					23											
					24											
					25											
					26											
					27											
					28											
					29											
					30											
Progress and Observations									Chiselling			General Remarks: 1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 5.50m and 10.1m bgl. 3. HSV tests were undertaken on in-tact samples recovered from the borehole. 4. Borehole backfilled with arisings.				
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)					

Method: Cable Percussion

Date(s): 13/08/2021 - 16/08/2021

Logged By: YP/DP

Drilled By: SEDS

Client: Portsmouth City Council

Co-ords: 469876.26, 109171.57

Checked By: DP

Flush:

Hydrock Project No: 19453

Ground Level: 26.57m OD

Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Depth (m)	Type	Results							
0.02	ES			Gravel aggregates over pinkish brown, sandy subangular medium to coarse GRAVEL of limestone aggregates. Rare rootlets. (MADE GROUND - SURFACE COVERING)	0.05	(0.05)	26.52		
0.20	ES			Yellowish brown, silty fine SAND with rare subangular medium to coarse gravel of aggregates. (MADE GROUND - ENGINEERED FILL)	0.40	(0.35)	26.17		
0.50 - 1.00	B			Firm, orangish brown and light grey mottled slightly sandy CLAY with rare subangular fine to coarse of flint. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))	1	(0.80)			
0.60	ES				1.20		25.37		
1.50	SPT	N=9 (1,2,2,2,2,3)		Firm, orangish brown to light brown, sandy silty CLAY with occasional pockets of light grey sandy clay. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))	2	(1.00)			
1.50 - 1.95	D				2.20		24.37		
2.20	D			Firm, dark grey, slightly sandy CLAY with occasional pockets of light brown/orangish brown clay. Sand is fine. (LONDON CLAY FORMATION)	2.50	(0.30)	24.07		
2.50	SPT	N=12 (1,1,2,3,3,4)		Firm to stiff, dark grey sandy CLAY/SILT with rare white shell fragments. Sand is fine. (LONDON CLAY FORMATION)	3	(2.00)			
2.50 - 2.95	D				4				
3.00	D			... From 4.00m bgl becoming stiff.	4.50		22.07		
3.50 - 3.95	U			Stiff friable grey sandy SILT/CLAY. Sand is fine. Occasional fine to medium light brownish grey fossil fragments of shell. (LONDON CLAY FORMATION)	5	(2.50)			
4.00	D			... At 5.00m bgl occasional fine to medium light brownish grey fossil fragments of shell and tube like segments.	6				
4.50	SPT	N=14 (1,2,3,3,4,4)		... At 6.00m bgl becoming less friable.	7		19.57		
4.50 - 4.95	D			Firm, grey sandy SILT. (LONDON CLAY FORMATION)	8	(1.00)			
5.00	D				8.00		18.57		
5.50 - 5.95	U			Very stiff, grey extremely to very closely fissured silty slightly sandy CLAY. Sand is fine (LONDON CLAY FORMATION)	9	(2.00)			
6.00	D				10		16.57		
7.00	SPT	N=19 (2,3,4,5,5,5)							
7.00 - 7.45	D								
8.00	D								
8.50 - 8.95	U								
8.50 - 9.00	B								

Progress and Observations

Chiselling

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m and 10.70m bgl. 3. Monitoring well installed at 10.00m bgl.

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)

Method: Cable Percussion

Date(s): 13/08/2021 - 16/08/2021

Logged By: YP/DP

Drilled By: SEDS

Client: Portsmouth City Council

Co-ords: 469876.26, 109171.57

Checked By: DP

Flush:

Hydrock Project No: 19453

Ground Level: 26.57m OD

Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Depth (m)	Type	Results							
10.00	SPT	N=26 (3,5,6,6,7,7)		Very stiff grey extremely to very closely fissured slightly sandy SILT/CLAY. Sand is fine. (LONDON CLAY FORMATION)	11	(2.00)	14.57		
10.00 - 10.45	D								
11.00	D								
11.50 - 11.95	U								
12.00	D			Very stiff grey silty CLAY. (LONDON CLAY FORMATION)	12				
13.00	SPT	N=29 (2,4,6,7,8,8)			13				
13.00 - 13.45	D								
14.00	D			... At 14.00m bgl becoming closely fissured.	14				
14.50 - 14.95	U								
15.00	D				15				
16.00	SPT	N=36 (4,6,7,8,10,11)		... At 16.00m bgl becoming extremely closely to very closely fissured. Occasional fine to medium off white pale brown shell fragments.	16				
16.00 - 16.45	D								
17.00	D			... At 17.00m bgl becoming extremely closely to very closely fissured.	17				
17.50 - 17.95	U								
18.00	D				18				
19.00	SPT	N=39 (5,7,8,10,10,11)		... At 19.00m bgl becoming very closely fissured. Occasional fine to medium off white pale brown shell fragments.	19				
19.00 - 19.45	D								
20.00	D				20				

Progress and Observations									Chiselling			General Remarks:
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	
												1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m and 10.70m bgl. 3. Monitoring well installed at 10.00m bgl.

Drilled By: SEDS

Flush:	
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Scale: 1:50

Progress and Observations									Chiselling			General Remarks:
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	From (m)	To (m)	Duration (HH:MM)	
												1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 8.50m and 10.70m bgl. 3. Monitoring well installed at 10.00m bgl.

Logged in general accordance with BS5930:2015

Method: Trial Pit	Date(s): 20/07/2021	Logged By: DP	Checked By: DP
Client: Portsmouth City Council	Co-ords: 469913.06, 109415.55	Stability: Stable	Dimensions: 4.00m
Hydrock Project No: 19453	Ground Level: 35.46m OD	Plant: ZAXIS 130LCN	0.60m 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	
Depth (m)	Type	Results							
0.10	ES	64kPa		Grasses and shrubs over pinkish grey, slightly sandy GRAVEL with abundant roots and rootlets. Gravel is angular to subangular fine to coarse of limestone aggregates. (MADE GROUND - SURFACE COVERING) Orangish brown, silty, fine SAND. (MADE GROUND - ENGINEERED FILL) ... From 0.20m bgl roots and rootlets becoming rare.	0.15	(0.15)	35.31		
0.50	B				0.60	(0.45)	34.86		
0.80	HSV			Firm to stiff, orangish brown sandy SILT. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))	1	(0.50)	34.36		
1.50	D	74kPa		Firm to soft, orange brown mottled greyish brown, sandy SILT. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))	2.10	(1.00)	33.36		
2.00	HSV				2	(1.30)	32.06		
2.30	B			Blueish grey, sandy SILT with occasional grey brown, cream, pearlescent shell fragments. Sand is fine. (LONDON CLAY FORMATION)	3				
3.30	D				3.40		32.06		
Base of Excavation at 3.40m									
							</		

General Remarks:
1. No groundwater encountered. 2. Backfilled with arisings.

Method: Trial Pit			Date(s): 21/07/2021		Logged By: YP		Checked By: DP		
Client: Portsmouth City Council			Co-ords: 469885.27, 109392.87		Stability: Stable		Dimensions: 3.10m		Scale: 1:25
Hydrock Project No: 19453			Ground Level: 35.60m OD		Plant: JCB JS131LC		0.50m		
Samples / Tests			Water-Strikes	Stratum Description	Depth m btgl	Thickness (m)	Level m OD	Legend	
Depth (m)	Type	Results							
0.30	ES			Aggregates over pinkish brown, very gravelly silty, fine SAND with abundant roots and rootlets. Gravel is subangular to subrounded medium to coarse of limestone aggregates. (MADE GROUND - SURFACE COVERING)	0.20	(0.20)	35.40		
				Light brown mottled grey, sandy SILT with rare subrounded to subangular fine to coarse gravel of limestone aggregates and frequent rootlets. (MADE GROUND - ENGINEERED FILL)	0.50	(0.30)	35.10		
0.70	B			Light brown mottled grey, sandy SILT. (MADE GROUND - ENGINEERED FILL)		(0.35)			
				... At 0.80m rare brick fragments.	0.85		34.75		
				Firm, dark grey, slightly sandy, silty CLAY. (LONDON CLAY FORMATION (WEATHERED))	1.00	(0.15)	34.60		
				Firm, light grey mottled light brown and orange, sandy, silty CLAY with occasional pockets of soft, light grey, very sandy, silty clay. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))					
2.50	D HSV	67kPa			2	(2.20)			
2.50									
					3				
					3.20		32.40		
Base of Excavation at 3.20m									
3.40	D								
					4				
					5				

General Remarks:
1. Slow groundwater seepage at 3.00m bgl. 2. Backfilled with arisings.

Method: Trial Pit

Date(s): 20/07/2021

Logged By: YP

Checked By: DP

Client: Portsmouth City Council

Co-ords: 469869.49, 109333.17

Stability: Stable

Dimensions:

Scale:

Hydrock Project No: 19453

Ground Level: 32.67m OD

Plant: JCB JS131LC

0.50m 3.40m

1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.30	ES			Pink, very gravelly, silty, fine to medium SAND. Gravel is subangular to subrounded fine to coarse of limestone aggregates. (MADE GROUND - SURFACE COVERING)	0.20	(0.20)	32.47	
0.60 0.60	B D			Orangish brown slightly mottled light grey, slightly silty, fine SAND with occasional pockets of light grey sandy clay. (MADE GROUND - ENGINEERED FILL)	0.70	(0.50)	31.97	
2.20	D			Soft to firm, light grey mottled orange, very sandy, silty CLAY with occasional pockets of dark orange stiff clay and rare black spots. Sand is fine. (LONDON CLAY FORMATION (WEATHERED))	1	(2.10)		
3.00 3.00	D HSV	69kPa		Firm, blueish grey, slightly sandy CLAY. Sand is fine. (LONDON CLAY FORMATION)	2.80	(0.20)	29.87	
				Base of Excavation at 3.00m	3.00		29.67	
					4			
					5			

General Remarks:

1. No groundwater encountered. 2. Backfilled with arisings.

Checked By: DP

Scale:

1:25

General Remarks:

1. No groundwater encountered. 2. Backfilled with arisings.

Logged in general accordance with BS930:2011

[illegible]

Checked By: DP

Scale:

1:25

[illegible]

Method: Trial Pit	Date(s): 20/07/2021	Logged By: YP	Checked By: DP
Client: Portsmouth City Council	Co-ords: 469807.23, 109186.54	Stability: Stable	Dimensions: 3.10m
Hydrock Project No: 19453	Ground Level: 25.43m OD	Plant: JCB JS131LC	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.40	ES	85kPa		Reddish brown, very gravelly, silty fine to medium SAND with occasional roots and rootlets. Gravel is subangular to subrounded medium to coarse of limestone aggregates. (MADE GROUND - SURFACE COVERING)	0.25	(0.25)	25.18	
0.70	B			Orangish/ yellowish brown, slightly gravelly, sandy SILT with occasional pockets of silty fine sand. Gravel is subrounded to subangular fine to coarse of limestone aggregates. (MADE GROUND - ENGINEERED FILL)	0.50	(0.25)	24.93	
0.70	HSV			Firm to stiff, brownish grey/greyish brown, slightly sandy, slightly gravelly SILT with occasional pockets orangish brown silty fine sand. Gravel is subrounded to rounded, fine to coarse of flint. (LONDON CLAY FORMATION (WEATHERED))	0.90	(0.40)	24.53	
1.30	D	84kPa		Firm to stiff, grey, slightly sandy, slightly gravelly SILT with occasional bedding/ laminations (10cm thick). Sand is fine. (LONDON CLAY FORMATION)	1	(2.50)	22.03	
2.10	HSV				2			
2.50	D			... At 2.50m becoming sandy. Sand is fine.				
2.50	HSV	69kPa				(2.50)	22.03	
3.30	D			... At 3.00m bgl rare white shell fragments.	3			
				Base of Excavation at 3.40m	3.40		22.03	
					4			
					5			

General Remarks:
1. No groundwater encountered. 2. Backfilled with arisings.

Method: Dynamic (Windowless) Sampler

Date(s): 27/07/2021

Logged By: LC

Drilled By: Impact Geotechnical

Client: Portsmouth City Council

Co-ords: 469930.40, 109428.97

Checked By: DP

Rig: Terrier

Hydrock Project No: 19453

Ground Level: 35.49m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.00 - 2.00		100%	0.30	ES			Reddish brown, slightly clayey, sandy GRAVEL. Gravel is subangular to angular fine to coarse of ballast/aggregate. Sand is fine to medium.	0.15	(0.15)	35.34		
			0.30 - 0.60	B			(MADE GROUND - SURFACE COVERING)					
							Brown, slightly silty, slightly gravelly, fine to medium SAND. Gravel is subangular fine to medium.		(0.65)			
							(MADE GROUND - ENGINEERED FILL)					
2.00 - 3.00		90%	1.20	SPT	N=8 (1,1,2,2,2,2)		Firm, brown mottled orange brown and grey, sandy CLAY with rare subangular fine to medium flint gravel. (LONDON CLAY FORMATION (WEATHERED))	0.80		34.69		
			1.30	ES								
			1.60	HSV	65kPa		... At 1.60m bgl becoming brown mottled orange.		(1.50)			
			1.70 - 2.00	B								
3.00 - 4.00		90%	2.00	SPT	N=14 (2,2,3,3,4,4)			2				
			2.80	HSV	71kPa							
			3.00	SPT	N=16 (2,3,3,4,4,5)							
4.00 - 5.00		100%	3.00	D			Firm to stiff, dark grey, sandy CLAY. Sand is fine. (LONDON CLAY FORMATION)	2.30		33.19		
			4.00	SPT	N=19 (2,4,4,4,5,6)				(2.20)			
			4.50	SPT	50/10mm (25,50)							
			4.50	D			End of Borehole at 4.50m	4.50		30.99		

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Borehole backfilled with arisings. 4. SPT refused at 4.50m bgl.

Drilled By: Impact Geotechnical

Riq: Terrier

Scale: 1:30

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 1.85m bgl. 3. Monitoring well installed to 5.0m bgl.

Logged in general accordance with BS5930:201

Drilled By: Impact Geotechnical

Riq: Terrier

Scale: 1:30

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Borehole backfilled with arisings.

Logged in general accordance with BS5930:201

Drilled By: Impact Geotechnical

Rig: Terrier

Scale: 1:30

General Remarks:
1. Inspection hand pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Monitoring well installed to 5.0m bgl.

Drilled By: Impact Geotechnical

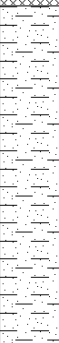
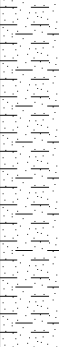
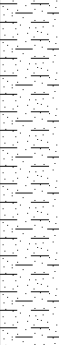
Riq: Terrier

Scale: 1:30

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. Groundwater encountered at 1.20m bgl. 3. Monitoring well installed to 5.0m bgl.

Logged in general accordance with BS5930:201

Hydrock						Project: Dunsbury Park				Borehole No WS5.06 Page No. 1 of 1					
Method: Dynamic (Windowless) Sampler						Date(s): 26/07/2021				Logged By: LC		Drilled By: Impact Geotechnical			
Client: Portsmouth City Council						Co-ords: 469837.98, 109241.69				Checked By: DP		Rig: Terrier			
Hydrock Project No: 19453						Ground Level: 26.83m OD						Scale: 1:30			
Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill			
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results										
1.00 - 2.00		100%	0.50	ES	48kPa		Reddish brown, slightly clayey, sandy GRAVEL. Gravel subangular to angular fine to coarse of ballast/aggregate. Sand is fine to medium. (MADE GROUND - SURFACE COVERING)	0.10	(0.10)	26.73					
			0.50	HSV				Grey brown, silty, gravelly fine to medium SAND. Gravel are subangular to angular fine to coarse of ballast/aggregate. (MADE GROUND - ENGINEERED FILL)		(0.50)					
			0.60 - 1.00	B	90kPa		Soft to firm dark grey sandy CLAY. Sand is fine. (LONDON CLAY FORMATION)	0.60		26.23					
			0.60	HSV											
2.00 - 3.00		100%	1.20	SPT	N=14 (1,2,3,3,4,4)		... At 1.30m bgl becoming stiff, dry and friable.	1							
			1.50	ES											
			2.00	SPT	N=17 (1,3,3,5,4,5)			2							
2.00	B														
3.00 - 4.00		100%	3.00	SPT	N=20 (2,3,3,5,6,6)			3		(4.85)					
			3.50	B											
			4.00	SPT	N=28 (2,4,6,7,7,8)			4							
5.00	B														
4.00 - 5.00		65%	5.00	SPT	N=52 (25,35,5,6,6)		... At 4.50m bgl becoming very sandy.	5							
			5.00	B											
										5.45				21.38	
End of Borehole at 5.45m															
							6								

General Remarks:
1. Inspection hand pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Borehole backfilled with arisings.

Drilled By: Impact Geotechnical

Rig: Terrier

Scale: 1:30

HoleBASE SI - Hydrock Dynamic Sampling Template v3

Drilled By: Impact Geotechnical

Riq: Terrier

Scale: 1:30

HoleBASE SI - Hydrock Dynamic Sampling Template v3

Hydrock						Project: Dunsbury Park						Borehole No WS5.09 Page No. 1 of 1					
Method: Dynamic (Windowless) Sampler						Date(s): 26/07/2021				Logged By: YP				Drilled By: Impact Geotechnical			
Client: Portsmouth City Council						Co-ords: 469837.08, 109174.74				Checked By: DP				Rig: Terrier			
Hydrock Project No: 19453						Ground Level: 27.00m OD								Scale: 1:30			
Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill					
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results												
1.00 - 2.00		100%	0.30	ES		Reddish brown very sandy GRAVEL. Gravel is subangular to subrounded fine to coarse of aggregate. (MADE GROUND - SURFACE COVERING) Yellowish brown, silty, slightly gravelly, fine to medium SAND. Gravel is subrounded fine to coarse of flint/aggregate? (Soil stabiliser applied - hard to dig) (MADE GROUND - ENGINEERED FILL) Medium dense, yellowish/orangish brown, silty fine SAND with rare subrounded fine to medium of flint and occasional pockets of light grey sandy silt. Sand is fine. (BOGNOR SAND MEMBER) ... At 1.50m bgl becoming orangish brown slightly mottled light grey.	0.10	(0.10)	26.90								
							(0.30)	26.60									
			0.70	B													
			1.20	SPT	N=16 (1,2,4,4,4,4)												
2.00 - 3.00		100%	1.50 - 2.00	B				(1.85)									
			2.00	SPT	N=11 (1,3,2,3,3,3)												
3.00 - 4.00		100%	3.00	SPT	N=11 (1,2,2,3,3,3)	Stiff dark grey sandy silty CLAY with rare white shell fragments. Sand is fine. (LONDON CLAY FORMATION)	2.25		24.75								
			3.50 - 3.80	B													
4.00 - 5.00		100%	4.00	SPT	N=17 (1,2,3,4,4,6)			(3.20)									
			5.00	SPT	N=22 (2,3,4,5,5,8)		... At 4.80m bgl occasional shell fragments.										
End of Borehole at 5.45m								5.45		21.55							

General Remarks:
1. Inspection hand pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Borehole backfilled with arisings.

Method: Dynamic (Windowless) Sampler

Date(s): 26/07/2021

Logged By: LC

Drilled By: Impact Geotechnical

Client: Portsmouth City Council

Co-ords: 469817.91, 109177.20

Checked By: DP

Rig: Terrier

Hydrock Project No: 19453

Ground Level: 25.64m OD

Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.40	ES			Reddish brown sandy GRAVEL. Gravel is subangular to angular fine to coarse of ballast/aggregate. Sand is fine. (MADE GROUND - SURFACE COVERING)	0.20	(0.20)	25.44		
			0.60 - 1.00	B			Yellow brown, very compacted, fine to medium SAND. (MADE GROUND - ENGINEERED FILL)	0.60	(0.40)	25.04		
			1.00	ES			Medium dense, brown, fine to medium SAND. (BOGNOR SAND MEMBER)	1.00	(0.40)	24.64		
			1.20	SPT	N=13 (2,2,2,3,4,4)		Medium dense, orangish brown mottled grey, clayey, fine to medium SAND. (BOGNOR SAND MEMBER)					
			1.20 - 1.50	B			... Between 1.30m and 1.70m bgl becoming orange brown mottled dark orange and dark grey.		(0.70)			
			2.00	SPT	N=11 (1,2,3,2,3,3)		Firm, dark grey, sandy CLAY. Sand is fine. (LONDON CLAY FORMATION)	1.70		23.94		
			2.00	D					(1.00)			
			2.00	HSV	54kPa							
			3.00	SPT	N=15 (2,2,3,4,4,4)		Stiff, dark grey, sandy CLAY with occasional shell fragments. (LONDON CLAY FORMATION)	2.70		22.94		
			3.00	HSV	57kPa							
			3.50	D								
			4.00	SPT	N=22 (2,3,5,5,6,6)				(2.75)			
			5.00	SPT	N=26 (2,4,6,6,7,7)							
			5.00	D								
							End of Borehole at 5.45m	5.45		20.19		

General Remarks:

1. Inspection hand pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Borehole backfilled with arisings.

Checked By: DP

Dimensions:	Scale:
-------------	--------

0.50m 2.70m 1:25

General Remarks:

1. No groundwater encountered. 2. Backfilled with 20mm gravel to 2.00m bgl and pipework for infiltration testing.

Logged in general accordance with BS930:2011

Site Investigation Photograph 1	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07	

Site Investigation Photograph 2	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07 arising	

Site Investigation Photograph 3	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07 – shell fragments	

Site Investigation Photograph 4	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07 – backfilled with arisings.	

Site Investigation Photograph 5	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.06	

Site Investigation Photograph 6	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.06 arisings.	

Site Investigation Photograph 7	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.06 – backfilled with arisings.	

Site Investigation Photograph 8	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.05	

Site Investigation Photograph 9	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.05 closer view	

Site Investigation Photograph 10	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.05 – pyrite fragments	

Site Investigation Photograph 11		
Date: 22/07/21		
Direction Photograph Taken: n/a.		
Description: TP5.05 – arisings		

Site Investigation Photograph 12		
Date: 22/07/21		
Direction Photograph Taken: n/a.		
Description: TP5.05 – backfilled with arisings		

Site Investigation Photograph 13	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.03	

Site Investigation Photograph 14	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.03 arisings	

Site Investigation Photograph 15	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.03 being backfilled with arisings	

Site Investigation Photograph 16	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.04	

Site Investigation Photograph 17	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.04 arisings	

Site Investigation Photograph 18	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.04 backfilled with arisings	

Site Investigation Photograph 19	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: SA101	

Site Investigation Photograph 20	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: SA101 – very compacted made ground (hard to dig)	

Site Investigation Photograph 21		
Date: 20/07/21		
Direction Photograph Taken: n/a.		
Description: SA101 – arising		

Site Investigation Photograph 22		
Date: 20/07/21		
Direction Photograph Taken: n/a.		
Description: SA101 – backfilled with pipework and gravel for infiltration testing.		

Site Investigation Photograph 23	
Date: 21/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.02	

Site Investigation Photograph 24	
Date: 21/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.02 arisings	

Site Investigation Photograph 25	
Date: 21/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.02 backfilled with arisings	

Site Investigation Photograph 26	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.01	

Site Investigation Photograph 27	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.01	

Site Investigation Photograph 28	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.01 arisings.	

Site Investigation Photograph 29	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS rig set up at location WS5.09.	

Site Investigation Photograph 30	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.09 soil recovery.	

Site Investigation Photograph 31	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.05 soil recovery.	

Site Investigation Photograph 32	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.05 monitoring well installed.	

Site Investigation Photograph 33	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.04 soil recovery.	

Site Investigation Photograph 34	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.04 monitoring well installed.	

Site Investigation Photograph 35	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: Mobilisation of WS rig to location WS5.02	

Site Investigation Photograph 36	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.02 soil recovery.	

Site Investigation Photograph 37	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.10 hand pit arisings.	

Site Investigation Photograph 38	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.10 soil recovery.	

Site Investigation Photograph 39	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.06 hand pit arisings.	

Site Investigation Photograph 40	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.06 soil recovery.	

Site Investigation Photograph 41	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.07 soil recovery	

Site Investigation Photograph 42	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.08 soil recovery.	

Site Investigation Photograph 43	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.08 monitoring well installed.	

Site Investigation Photograph 44	
Date: 10/08/21	
Direction Photograph Taken: n/a.	
Description: Arisings from BH5.01	

Site Investigation Photograph 1	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07	

Site Investigation Photograph 2	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07 arisings	

Site Investigation Photograph 3	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07 – shell fragments	

Site Investigation Photograph 4	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.07 – backfilled with arisings.	

Site Investigation Photograph 5	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.06	

Site Investigation Photograph 6	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.06 arising.	

Site Investigation Photograph 7	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.06 – backfilled with arisings.	

Site Investigation Photograph 8	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.05	

Site Investigation Photograph 9	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.05 closer view	

Site Investigation Photograph 10	
Date: 22/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.05 – pyrite fragments	

Site Investigation Photograph 11		
Date: 22/07/21		
Direction Photograph Taken: n/a.		
Description: TP5.05 – arisings		

Site Investigation Photograph 12		
Date: 22/07/21		
Direction Photograph Taken: n/a.		
Description: TP5.05 – backfilled with arisings		

Site Investigation Photograph 13	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.03	

Site Investigation Photograph 14	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.03 arisings	

Site Investigation Photograph 15	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.03 being backfilled with arisings	

Site Investigation Photograph 16	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.04	

Site Investigation Photograph 17	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.04 arisings	

Site Investigation Photograph 18	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.04 backfilled with arisings	

Site Investigation Photograph 19	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: SA101	

Site Investigation Photograph 20	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: SA101 – very compacted made ground (hard to dig)	

Site Investigation Photograph 21	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: SA101 – arising	

Site Investigation Photograph 22	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: SA101 – backfilled with pipework and gravel for infiltration testing.	

Site Investigation Photograph 23	
Date: 21/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.02	

Site Investigation Photograph 24	
Date: 21/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.02 arisings	

Site Investigation Photograph 25	
Date: 21/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.02 backfilled with arisings	

Site Investigation Photograph 26	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.01	

Site Investigation Photograph 27	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.01	

Site Investigation Photograph 28	
Date: 20/07/21	
Direction Photograph Taken: n/a.	
Description: TP5.01 arisings.	

Site Investigation Photograph 29		
Date: 26/07/21		
Direction Photograph Taken: n/a.		
Description: WS rig set up at location WS5.09.		

Site Investigation Photograph 30		
Date: 26/07/21		
Direction Photograph Taken: n/a.		
Description: WS5.09 soil recovery.		

Site Investigation Photograph 31	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.05 soil recovery.	

Site Investigation Photograph 32	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.05 monitoring well installed.	

Site Investigation Photograph 33	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.04 soil recovery.	

Site Investigation Photograph 34	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.04 monitoring well installed.	

Site Investigation Photograph 35	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: Mobilisation of WS rig to location WS5.02	

Site Investigation Photograph 36	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.02 soil recovery.	

Site Investigation Photograph 37	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.10 hand pit arisings.	

Site Investigation Photograph 38	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.10 soil recovery.	

Site Investigation Photograph 39	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.06 hand pit arisings.	

Site Investigation Photograph 40	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.06 soil recovery.	

Site Investigation Photograph 41	
Date: 26/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.07 soil recovery	

Site Investigation Photograph 42	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.08 soil recovery.	

Site Investigation Photograph 43	
Date: 27/07/21	
Direction Photograph Taken: n/a.	
Description: WS5.08 monitoring well installed.	

Site Investigation Photograph 44	
Date: 10/08/21	
Direction Photograph Taken: n/a.	
Description: Arisings from BH5.01	

Appendix D Geotechnical Test Results



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

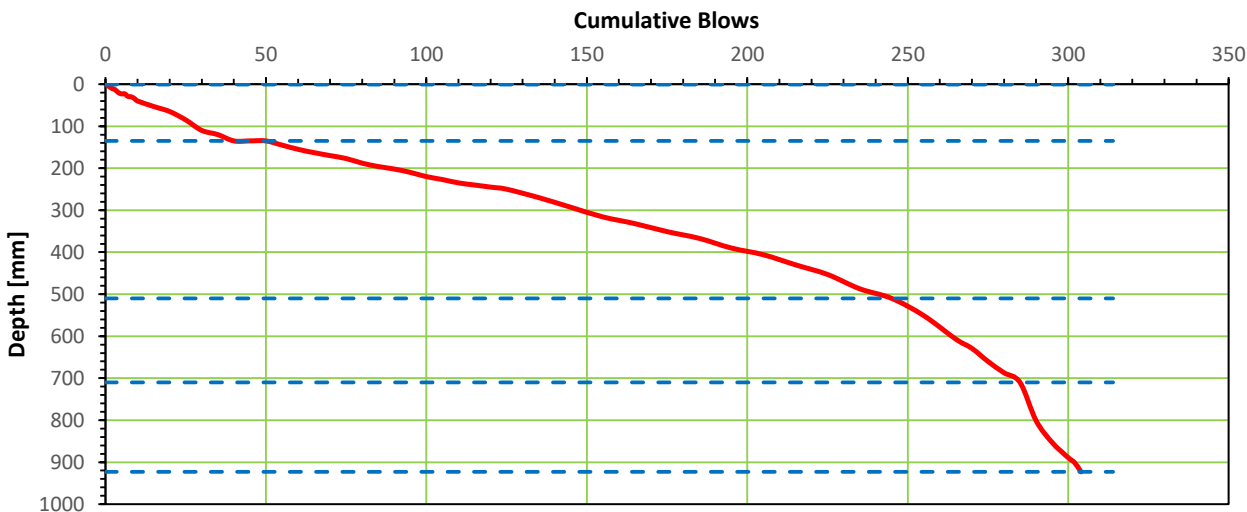
Client Reference:
Job Number: 21-87904_7
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_7
Location: PLTS.06
Sample Reference: DCP1
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 40

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	40	40	83	135	135
2	205	245	>100	375	510
3	40	285	55	200	710
4	19	304	23	213	923



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks:

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: **23/07/2021**



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

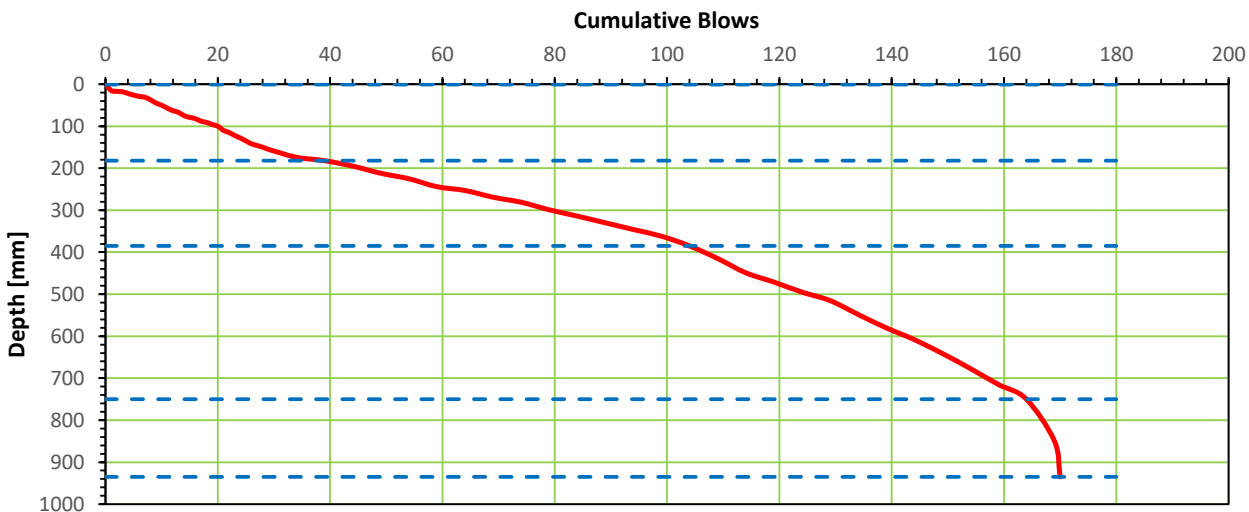
Client Reference:
Job Number: 21-87904_8
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_8
Location: TPS.01
Sample Reference: DCP2
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 15

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	39	39	59	182	182
2	65	104	91	203	385
3	60	164	45	365	750
4	6	170	8	185	935



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks:

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: **23/07/2021**



4041

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer i2 Analytical Ltd
7 Woodshots Meadow
Croxtley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:
Job Number: 21-87904_9
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_9
Location: TPS.02
Sample Reference: DCP3
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 25

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	9	9	28	85	85
2	50	59	15	837	922



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks:

Signed:

Mark Collyer
Regional Director (Geotechnical) - South
for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: 23/07/2021



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:
Job Number: 21-87904_10
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_10
Location: PLS.02
Sample Reference: DCP4
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 50

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	25	25	32	210	210
2	35	60	36	263	473
3	90	150	59	425	898



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks:

Signed:

SSF82.5

Date Reported: **23/07/2021**

Mark Collyer
Regional Director (Geotechnical) - South
for and on behalf of i2 Analytical Ltd



4041

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer i2 Analytical Ltd
 7 Woodshots Meadow
 Croxley Green Business Park
 Watford Herts WD18 8YS



Environmental Science

Client: Hydrock Consultants Ltd
 Client Address: Hawthorn Park, Holdenby Road,
 Spratton, NN6 8LD

Contact: Yacklin Panza
 Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:
 Job Number: 21-87904_11
 Date Sampled: 22/07/2021
 Date Received: 22/07/2021
 Date Tested: 22/07/2021
 Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_11
 Location: WSS.01
 Sample Reference: DCP5
 Sample Description: Aggregate
 Start Depth [mm]: 0

DCP Offset [mm]: 35

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	8	8	11	185	185
2	137	145	52	728	913



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks:

Signed:

Mark Collyer
 Regional Director (Geotechnical) - South
 for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: **23/07/2021**



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Sratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:

Job Number: 21-87904_12

Date Sampled: 22/07/2021

Date Received: 22/07/2021

Date Tested: 22/07/2021

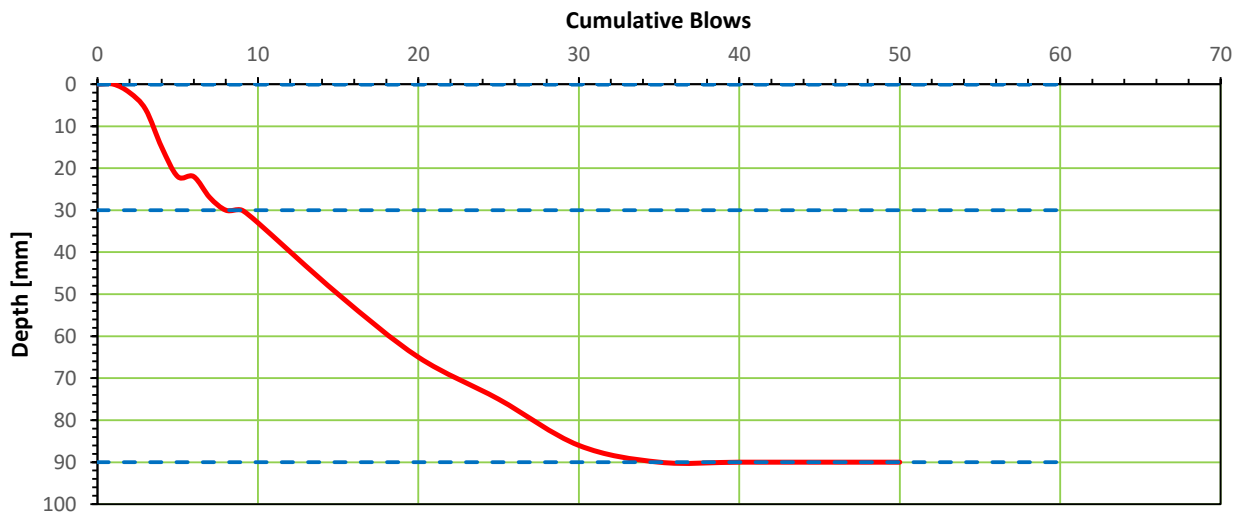
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_12
Location: TP5.03
Sample Reference: DCP6
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 40

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	9	9	85	30	30
2	41	50	>100	60	90



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: Test Stopped - No Penetration after 20 blows

Signed:

Mark Collyer

Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: 23/07/2021



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

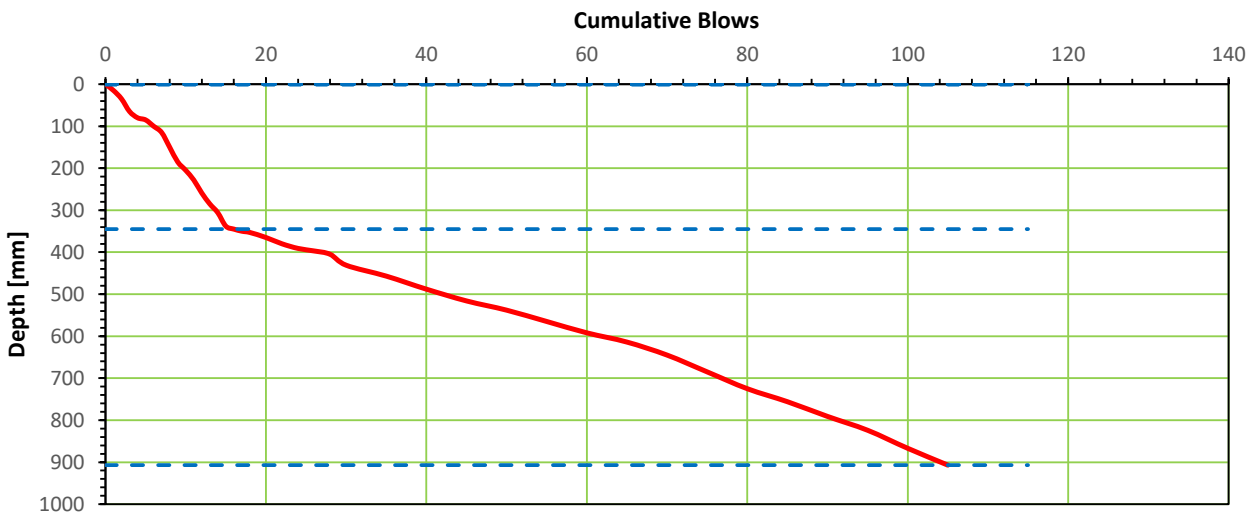
Client Reference:
Job Number: 21-87904_13
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_13
Location: TP5.04
Sample Reference: DCP7
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 45

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	16	16	12	345	345
2	89	105	43	562	907



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: 0

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: **23/07/2021**



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:

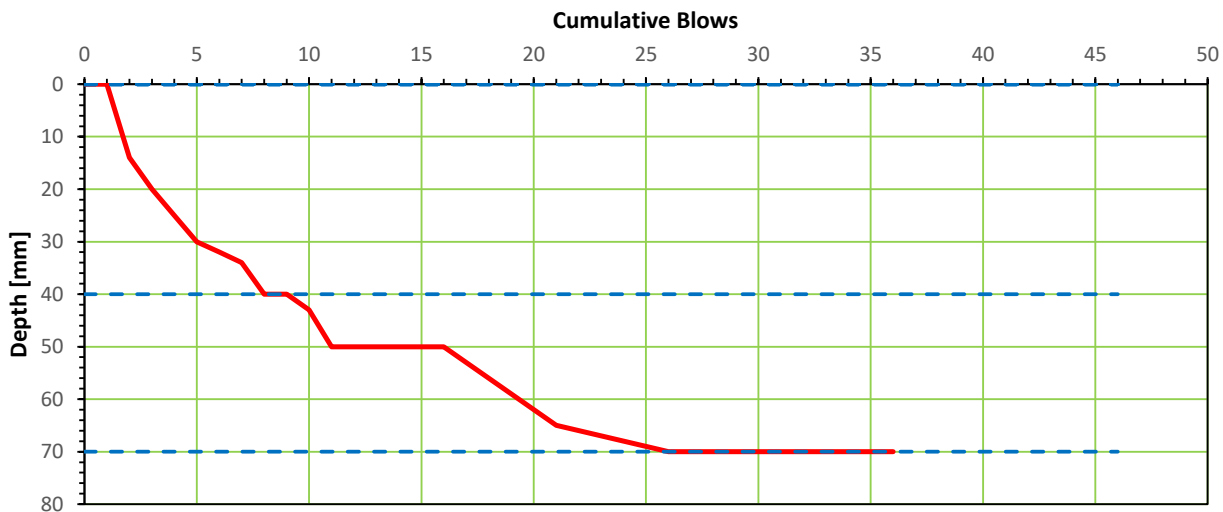
Job Number: 21-87904_14
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_14
Location: PLTS-04
Sample Reference: DCP8
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 20

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	7	7	48	40	40
2	29	36	>100	30	70



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: Stopped Test - 20 blows no further penetration

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: 23/07/2021



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:

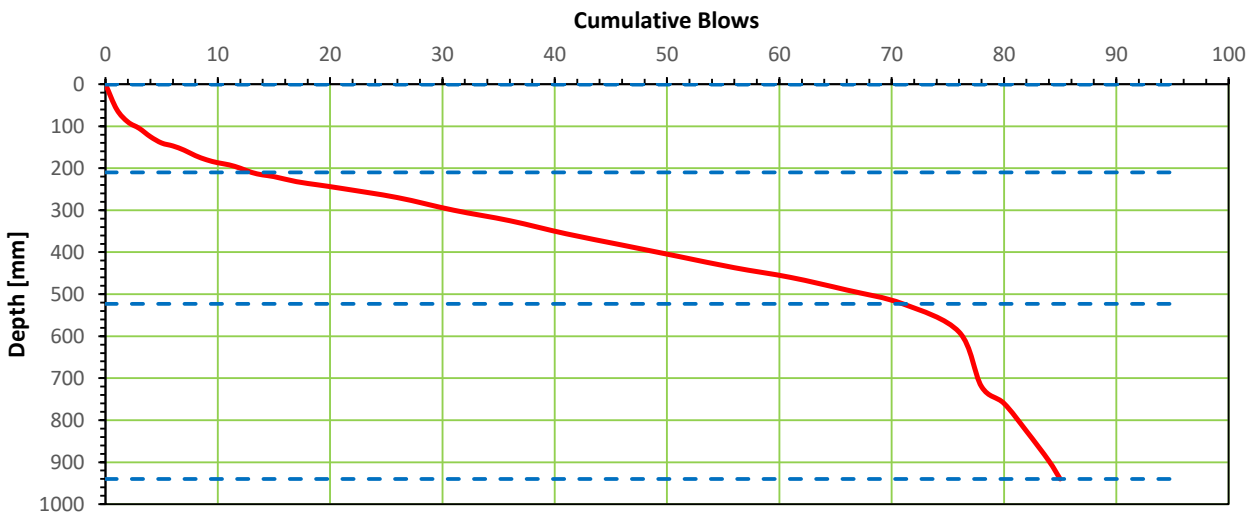
Job Number: 21-87904_15
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_15
Location: TPS.05
Sample Reference: DCP9
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 20

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	13	13	16	210	210
2	58	71	51	313	523
3	14	85	8	417	940



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: 0

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: **23/07/2021**



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:

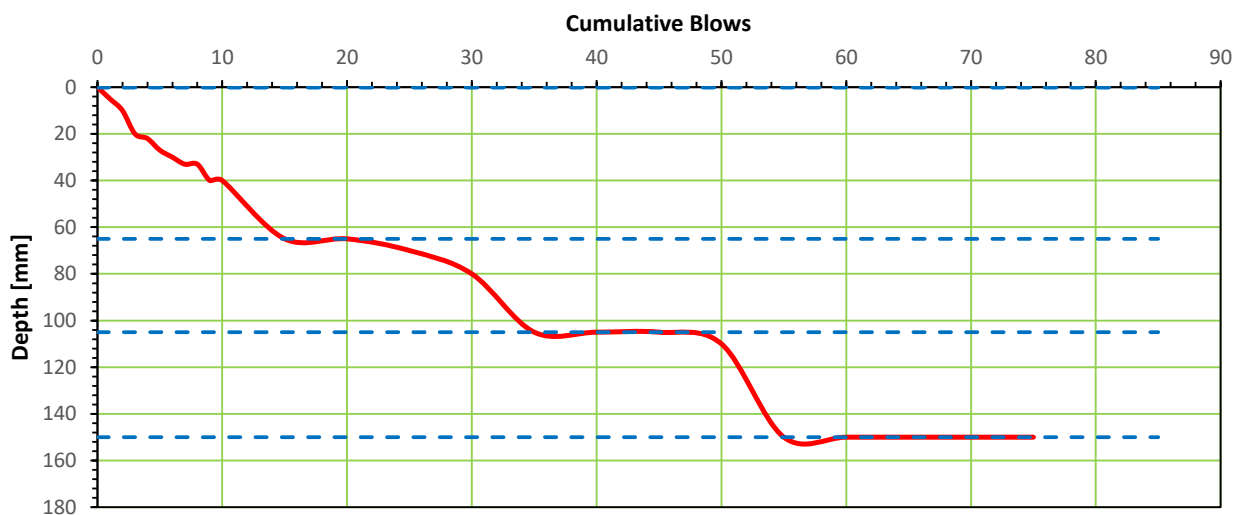
Job Number: 21-87904_16
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_16
Location: TPS.05
Sample Reference: DCP10
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 30

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	15	15	64	65	65
2	25	40	>100	40	105
3	35	75	>100	45	150



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: Stopped test - 20 blows no further penetration

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: 23/07/2021



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:

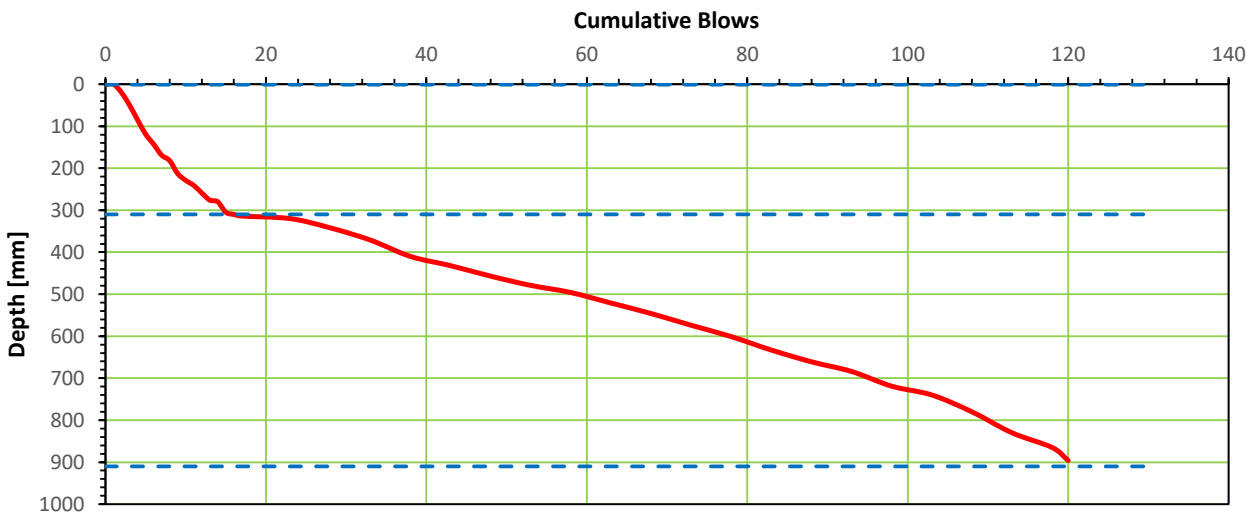
Job Number: 21-87904_17
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_17
Location: WS5-10
Sample Reference: DCP11
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 50

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	15	15	12	310	310
2	105	120	48	600	910



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: Stopped test - 20 blows no further penetration

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: 23/07/2021



4041

TEST CERTIFICATE**Determination of TRL Dynamic Cone Penetrometer**

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



Environmental Science

Client: Hydrock Consultants Ltd
Client Address: Hawthorn Park, Holdenby
Spratton, NN6 8LD

Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference:

Job Number: 21-87904_18
Date Sampled: 22/07/2021
Date Received: 22/07/2021
Date Tested: 22/07/2021
Sampled By: HM/AH

Test Results

Laboratory Reference: 87904_18
Location: TP5.07
Sample Reference: DCP12
Sample Description: Aggregate
Start Depth [mm]: 0

DCP Offset [mm]: 55

Layer	No of Blows	Cumulative Blows	CBR %	Layer Thickness mm	Total Depth mm
1	28	28	30	245	245
2	102	130	64	443	688
3	31	161	39	215	903



Notice: SHW Series 800 Clause 882 Equation 8/1 : $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{Strength})$

Remarks: 0

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

for and on behalf of i2 Analytical Ltd

SSF82.5

Date Reported: **23/07/2021**



4041

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9
 Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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



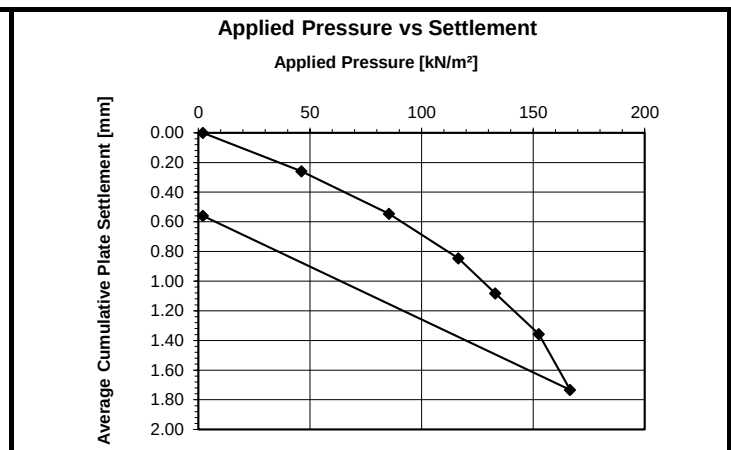
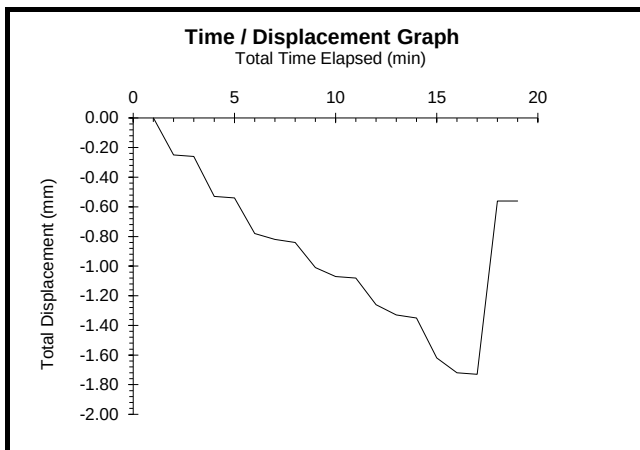
Client: Hydrock
 Client Address: Hawthorn Park,
 Holdenby Road,
 Spratton
 NN6 8LD
 Contact: Yacklin Panza
 Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference: PO08449
 Job Number: 21-87904_6
 Date Tested: 22/07/2021
 Tested By: HM

Test Results

Laboratory Reference: 87904_6
 Test Reference: 6
 Material Description: Aggregate
 Test Location: PLT5.01
 Depth Top (m): N/A
 Layer Thickness (mm): Unknown
 Weather Conditions: Sunny
 Kentledge Type: 13T Excavator
 Plate Diameter [m]: 0.60

Applied Load [kN]	Applied Pressure [kN/m ²]	Average Plate Settlement [mm]
0.57	2	0.00
13.07	46	0.26
24.16	85	0.55
32.95	117	0.85
37.63	133	1.08
43.14	153	1.36
47.11	167	1.73
0.57	2	0.56
End of Test		
Recovery %		67.69%



Pressure at 1.25mm Settlement: 145 kN/m²
 Modulus of Subgrade Reaction: 93 MN/m²/m
 Equivalent CBR By Plate Loading: 25%

Max Applied Pressure: 166.6 kN/m²
 Maximum settlement: 1.73 mm
 Moisture Content: N/A

Remarks:

Signed:

Mark Collyer
 Regional Director (Geotechnical) - South

SSF68.4
 Date Reported: 23/07/2021

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis.

SSF68.3



4041

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9
 Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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



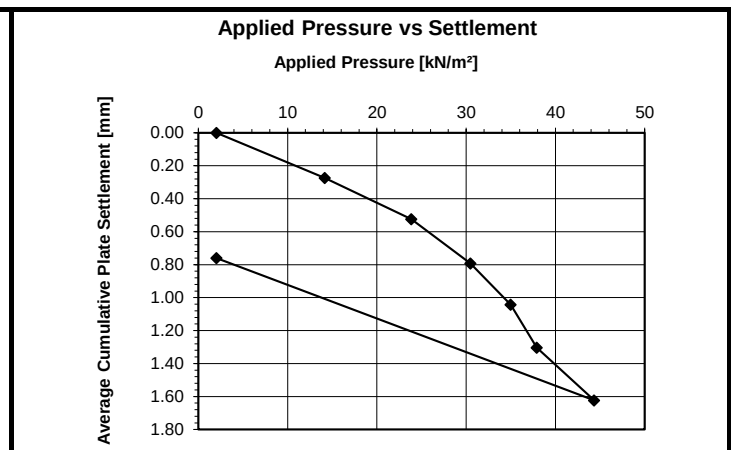
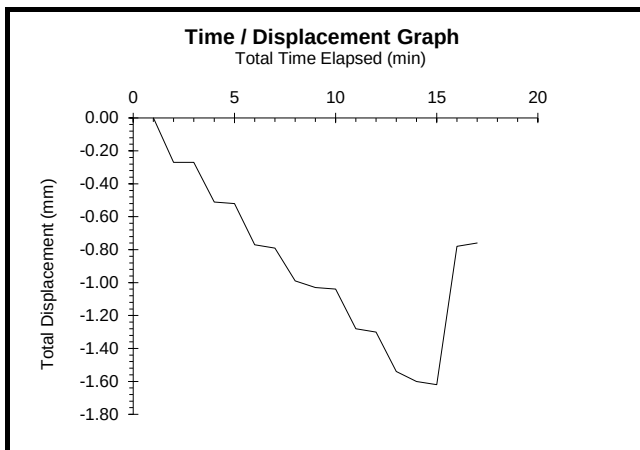
Client: Hydrock
 Client Address: Hawthorn Park,
 Holdenby Road,
 Spratton
 NN6 8LD
 Contact: Yacklin Panza
 Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference: PO08449
 Job Number: 21-87904_5
 Date Tested: 22/07/2021
 Tested By: HM

Test Results

Laboratory Reference: 87904_5
 Test Reference: 5
 Material Description: Sandy Gravel
 Test Location: PL5.02
 Depth Top (m): N/A
 Layer Thickness (mm): Unknown
 Weather Conditions: Sunny
 Kentledge Type: 13T Excavator
 Plate Diameter [m]: 0.60

Applied Load [kN]	Applied Pressure [kN/m ²]	Average Plate Settlement [mm]
0.57	2	0.00
4.01	14	0.27
6.75	24	0.52
8.62	30	0.79
9.89	35	1.04
10.72	38	1.30
12.54	44	1.62
0.57	2	0.76
End of Test		
Recovery %		53.18%



Pressure at 1.25mm Settlement: 37 kN/m²
 Modulus of Subgrade Reaction: 24 MN/m²/m
 Equivalent CBR By Plate Loading: 2.4%
 Max Applied Pressure: 44.4 kN/m²
 Maximum settlement: 1.62 mm
 Moisture Content: N/A

Remarks:

Signed:

Mark Collyer
 Regional Director (Geotechnical) - South

SSF68.4
 Date Reported: 23/07/2021

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

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SSF68.3



4041

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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



Client: Hydrock
Client Address: Hawthorn Park,
Holdenby Road,
Spratton
NN6 8LD
Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

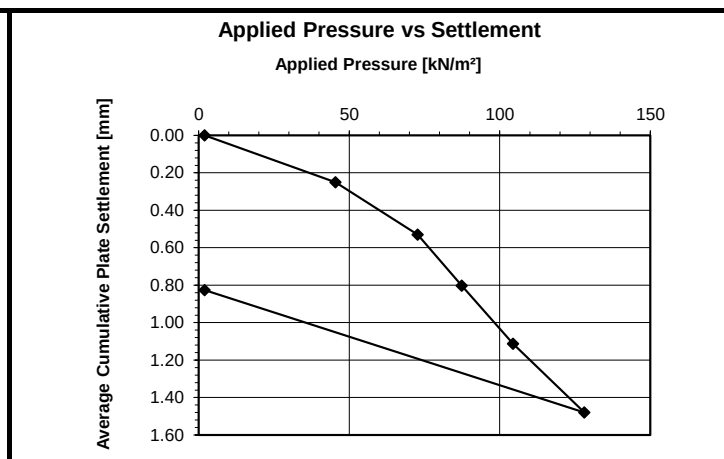
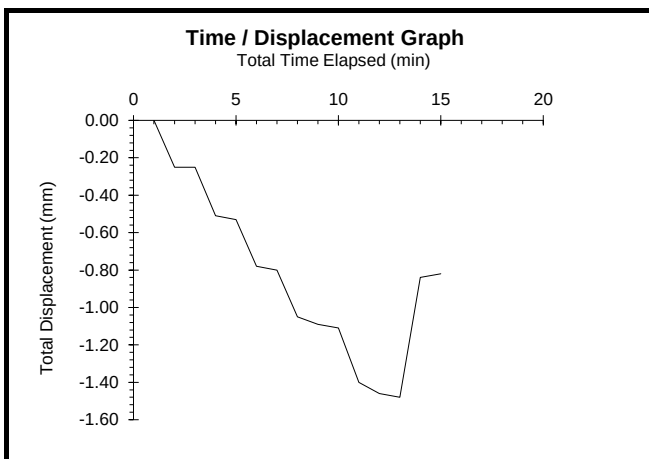
Client Reference: PO08449
Job Number: 21-87904_4
Date Tested: 22/07/2021
Tested By: HM

Test Results

Laboratory Reference: 87904_4
Test Reference: 4
Material Description: Sandy Gravel
Test Location: PLT05.03

Depth Top (m): N/A
Layer Thickness (mm): Unknown
Weather Conditions: Sunny
Kentledge Type: 13T Excavator
Plate Diameter [m]: 0.60

Applied Load [kN]	Applied Pressure [kN/m ²]	Average Plate Settlement [mm]
0.57	2	0.00
12.85	45	0.25
20.57	73	0.53
24.72	87	0.80
29.54	104	1.11
36.23	128	1.48
0.57	2	0.83
End of Test		
Recovery %		44.14%



Pressure at 1.25mm Settlement: 113 kN/m²
Modulus of Subgrade Reaction: 73 MN/m²/m
Equivalent CBR By Plate Loading: 16%

Max Applied Pressure: 128.1 kN/m²
Maximum settlement: 1.48 mm
Moisture Content: N/A

Remarks:

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

SSF68.4

Date Reported: 23/07/2021

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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



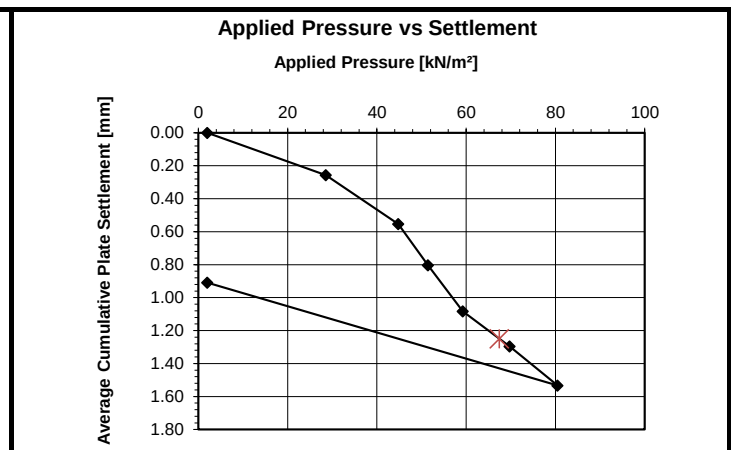
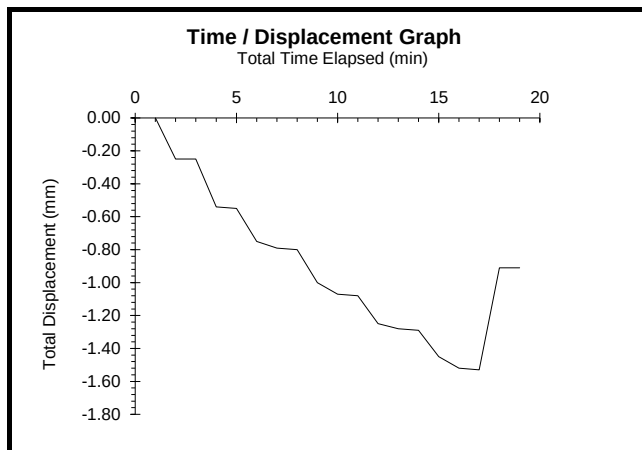
Client: Hydrock
Client Address: Hawthorn Park,
Holdenby Road,
Spratton
NN6 8LD
Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference: PO08449
Job Number: 21-87904_3
Date Tested: 22/07/2021
Tested By: HM

Test Results

Laboratory Reference: 87904_3
Test Reference: 3
Material Description: Sandy Gravel
Test Location: PL5. 04
Depth Top (m): N/A
Layer Thickness (mm): Unknown
Weather Conditions: Sunny
Kentledge Type: 13T Excavator
Plate Diameter [m]: 0.60

Applied Load [kN]	Applied Pressure [kN/m ²]	Average Plate Settlement [mm]
0.57	2	0.00
8.08	29	0.26
12.67	45	0.55
14.55	51	0.80
16.76	59	1.08
19.72	70	1.30
22.76	80	1.53
0.57	2	0.91
End of Test		
Recovery %		40.65%



Pressure at 1.25mm Settlement: 67 kN/m²
Modulus of Subgrade Reaction: 43 MN/m²/m
Equivalent CBR By Plate Loading: 6.6%
Max Applied Pressure: 80.5 kN/m²
Maximum settlement: 1.53 mm
Moisture Content: N/A

Remarks:

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

SSF68.4
Date Reported: 23/07/2021

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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



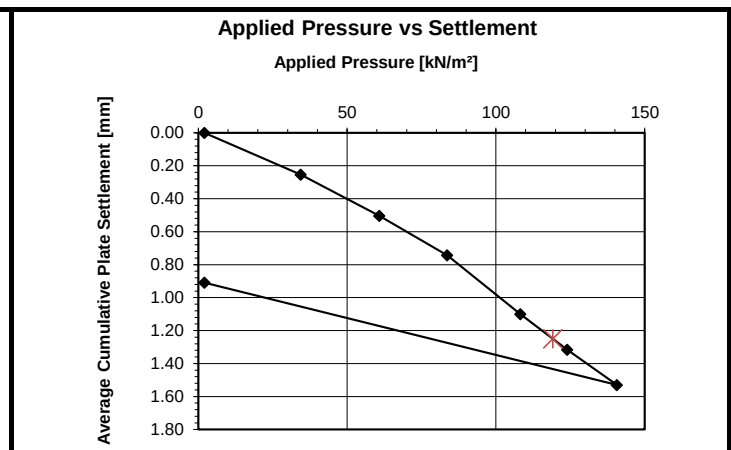
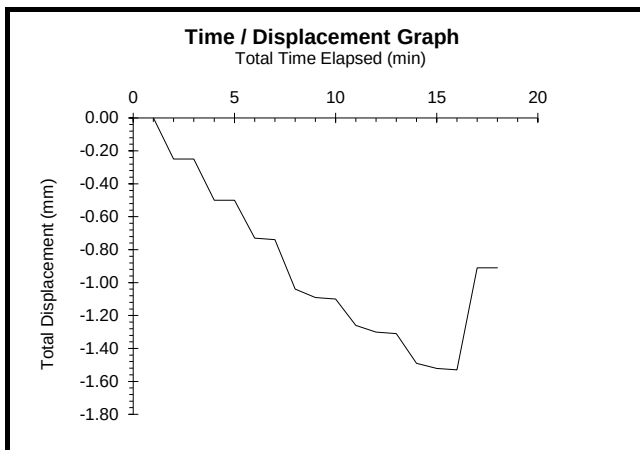
Client: Hydrock
Client Address: Hawthorn Park,
Holdenby Road,
Spratton
NN6 8LD
Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

Client Reference: PO08449
Job Number: 21-87904_2
Date Tested: 22/07/2021
Tested By: HM

Test Results

Laboratory Reference: 87904_2
Test Reference: 2
Material Description: Sandy Gravel
Test Location: PL5. 05
Depth Top (m): N/A
Layer Thickness (mm): Unknown
Weather Conditions: Sunny
Kentledge Type: 13T Excavator
Plate Diameter [m]: 0.60

Applied Load [kN]	Applied Pressure [kN/m ²]	Average Plate Settlement [mm]
0.57	2	0.00
9.73	34	0.25
17.21	61	0.50
23.65	84	0.74
30.61	108	1.10
35.06	124	1.32
39.78	141	1.53
0.57	2	0.91
End of Test		
Recovery %		40.52%



Pressure at 1.25mm Settlement: 119 kN/m²
Modulus of Subgrade Reaction: 77 MN/m²/m
Equivalent CBR By Plate Loading: 18%

Max Applied Pressure: 140.7 kN/m²
Maximum settlement: 1.53 mm
Moisture Content: N/A

Remarks:

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

SSF68.4
Date Reported: 23/07/2021

Page: 1 of 1

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Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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



Client: Hydrock
Client Address: Hawthorn Park,
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Spratton
NN6 8LD
Contact: Yacklin Panza
Testing Carried Out At: Dunsbury Park, Portsmouth

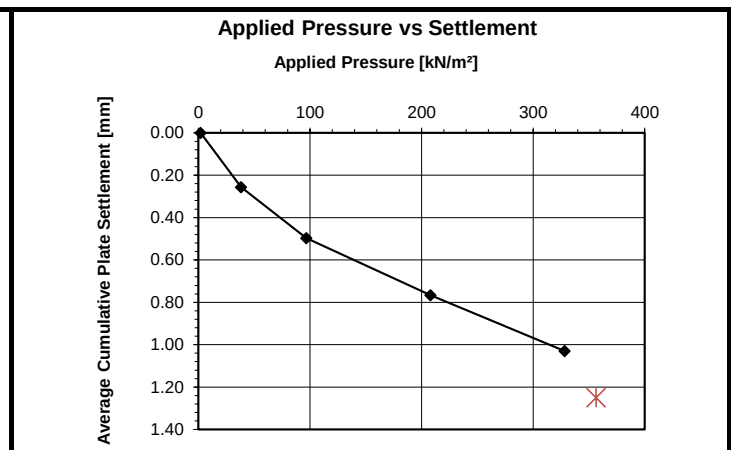
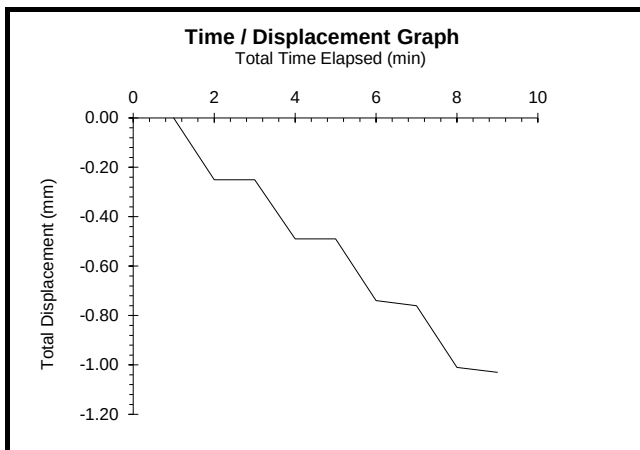
Client Reference: PO08449
Job Number: 21-87904_1
Date Tested: 22/07/2021
Tested By: HM

Test Results

Laboratory Reference: 87904_1
Test Reference: 1
Material Description: Sandy Gravel
Test Location: PL5. 06

Depth Top (m): N/A
Layer Thickness (mm): Unknown
Weather Conditions: Sunny
Kentledge Type: 13T Excavator
Plate Diameter [m]: 0.60

Applied Load [kN]	Applied Pressure [kN/m ²]	Average Plate Settlement [mm]
0.57	2	0.00
10.86	38	0.26
27.37	97	0.50
58.87	208	0.77
92.82	328	1.03
End of Test		
Recovery %		



Pressure at 1.25mm Settlement: 357 kN/m²
Modulus of Subgrade Reaction: 229 MN/m²/m
Equivalent CBR By Plate Loading: >100%

Max Applied Pressure: 328.3 kN/m²
Maximum settlement: 1.03 mm
Moisture Content: N/A

Remarks: Test suspended, reaction load lifting.

Signed:

Mark Collyer
Regional Director (Geotechnical) - South

SSF68.4
Date Reported: 23/07/2021

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

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SSF68.3



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 55139

Client Ref: **19453**

Report Date: **26-08-2021**

Client PO: **P009048**

Client **Hydrock Limited**
Hydrock
First Floor
5 Castlebridge
5-19 Cowbridge Road East
Cardiff
CF11 9AB
Tel: 02920 023665 Mob: 07392 081090

Contract Title: **Dunsbury Park**
For the attention of: **David Pethica**

Date Received: **10-08-2021**

Date Completed: **26-08-2021**

Test Description	Qty
Samples Received	204
- @ Non Accredited Test	
Moisture Content	20
BS 1377:1990 - Part 2 : 3.2 - * UKAS	
4 Point Liquid & Plastic Limit	20
BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	
PSD Wet Sieve method	10
BS 1377:1990 - Part 2 : 9.2 - * UKAS	
BRE Reduced Suite	10
includes pH, water & acid soluble sulphate and total sulphur	
Sub-contracted Test - @ Non Accredited Test	
CBR: Rem specified MC and tested at top only	9
BS 1377:1990 - Part 4 : 7 - * UKAS	

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 55139

Test Description	Qty
Soaking or Curing CBR specimens BS 1377:1990 - Part 4 : 7.3 - @ Non Accredited Test	28
Dry Den/MC (Vibrating Hammer Method) BS 1377:1990 - Part 4 : 3.7 - * UKAS	3
One-dimensional Consolidation 75mm or 50mm diameter specimens (5 days) BS 1377:1990 - Part 5 : 3 - * UKAS	3
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

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Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.3 & 5.3)**

Contract Number	55139	
Site Name	Dunsbury Park	
Date Tested	19/08/2021	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
SA101			1.50	-		Brown fine sandy silty CLAY.
TP501			1.50	-		Brown fine sandy silty CLAY.
TP501			2.30	-		Brown fine sandy silty CLAY.
TP502			0.70	-		Brown fine sandy silty CLAY.
TP502			2.50	-		Brown fine sandy silty CLAY.
TP503			0.60	-		Brown fine sandy silty CLAY.
TP503			3.00	-		Brown fine sandy silty CLAY.
TP504			2.50	-		Brown fine sandy silty CLAY.
TP505			1.80	-		Brown fine sandy silty CLAY.
TP506			2.30	-		Brown fine sandy silty CLAY.
TP507			1.30	-		Brown fine sandy silty CLAY.
TP507			3.30	-		Brown fine sandy silty CLAY.
WS501			1.70	-	2.00	Brown fine sandy silty CLAY.
WS501			4.50	-		Brown fine sandy silty CLAY.
WS502			1.30	-		Brown fine sandy silty CLAY.
WS503			5.00	-	5.45	Brown fine sandy silty CLAY.
WS503			4.00	-		Brown fine sandy silty CLAY.
WS504			2.50	-		Brown fine sandy silty CLAY.
WS505			4.50	-		Brown fine sandy silty CLAY.
WS506			5.00	-		Brown fine sandy silty CLAY.
WS508			2.50	-		Brown fine sandy silty CLAY.
				-		
				-		
				-		

Operators	Checked	26/08/2021	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	26/08/2021	Paul Evans (Quality/Technical Manager)



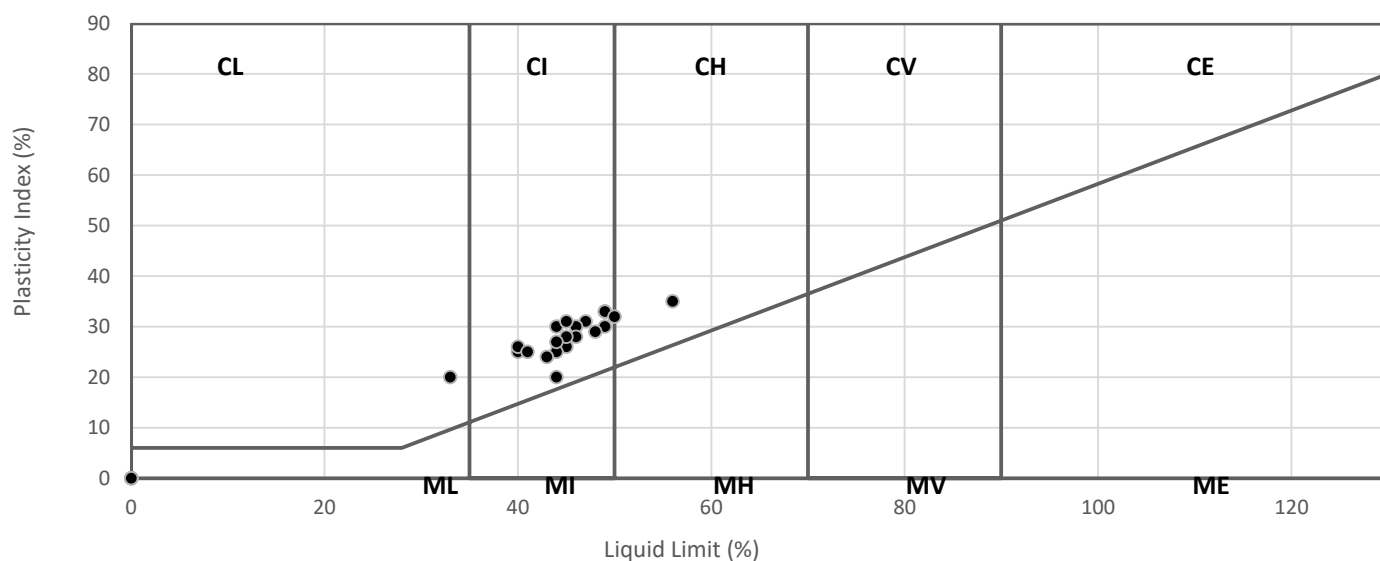
NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)

Contract Number	55139	
Project Location	Dunsbury Park	
Date Tested	19/08/2021	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
SA101			1.50	-		23	45	19	26	100	CI Intermediate Plasticity
TP501			1.50	-		17	40	15	25	100	CI Intermediate Plasticity
TP501			2.30	-		20	49	16	33	100	CI Intermediate Plasticity
TP502			0.70	-		19	40	14	26	100	CI Intermediate Plasticity
TP502			2.50	-		19	47	16	31	100	CI Intermediate Plasticity
TP503			0.60	-		30	49	16	33	100	CI Intermediate Plasticity
TP503			3.00	-		24	46	16	30	100	CI Intermediate Plasticity
TP504			2.50	-		28	49	19	30	100	CI Intermediate Plasticity
TP505			1.80	-		20	44	19	25	100	CI Intermediate Plasticity
TP506			2.30	-		20	46	18	28	100	CI Intermediate Plasticity
TP507			1.30	-		22	41	16	25	100	CI Intermediate Plasticity
TP507			3.30	-		20	44	14	30	100	CI Intermediate Plasticity
WS501			1.70	-	2.00	24	44	24	20	100	CI Intermediate Plasticity
WS501			4.50	-		23	48	19	29	100	CI Intermediate Plasticity
WS502			1.30	-		20	33	13	20	100	CL Low Plasticity
WS503			5.00	-	5.45	27	43	19	24	100	CI Intermediate Plasticity
WS503			4.00	-		23	45	17	28	100	CI Intermediate Plasticity
WS504			2.50	-		22	56	21	35	100	CH High Plasticity
WS505			4.50	-		20	50	18	32	100	CI/H Inter/High Plasticity
WS506			5.00	-		20	45	14	31	100	CI Intermediate Plasticity
WS508			2.50	-		21	44	17	27	100	CI Intermediate Plasticity
				-							
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION BS 5930:1999+A2:2010



Operators	Checked	26/08/2021	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	26/08/2021	Paul Evans (Quality/Technical Manager)



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. WS501

Site Name Dunsbury Park

Sample No.

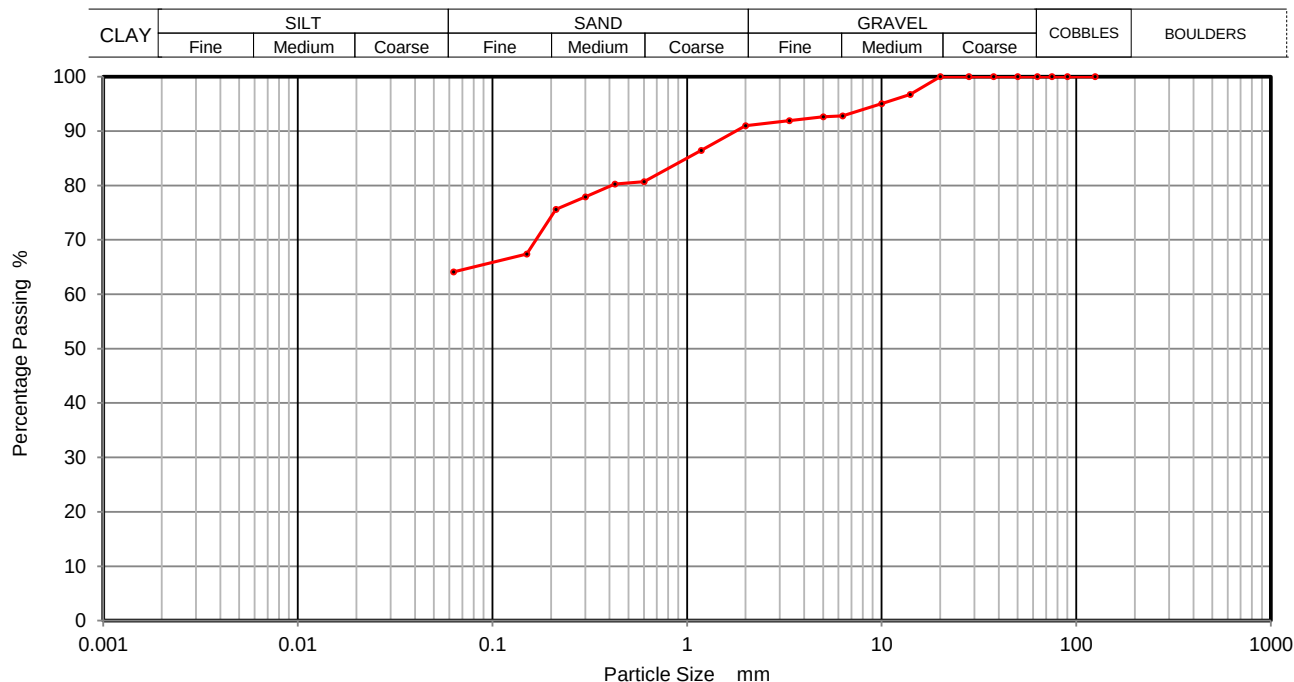
Soil Description Brown fine slightly gravelly fine to medium sandy silty CLAY.

Depth Top 0.30

Depth Base 0.60

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	95		
6.3	93		
5	93		
3.35	92		
2	91		
1.18	86		
0.6	81		
0.425	80		
0.3	78		
0.212	76		
0.15	67		
0.063	64		

Sample Proportions	% dry mass
Cobbles	0
Gravel	9
Sand	27
Silt and Clay	64

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	

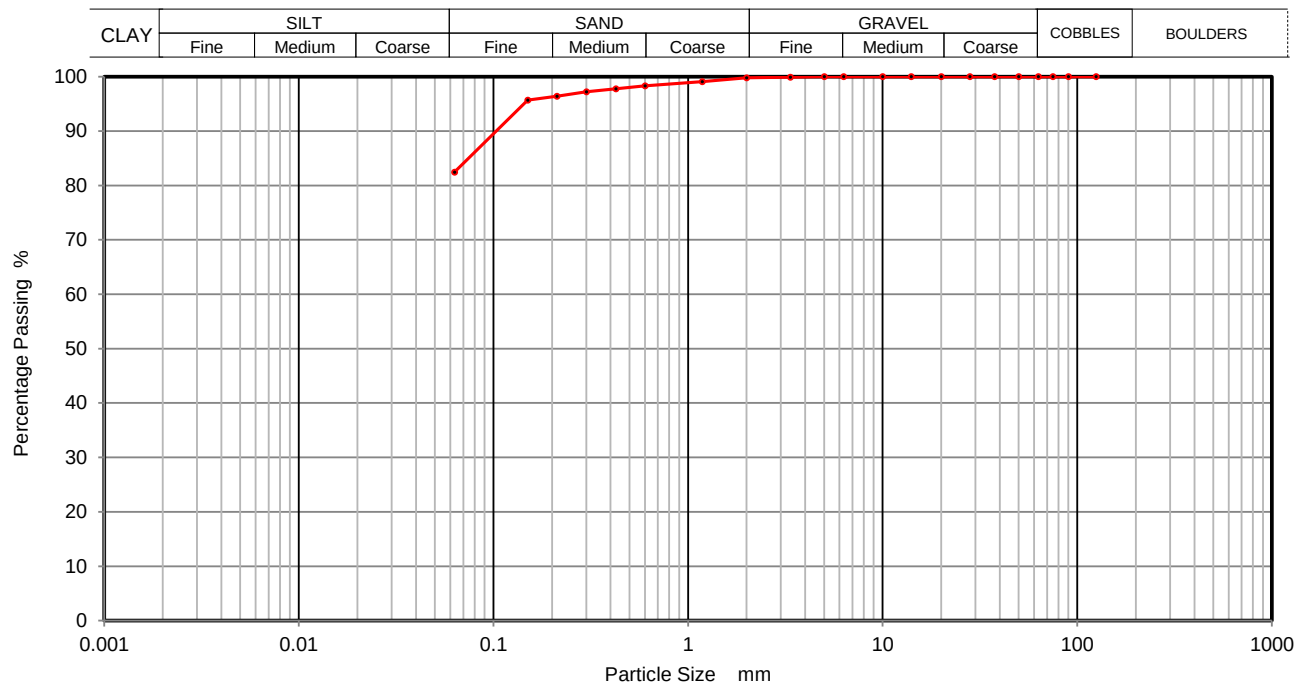


2788



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number	55139	
	Borehole/Pit No.	
SA101		
Site Name	Dunsbury Park	
Soil Description	Brown fine to medium sandy silty CLAY.	Sample No.
Depth Top	0.60	Depth Base
Date Tested	25/08/2021	Sample Type
		B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	98		
0.3	97		
0.212	96		
0.15	96		
0.063	82		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	18
Silt and Clay	82

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. TP501

Site Name Dunsbury Park

Sample No.

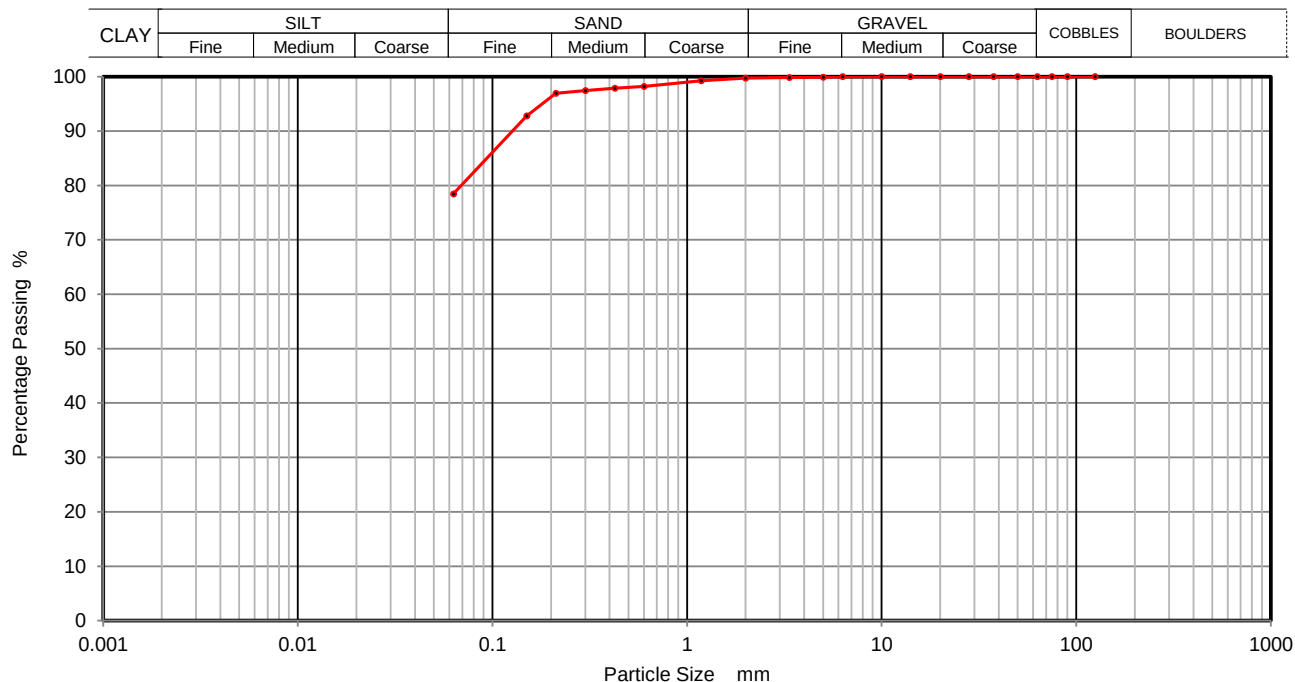
Soil Description Brown fine to medium sandy silty CLAY.

Depth Top 0.50

Depth Base

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	98		
0.3	97		
0.212	97		
0.15	93		
0.063	78		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	22
Silt and Clay	78

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	



2788



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. TP504

Site Name Dunsbury Park

Sample No.

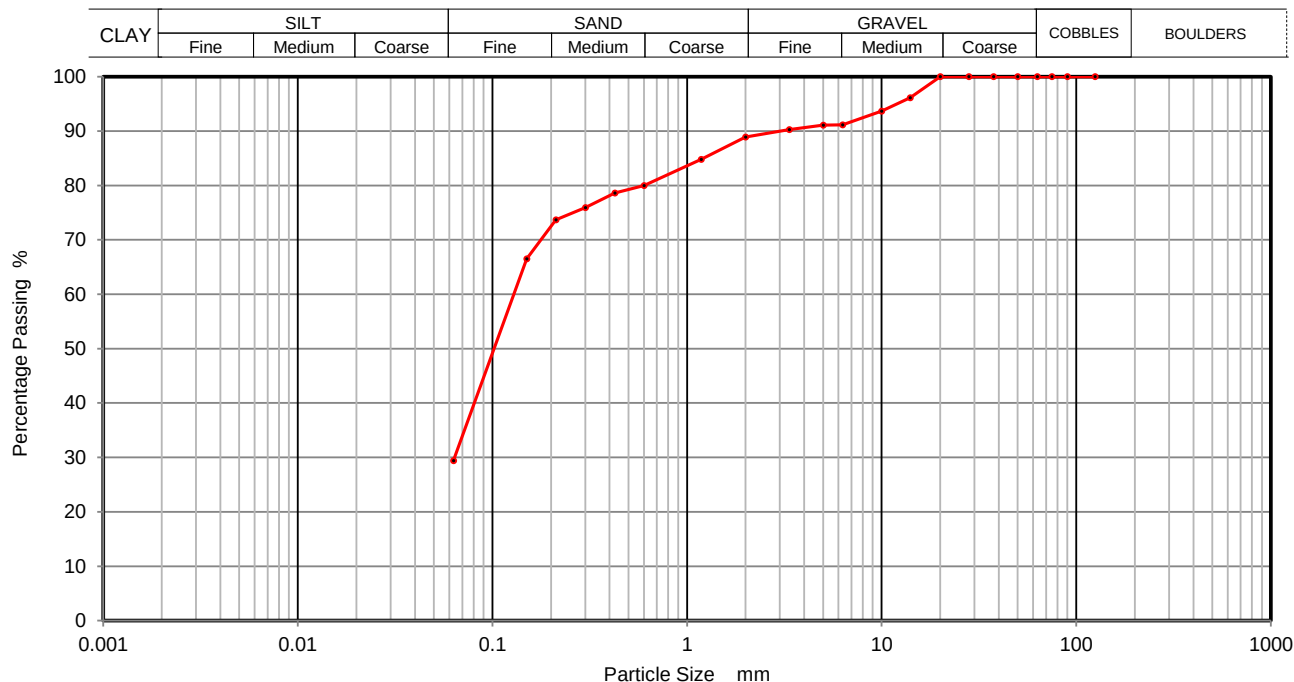
Soil Description Brown fine to medium gravelly silty clayey fine to coarse SAND.

Depth Top 1.00

Depth Base

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	94		
6.3	91		
5	91		
3.35	90		
2	89		
1.18	85		
0.6	80		
0.425	79		
0.3	76		
0.212	74		
0.15	67		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	11
Sand	60
Silt and Clay	29

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	

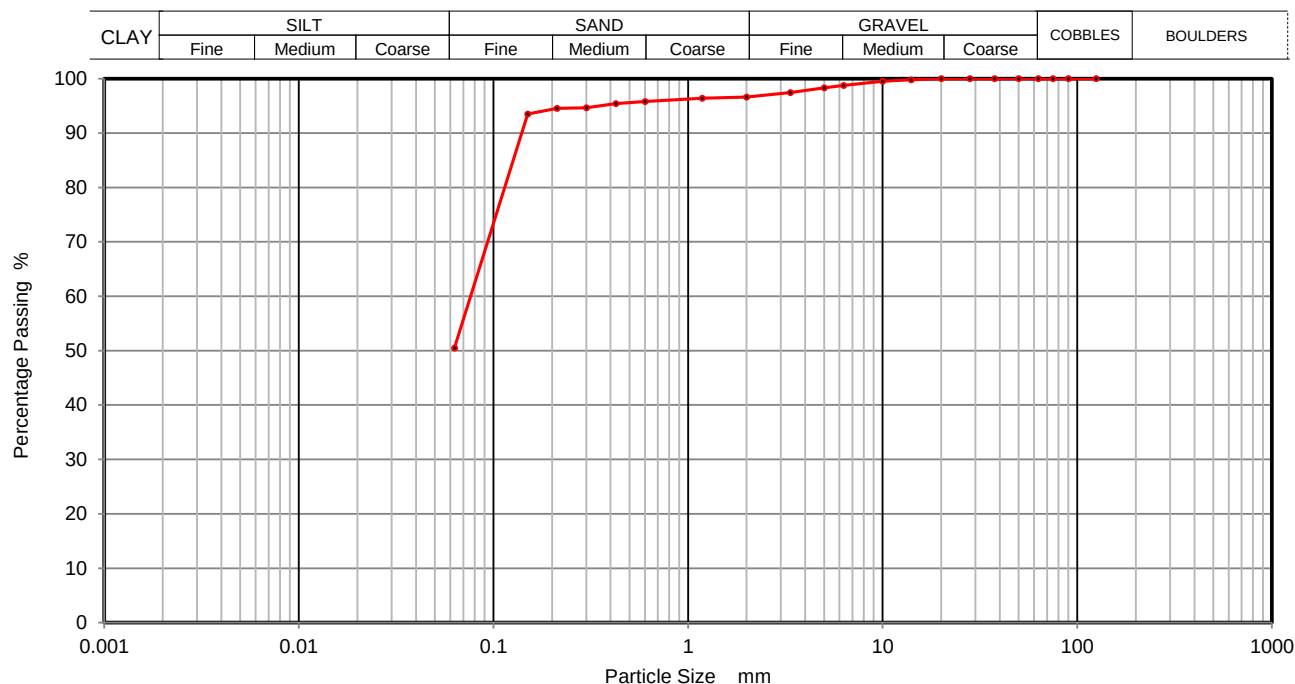


2788



**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	55139	
	Borehole/Pit No.	
WS503		
Site Name	Dunsbury Park	
Soil Description	Brown fine slightly gravelly fine to coarse sandy silty CLAY.	Sample No.
Depth Top	0.20	
Depth Base	0.60	
Date Tested	25/08/2021	
Sample Type	B	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	98		
3.35	97		
2	97		
1.18	96		
0.6	96		
0.425	95		
0.3	95		
0.212	95		
0.15	94		
0.063	50		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	47
Silt and Clay	50

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. WS505

Site Name Dunsbury Park

Sample No.

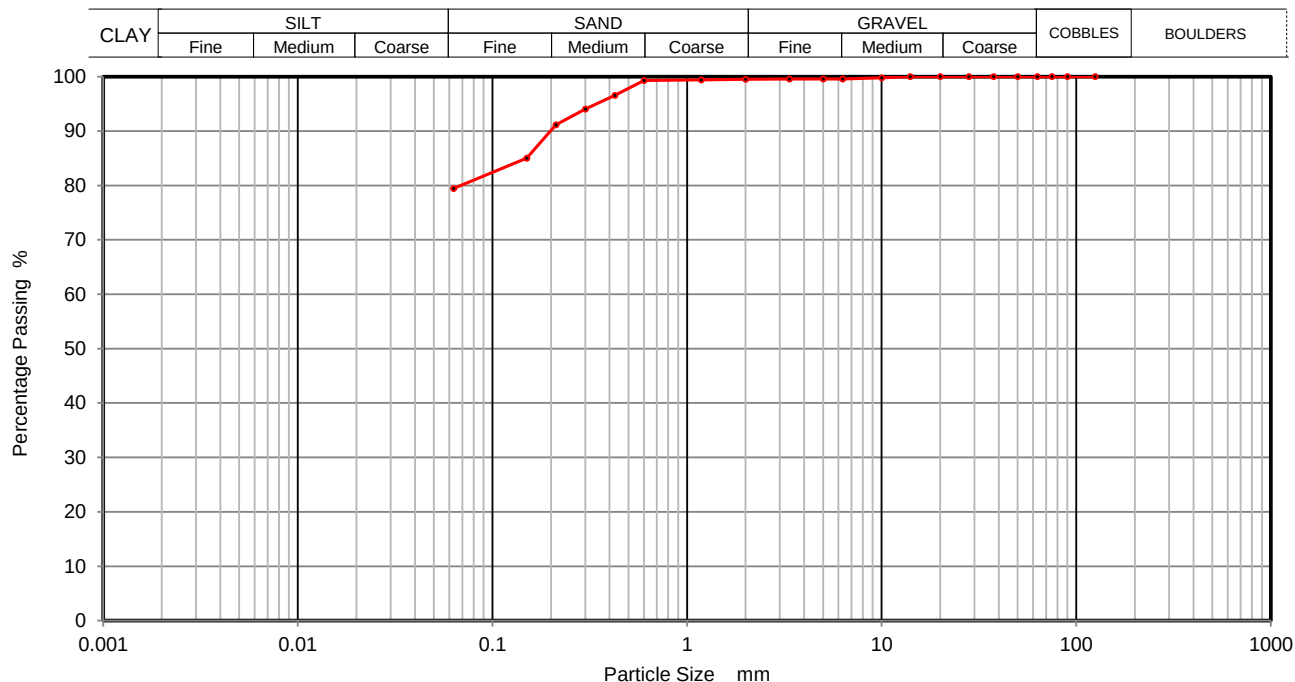
Soil Description Brown fine to coarse sandy silty CLAY.

Depth Top 1.50

Depth Base

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	97		
0.3	94		
0.212	91		
0.15	85		
0.063	79		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	21
Silt and Clay	79

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	



2788



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. WS508

Site Name Dunsbury Park

Sample No.

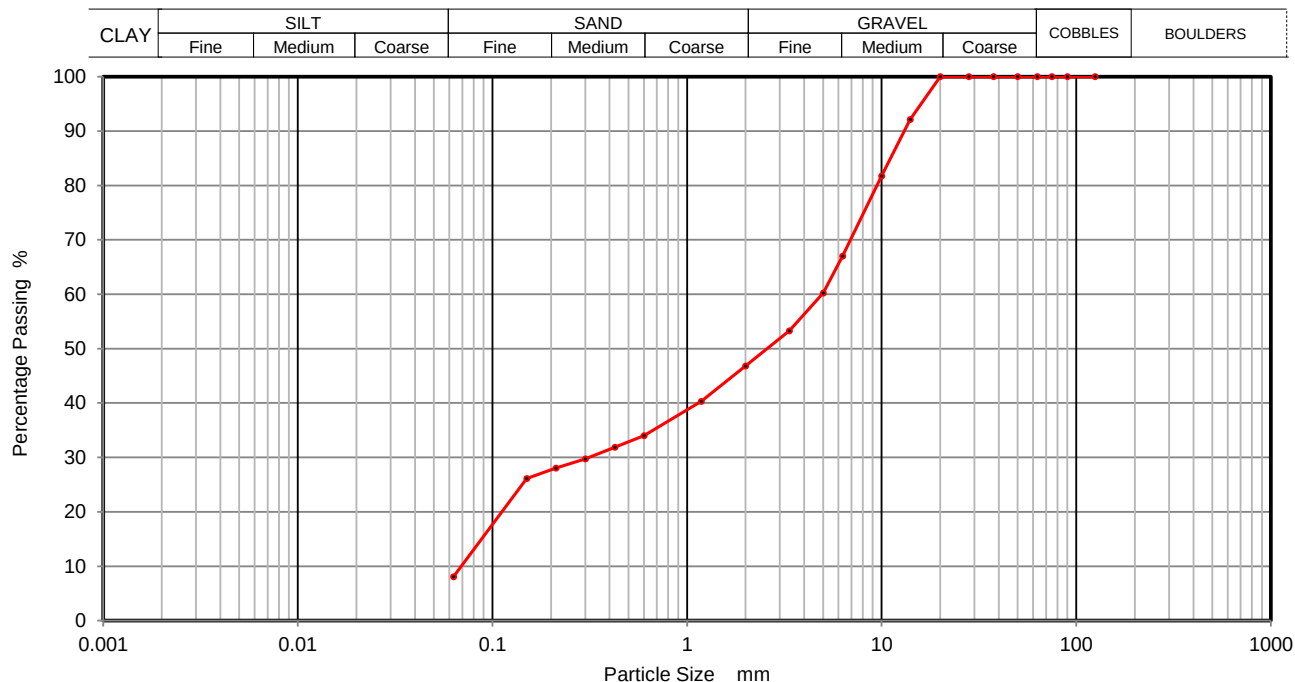
Soil Description Brown silty fine to coarse sandy GRAVEL.

Depth Top 0.30

Depth Base 0.60

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	92		
10	82		
6.3	67		
5	60		
3.35	53		
2	47		
1.18	40		
0.6	34		
0.425	32		
0.3	30		
0.212	28		
0.15	26		
0.063	8		

Sample Proportions	% dry mass
Cobbles	0
Gravel	53
Sand	39
Silt and Clay	8

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. WS509

Site Name Dunsbury Park

Sample No.

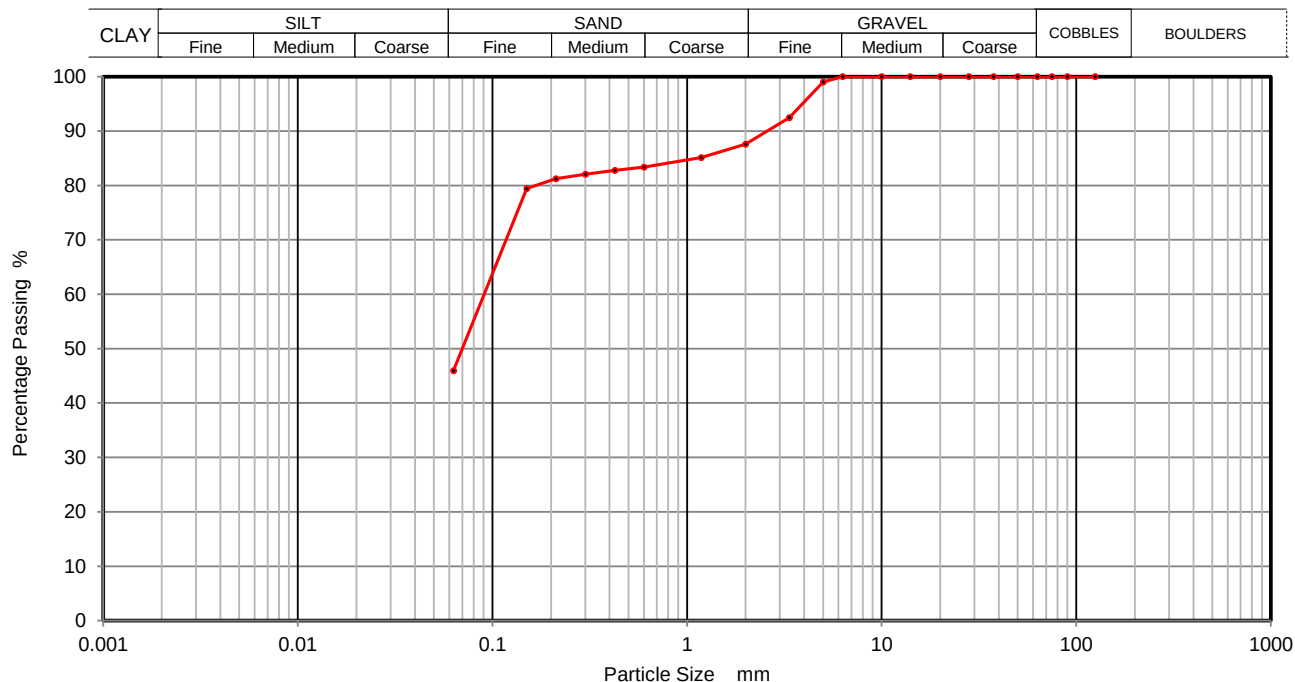
Soil Description Brown fine to medium gravelly fine to coarse sandy silty CLAY.

Depth Top 1.50

Depth Base 2.00

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	92		
2	88		
1.18	85		
0.6	83		
0.425	83		
0.3	82		
0.212	81		
0.15	79		
0.063	46		

Sample Proportions	% dry mass
Cobbles	0
Gravel	12
Sand	42
Silt and Clay	46

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	



2788



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55139

Borehole/Pit No. WS510

Site Name Dunsbury Park

Sample No.

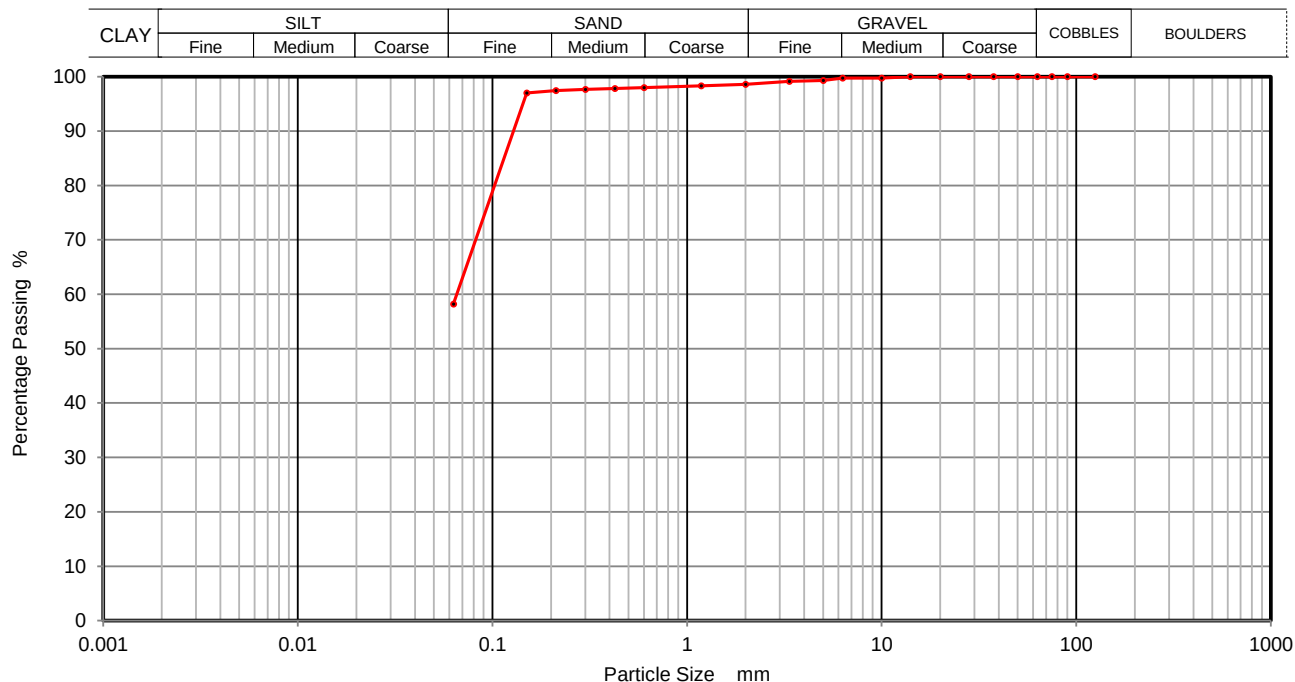
Soil Description Brown fine slightly gravelly fine to coarse sandy silty CLAY.

Depth Top 1.20

Depth Base 1.50

Date Tested 25/08/2021

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	98		
0.6	98		
0.425	98		
0.3	98		
0.212	97		
0.15	97		
0.063	58		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	41
Silt and Clay	58

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	25/08/2021	Richard John	
David	Approved	26/08/2021	Paul Evans	



2788



California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. WS503

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 0.20

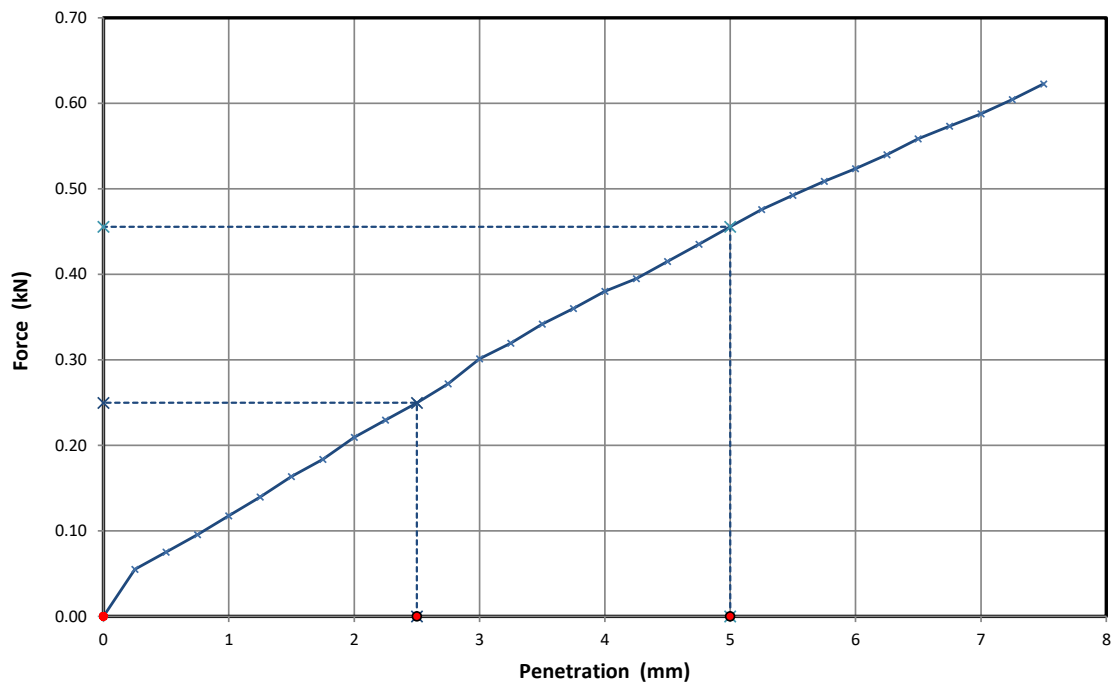
Compaction Method 2.5 Kg Rammer

Depth Base 0.60

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	27
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m ³)	1.95
Dry Density (Mg/m ³)	1.53

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	1.9	2.5mm Bottom	
5mm Top	2.3	5mm Bottom	
CBR Value %	2.3	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. TP501

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 0.50

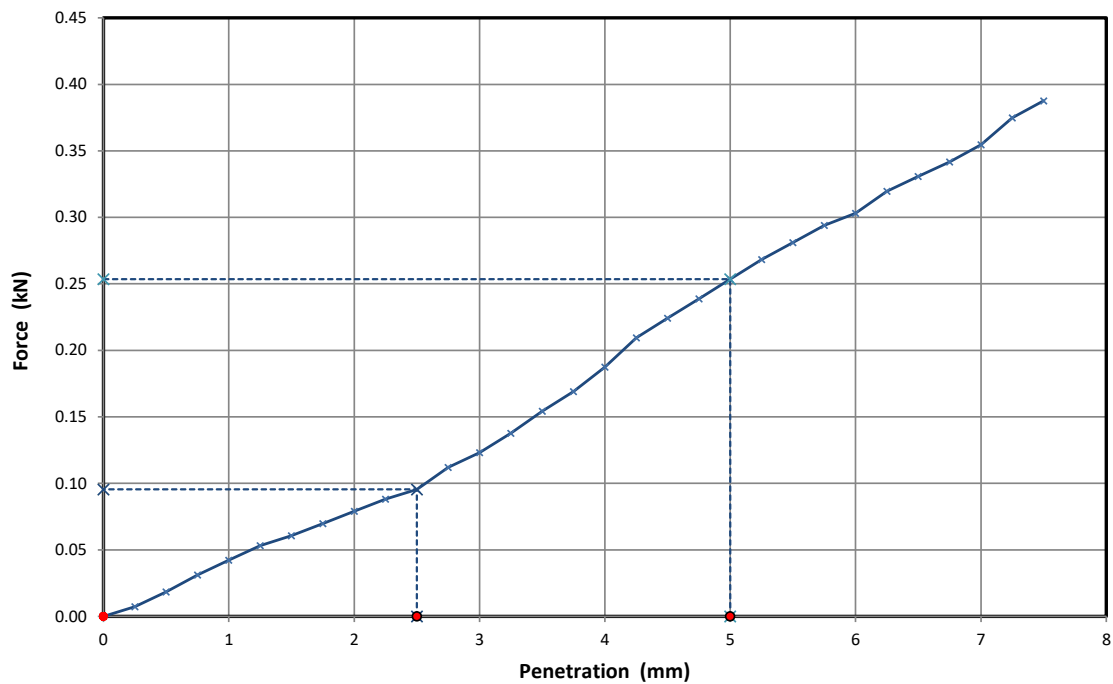
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	18
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.04
Dry Density (Mg/m3)	1.73

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.48
Remarks	

CBR Test Values			
2.5mm Top	0.72	2.5mm Bottom	
5mm Top	1.3	5mm Bottom	
CBR Value %	1.3	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





**California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7**

Contract Number 55139

Borehole/Pit No. TP502

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 0.70

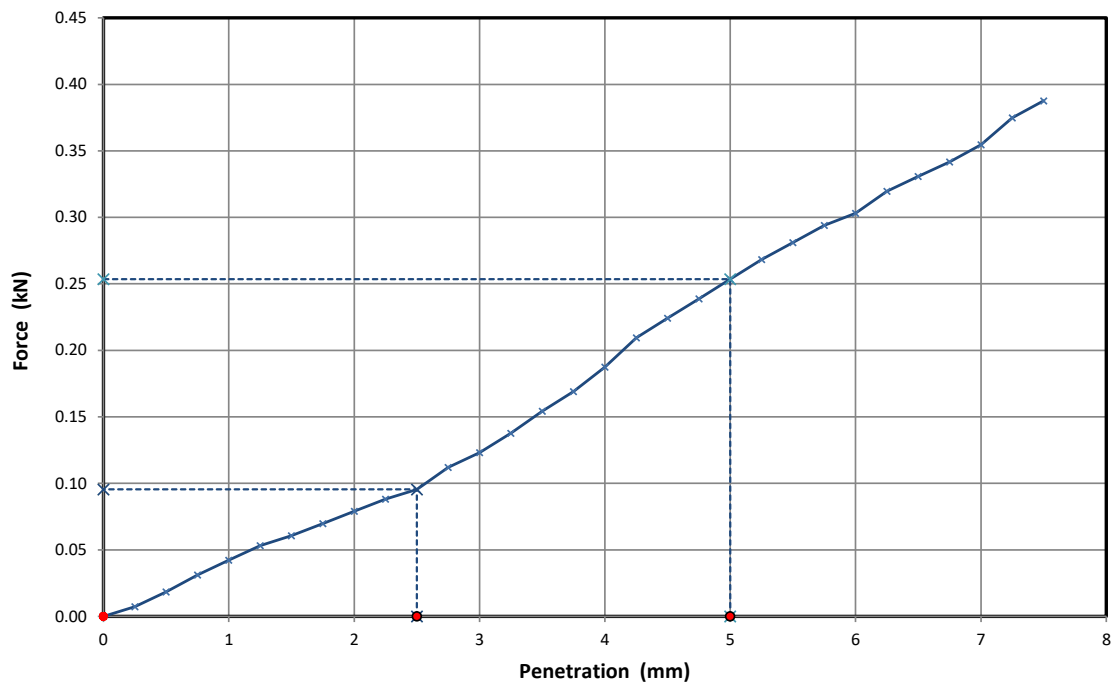
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	18
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.04
Dry Density (Mg/m3)	1.73

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.45
Remarks	

CBR Test Values			
2.5mm Top	0.72	2.5mm Bottom	
5mm Top	1.3	5mm Bottom	
CBR Value %	1.3	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. TP503

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 0.60

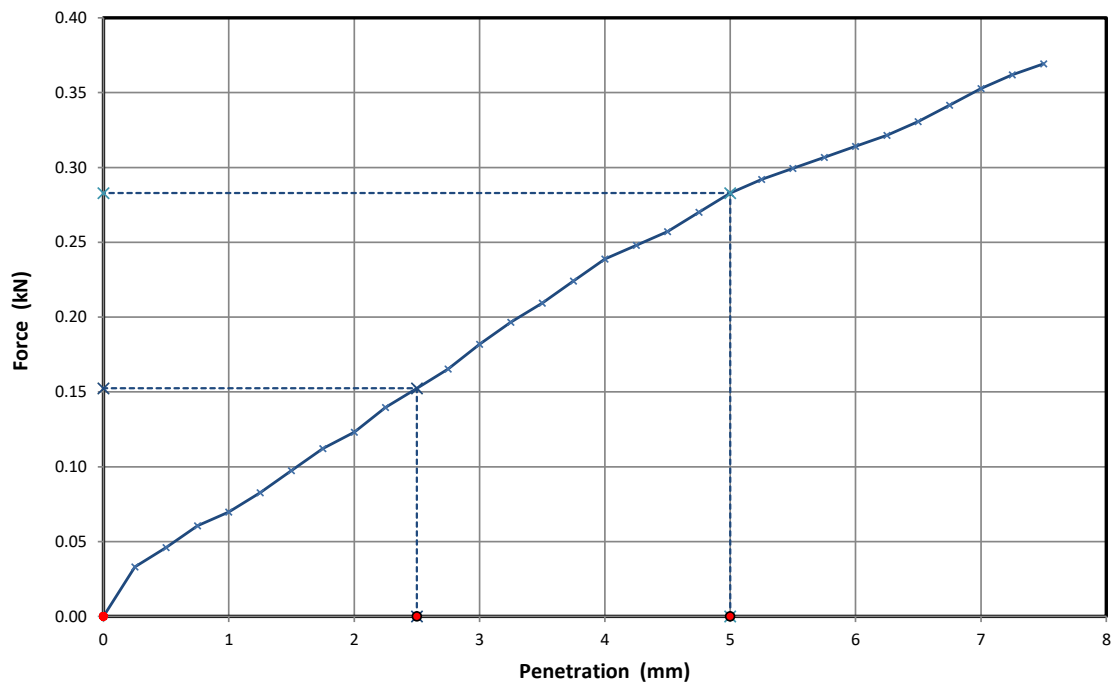
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	23
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m ³)	1.94
Dry Density (Mg/m ³)	1.58

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.22
Remarks	

CBR Test Values			
2.5mm Top	1.2	2.5mm Bottom	
5mm Top	1.4	5mm Bottom	
CBR Value %	1.4	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. TP504

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 1.00

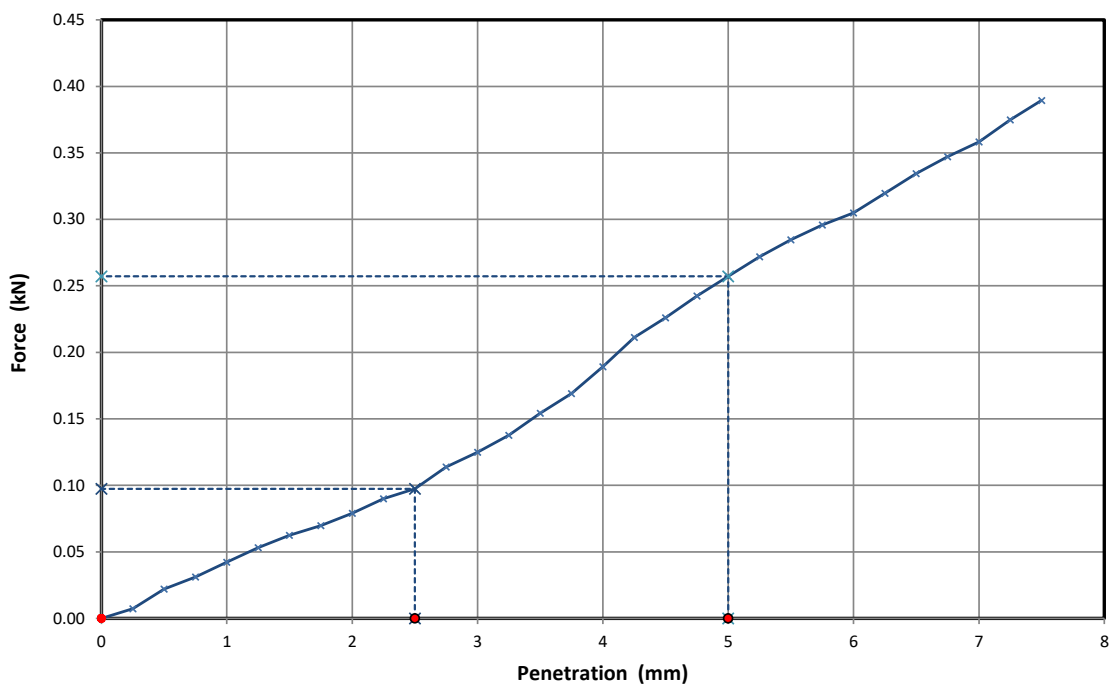
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	18
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m3)	1.96
Dry Density (Mg/m3)	1.67

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.47
Remarks	

CBR Test Values			
2.5mm Top	0.74	2.5mm Bottom	
5mm Top	1.3	5mm Bottom	
CBR Value %	1.3	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. TP505

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 0.80

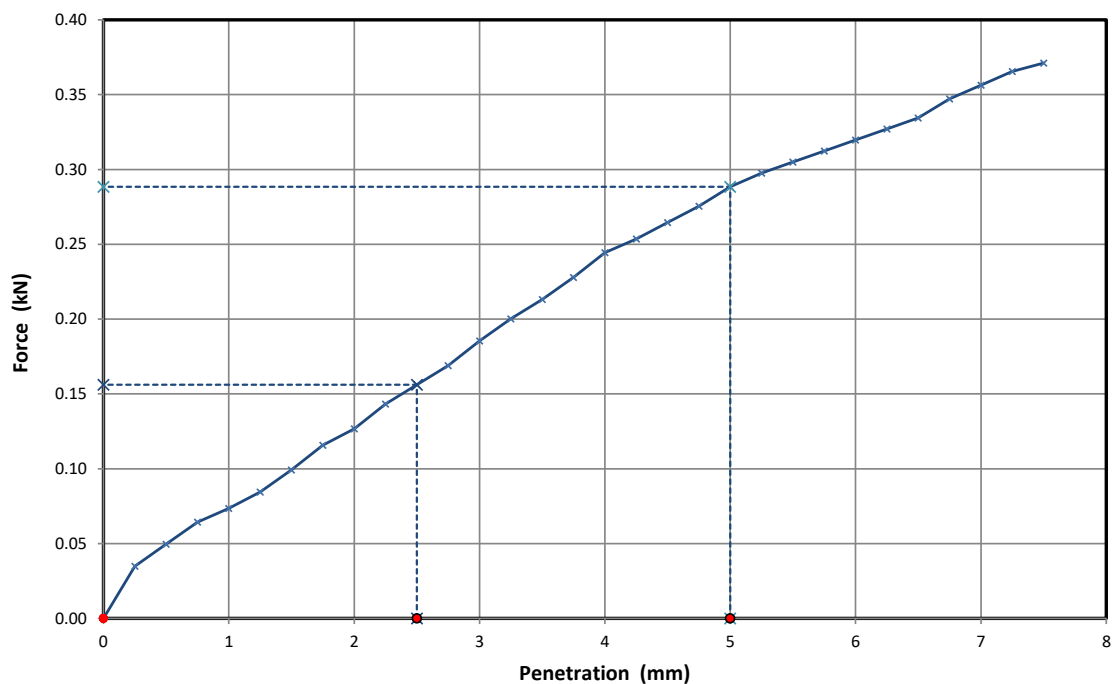
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	24
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m ³)	1.96
Dry Density (Mg/m ³)	1.58

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.21
Remarks	

CBR Test Values			
2.5mm Top	1.2	2.5mm Bottom	
5mm Top	1.4	5mm Bottom	
CBR Value %	1.4	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





**California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7**

Contract Number 55139

Borehole/Pit No. TP506

Site Name Dunsbury Park

Sample No.

Soil Description Greyish brown fine to medium sandy silty CLAY

Depth Top 0.60

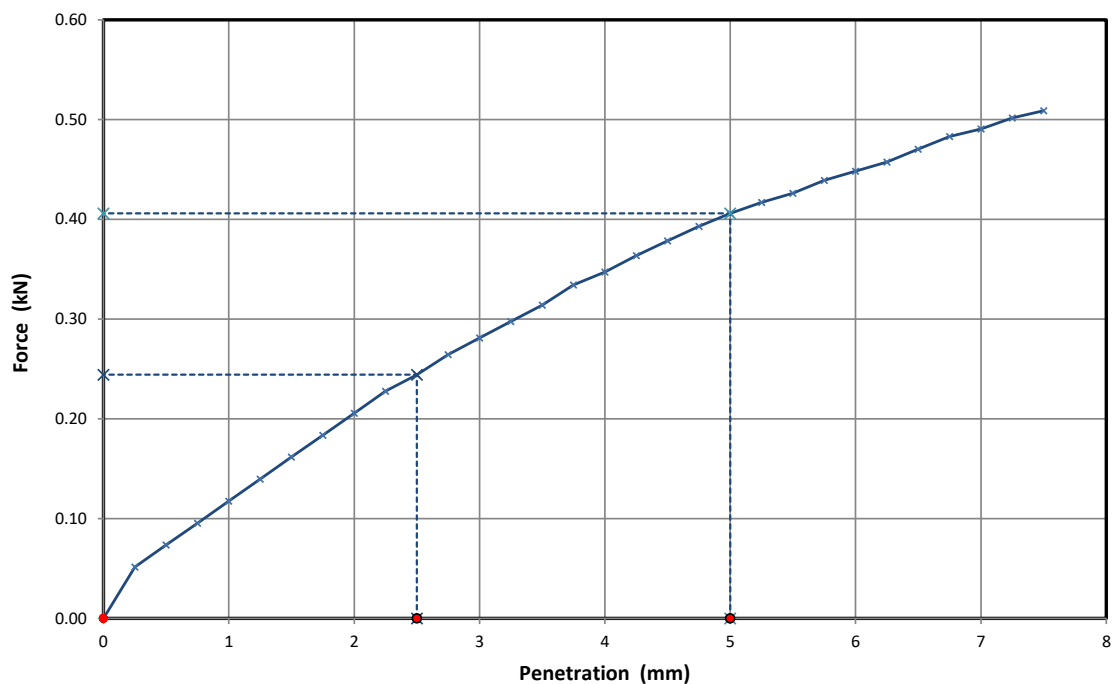
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	25
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m ³)	1.98
Dry Density (Mg/m ³)	1.59

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.19
Remarks	

CBR Test Values			
2.5mm Top	1.9	2.5mm Bottom	
5mm Top	2	5mm Bottom	
CBR Value %	2	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. TP507

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine to medium sandy silty CLAY

Depth Top 0.70

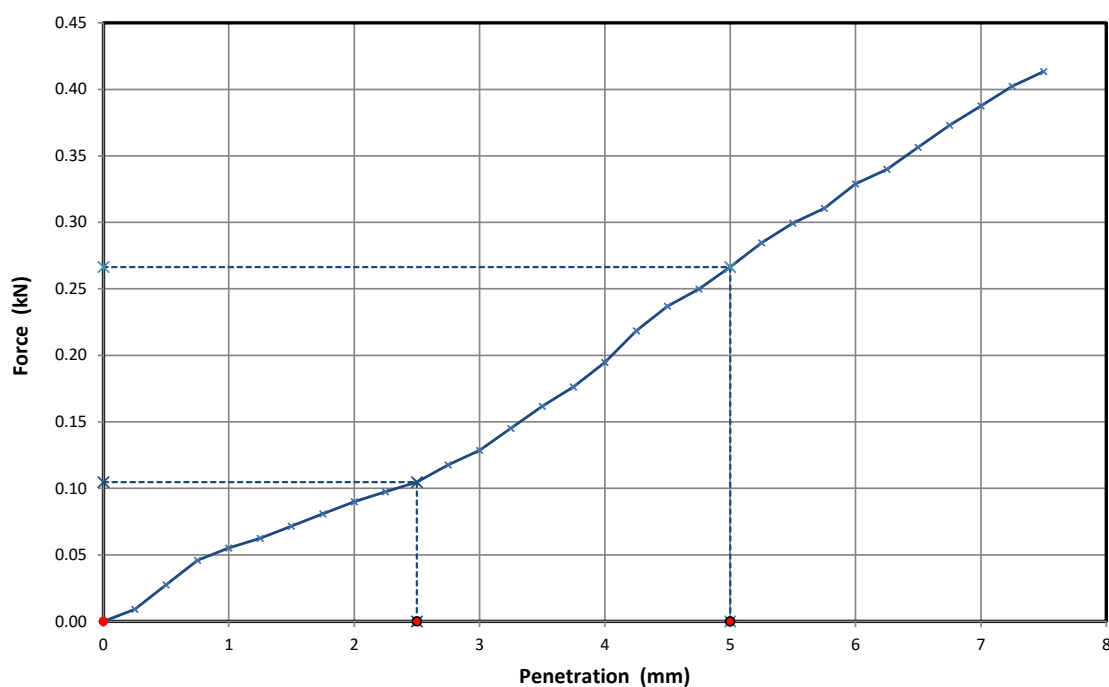
Compaction Method 2.5 Kg Rammer

Depth Base

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	19
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m3)	1.95
Dry Density (Mg/m3)	1.63

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	96
Swelling (mm)	0.31
Remarks	

CBR Test Values			
2.5mm Top	0.79	2.5mm Bottom	
5mm Top	1.3	5mm Bottom	
CBR Value %	1.3	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Contract Number 55139

Borehole/Pit No. WS510

Site Name Dunsbury Park

Sample No.

Soil Description Brown fine sandy silty CLAY

Depth Top 0.60

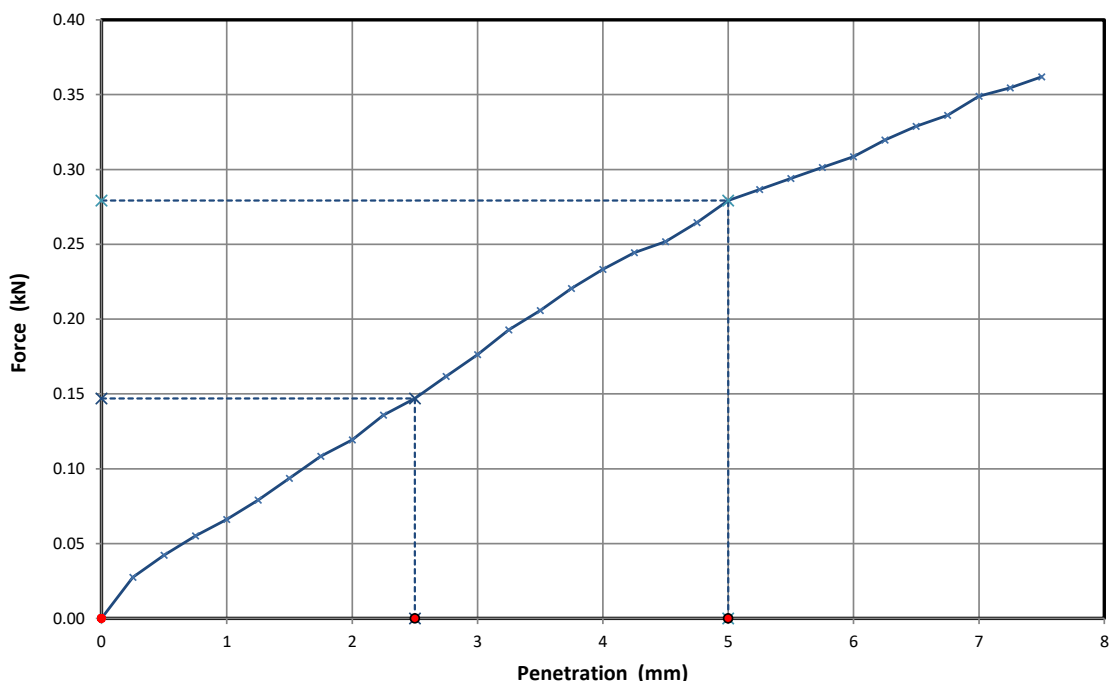
Compaction Method 2.5 Kg Rammer

Depth Base 1.00

Retained 20mm (%) 0

Sample Type B

Date Tested 23/08/2021



Initial Sample Conditions	
Moisture Content (%)	20
Moisture Top (%)	
Moisture Bottom (%)	
Bulk Density (Mg/m3)	1.95
Dry Density (Mg/m3)	1.62

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	1.1	2.5mm Bottom	
5mm Top	1.4	5mm Bottom	
CBR Value %	1.4	CBR Value %	

Operators	Checked	25/08/2021	Richard John	
Conal	Approved	26/08/2021	Paul Evans	





**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number

55139

BH / TP No

TP501

Site Name

Dunsbury Park

Sample No

Sample Description

Brown sandy silty CLAY

Depth Top

0.5

Compaction Method

Vibrating Rammer

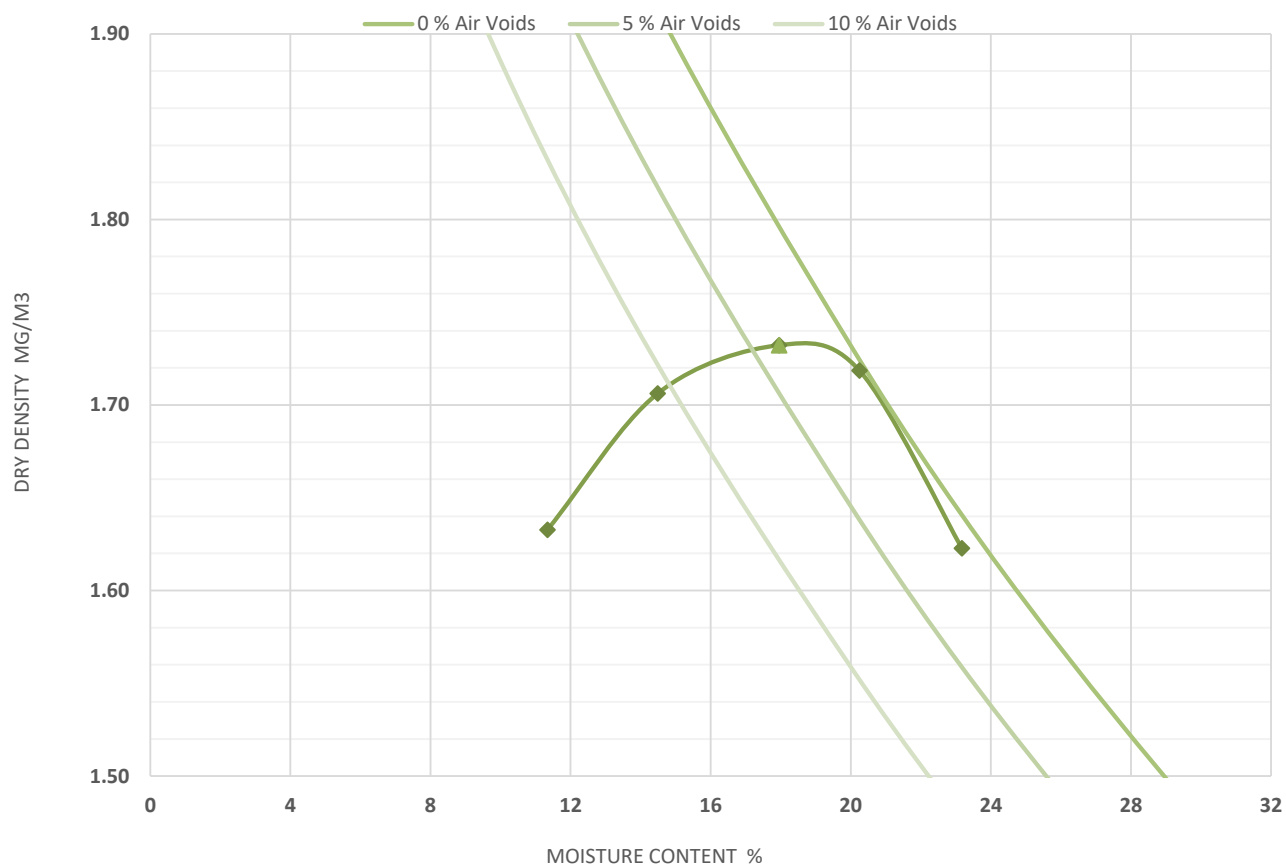
Depth Bottom

Date Tested

23/08/2021

Sample Type

B



Compaction Point	1	2	3	4	5						
Moisture Content	11	14	18	20	23						
Bulk Density	1.82	1.95	2.04	2.07	2.00						
Dry Density	1.63	1.71	1.73	1.72	1.62						

Initial Moisture Content	11
Maximum Dry Density	1.73
Optimum Moisture Content	18
Particle Density	2.65
Material Retained 37.5mm	0
Material Retained 20mm	0

Operators	Checked	26/08/2021	Richard John	
Conor	Approved	27/08/2021	Paul Evans	





**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number

55139

BH / TP No

TP503

Site Name

Dunsbury Park

Sample No

Sample Description

Brown sandy silty CLAY

Depth Top

0.6

Compaction Method

Vibrating Rammer

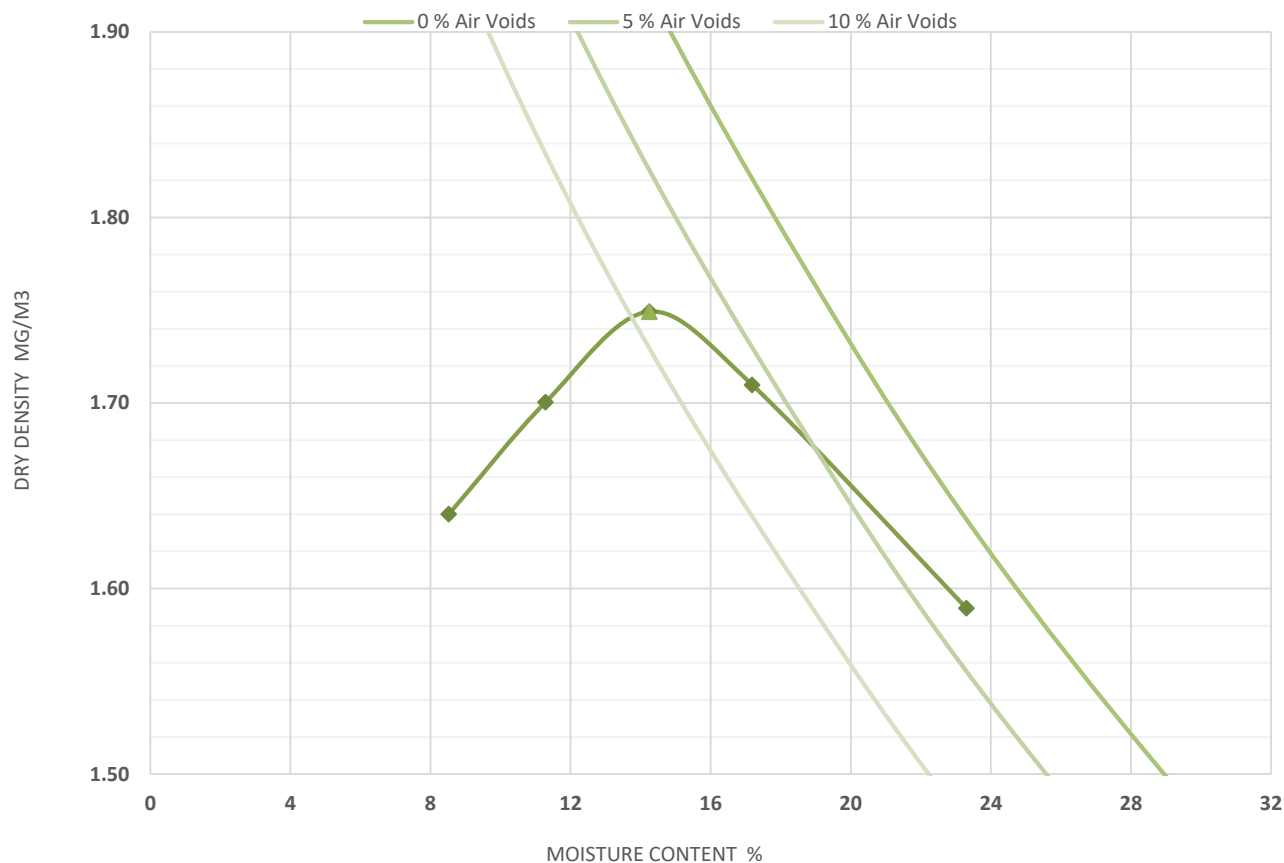
Depth Bottom

Date Tested

23/08/2021

Sample Type

B



Compaction Point	1	2	3	4	5						
Moisture Content	8.5	11	14	17	23						
Bulk Density	1.78	1.89	2.00	2.00	1.96						
Dry Density	1.64	1.70	1.75	1.71	1.59						

Initial Moisture Content	23
Maximum Dry Density	1.75
Optimum Moisture Content	14
Particle Density	2.65
Material Retained 37.5mm	0
Material Retained 20mm	0

Operators	Checked	26/08/2021	Richard John	
Conor	Approved	27/08/2021	Paul Evans	





**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number

55139

BH / TP No

WS509

Site Name

Dunsbury Park

Sample No

Sample Description

Brown sandy silty CLAY

Depth Top

0.7

Compaction Method

Vibrating Rammer

Depth Bottom

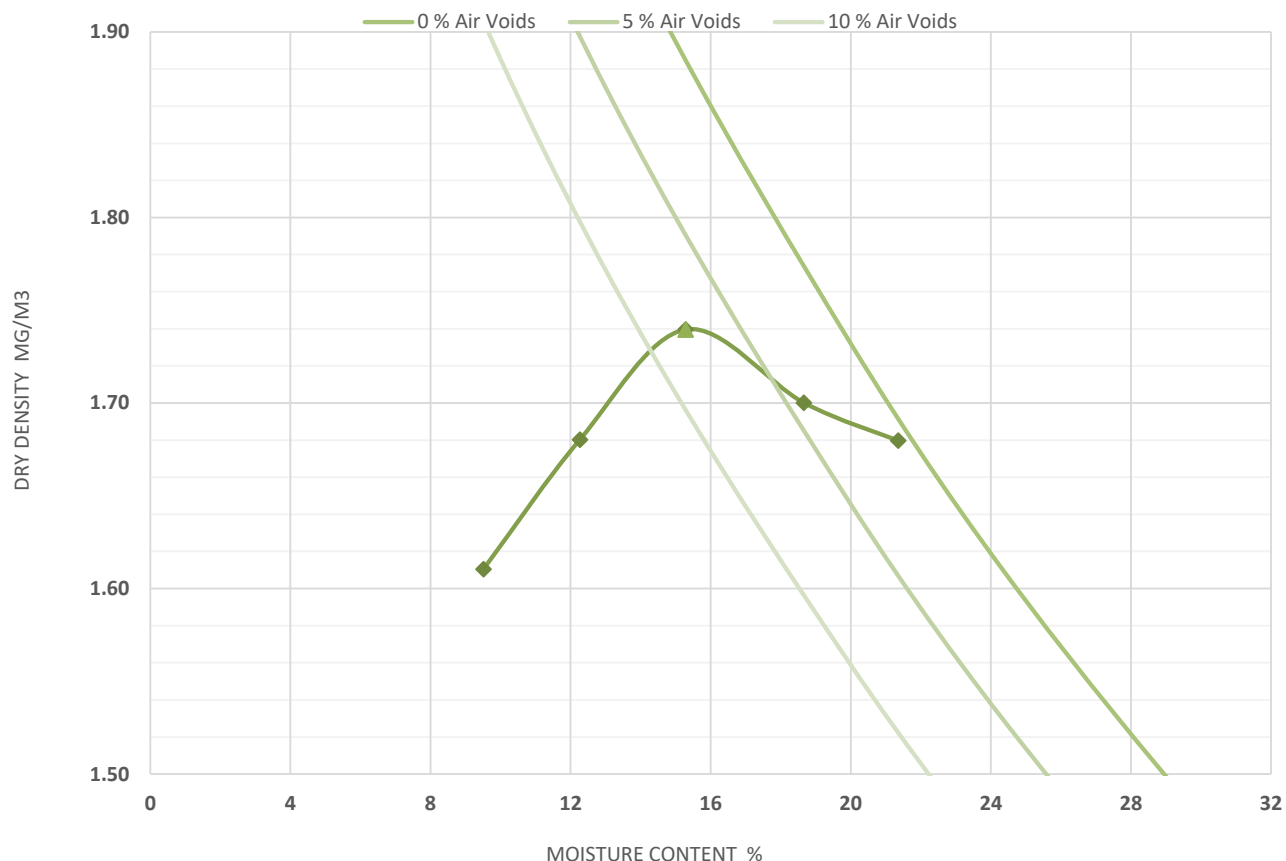
1

Date Tested

23/08/2021

Sample Type

B



Compaction Point	1	2	3	4	5						
Moisture Content	9.5	12	15	19	21						
Bulk Density	1.76	1.89	2.01	2.02	2.04						
Dry Density	1.61	1.68	1.74	1.70	1.68						

Initial Moisture Content	19
Maximum Dry Density	1.74
Optimum Moisture Content	15
Particle Density	2.65
Material Retained 37.5mm	0
Material Retained 20mm	0

Operators	Checked	26/08/2021	Richard John	
Conor	Approved	27/08/2021	Paul Evans	





ONE DIMENSIONAL CONSOLIDATION TEST
BS1377:Part 5:1990, clause 3

Contract Number

55139

Borehole/Trialpit No.

TP501

Site Name

Dunsbury Park

Sample No.

Soil Description

Greyish brown silty CLAY

Depth Top (m)

2.30

Depth Base (m)

Lab Temperature

20°C

Sample Location

Top

Remarks

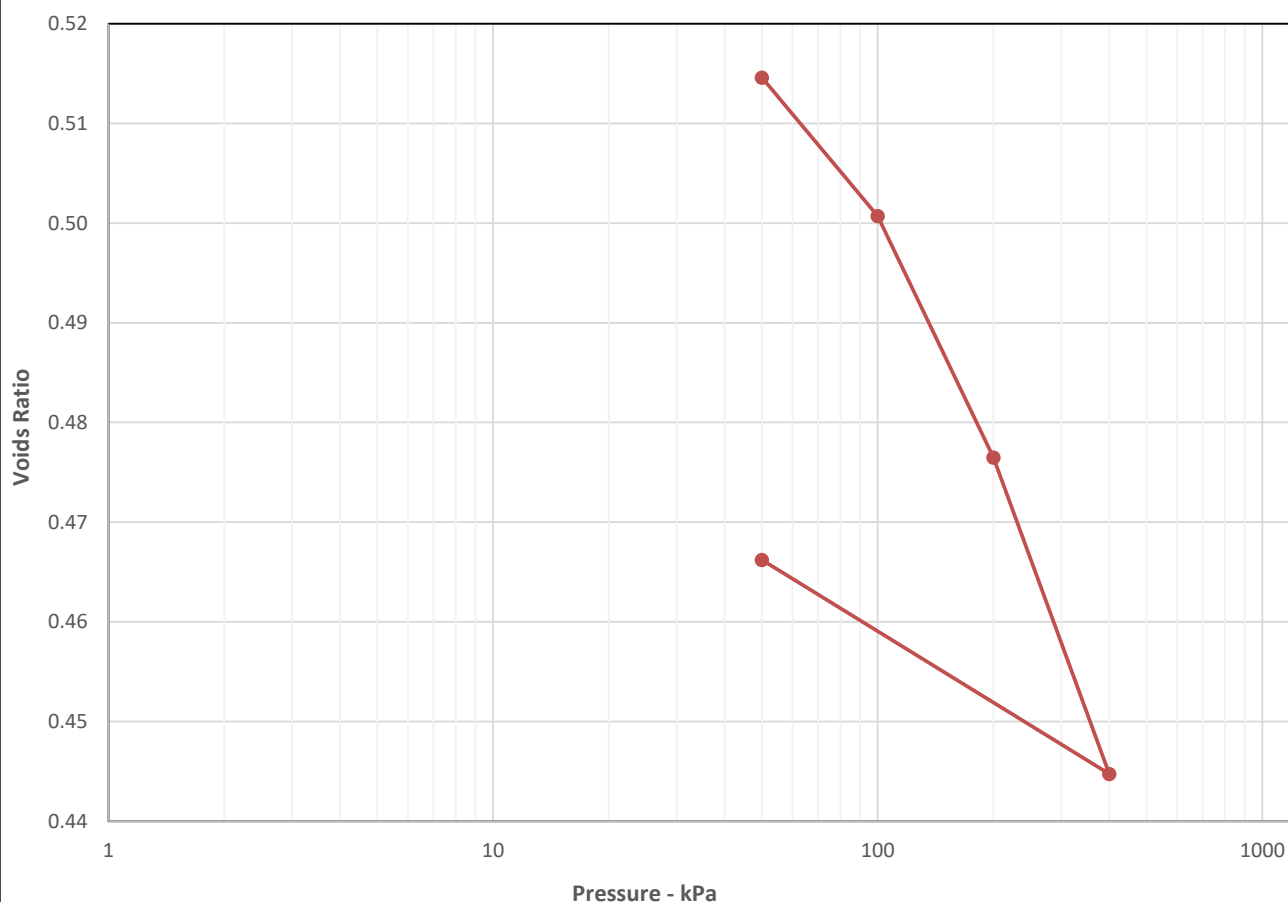
Cv Calculated Using T90
Particle Density Assumed Unless Stated Otherwise

Sample Type

U

Date Tested

11/08/2021



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	23	0	-	50	0.6	9.6		-			
Bulk Density (Mg/m3)	2.09	50	-	100	0.18	4		-			
Dry Density (Mg/m3)	1.70	100	-	200	0.16	9.5		-			
Voids Ratio	0.5573	200	-	400	0.11	6.2		-			
Degree of saturation	108.3	400	-	50	0.042	3.3		-			
Height (mm)	19.73		-					-			
Diameter (mm)	75.1		-					-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	25/08/2021	Richard John	
Wayne W	Approved	26/08/2021	Paul Evans	





ONE DIMENSIONAL CONSOLIDATION TEST
BS1377:Part 5:1990, clause 3

Contract Number

55139

Borehole/Trialpit No.

WS505

Site Name

Dunsbury Park

Sample No.

Soil Description

Greyish brown fine sandy silty CLAY

Depth Top (m)

2.70

Depth Base (m)

Lab Temperature

20°C

Sample Location

Top

Remarks

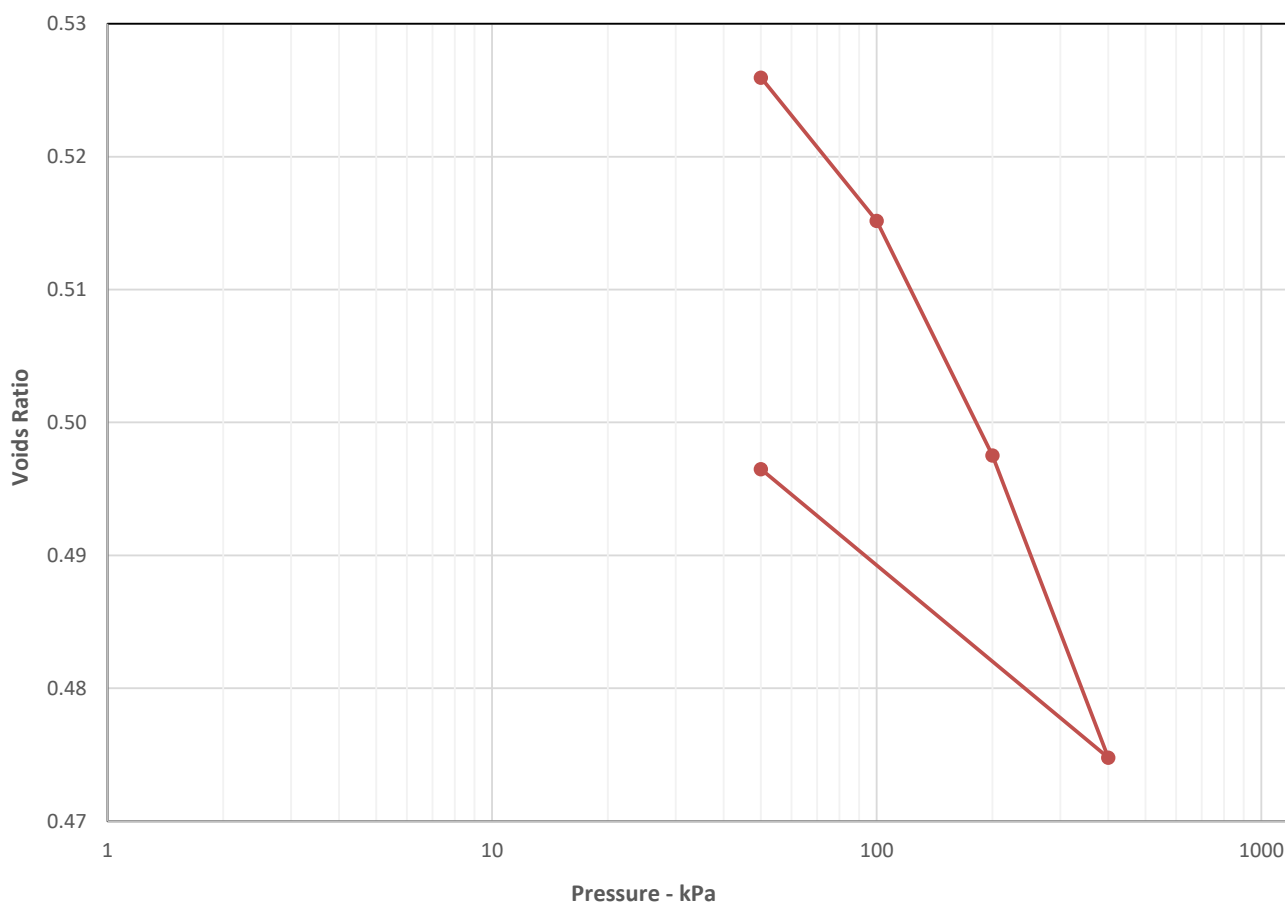
Cv Calculated Using T90
Particle Density Assumed Unless Stated Otherwise

Sample Type

U

Date Tested

11/08/2021



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	20	0	-	50	0.2	16		-			
Bulk Density (Mg/m3)	2.06	50	-	100	0.14	10		-			
Dry Density (Mg/m3)	1.72	100	-	200	0.12	9.4		-			
Voids Ratio	0.5421	200	-	400	0.08	16.0		-			
Degree of saturation	97.2	400	-	50	0.042	9.2		-			
Height (mm)	19.74		-					-			
Diameter (mm)	75.15		-					-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	25/08/2021	Richard John	
Wayne W	Approved	26/08/2021	Paul Evans	





ONE DIMENSIONAL CONSOLIDATION TEST
BS1377:Part 5:1990, clause 3

Contract Number 55139

Borehole/Trialpit No. WS509

Site Name Dunsbury Park

Sample No.

Soil Description

Greyish brown fine sandy silty CLAY

Depth Top (m)

3.50

Depth Base (m)

3.80

Lab Temperature

20°C

Sample Location

Top

Remarks

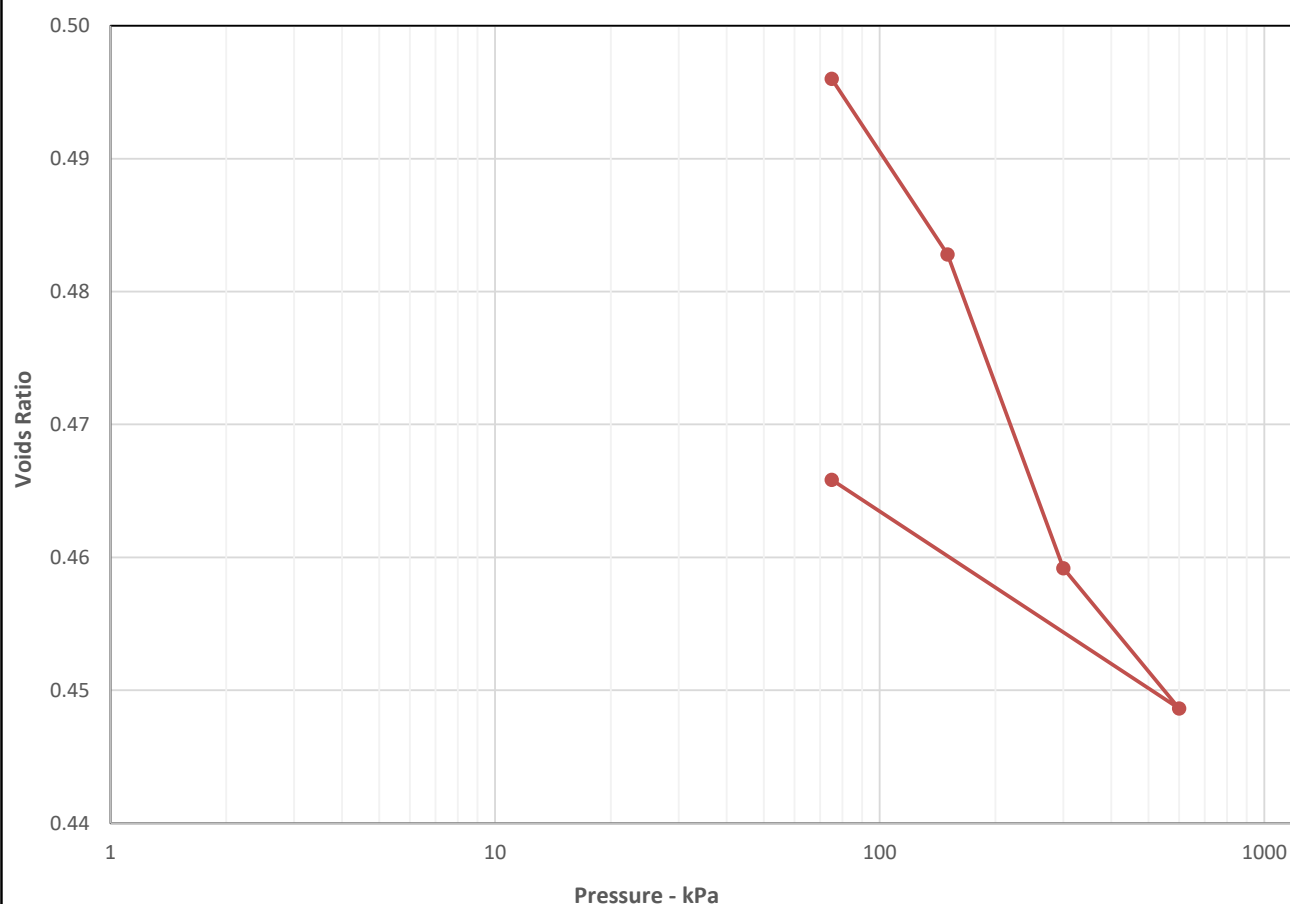
Cv Calculated Using T90
Particle Density Assumed Unless Stated Otherwise

Sample Type

U

Date Tested

11/08/2021



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	21	0	-	75	0.3	1.6		-			
Bulk Density (Mg/m3)	2.09	75	-	150	0.12	9.7		-			
Dry Density (Mg/m3)	1.73	150	-	300	0.11	11		-			
Voids Ratio	0.5318	300	-	600	0.02	9.3		-			
Degree of saturation	104.6	600	-	75	0.023	5.9		-			
Height (mm)	19.6		-					-			
Diameter (mm)	75.1		-					-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	25/08/2021	Richard John	
Wayne W	Approved	26/08/2021	Paul Evans	





Certificate of Analysis

Certificate Number 21-16973

Issued: 19-Aug-21

Client GEO Site and Testing Services Ltd
Unit 4
Heol Aur
Dafen Ind Est
Dafen
Carmarthenshire
SA14 8QN

Our Reference 21-16973

Client Reference 19453-GELO

Order No (not supplied)

Contract Title Dunsbury Park

Description 10 Soil samples.

Date Received 12-Aug-21

Date Started 12-Aug-21

Date Completed 19-Aug-21

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

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

Approved By

Adam Fenwick
Contracts Manager



2139

Summary of Chemical Analysis

Soil Samples

Our Ref 21-16973

Client Ref 19453-GELO

Contract Title Dunsbury Park

Lab No	1888913	1888914	1888915	1888916	1888917	1888918	1888919	1888920	1888921	1888922
Sample ID	SA101	TP5.05	WS5.02	WS5.03	WS5.04	WS5.05	WS5.06	WS5.08	WS5.09	WS5.07
Depth	1.50	0.80	1.85-2.00	0.20-0.60	1.80	1.50	5.00	0.60-1.00	3.50-3.80	0.20-0.50
Other ID										
Sample Type	D	B	D	B	D	B	B	B	B	B
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units										
Inorganics													
pH	DETSC 2008#		pH	7.4	7.6	8.3	7.7	7.7	7.8	8.0	8.0	8.6	11.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	220	44	60	17	23	20	350	31	580	62
Sulphur as S, Total	DETSC 2320	0.01	%	0.31	< 0.01	0.02	< 0.01	0.01	< 0.01	1.0	0.01	4.8	0.14
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.11	0.03	0.02	< 0.01	< 0.01	< 0.01	0.12	< 0.01	0.35	0.20

Information in Support of the Analytical Results

Our Ref 21-16973
 Client Ref 19453-GELO
 Contract Dunsbury Park

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1888913	SA101 1.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888914	TP5.05 0.80 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888915	WS5.02 1.85-2.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888916	WS5.03 0.20-0.60 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888917	WS5.04 1.80 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888918	WS5.05 1.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888919	WS5.06 5.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888920	WS5.08 0.60-1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888921	WS5.09 3.50-3.80 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1888922	WS5.07 0.20-0.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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Information in Support of the Analytical Results

Our Ref 21-16973
Client Ref 19453-GELO
Contract Dunsbury Park

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

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

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

Disposal

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

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

End of Report



Contract Number: 55665

Client Ref: **19543-GELO**

Report Date: **28-09-2021**

Client PO: **P009586**

Client **Hydrock Limited**
Hydrock
First Floor
5 Castlebridge
5-19 Cowbridge Road East
Cardiff
CF11 9AB
Tel: 02920 023665 Mob: 07392 081090

Contract Title: **Dunsbury Park**
For the attention of: **Yacklin Panza**

Date Received: **07-09-2021**

Date Completed: **28-09-2021**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	8
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	8
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	1
BRE Reduced Suite includes pH, water & acid soluble sulphate and total sulphur Sub-contracted Test - @ Non Accredited Test	5
Dry Den/MC (Vibrating Hammer Method) BS 1377:1990 - Part 4 : 3.7 - * UKAS	1
CBR: Rem specified MC and tested at top only BS 1377:1990 - Part 4 : 7 - * UKAS	3

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)



Contract Number: 55665

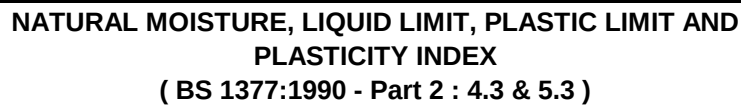
Test Description	Qty
Dry Den/MC (4.5kg Rammer Method 1 litre mould/CBR Mould) BS 1377:1990 - Part 4 : 3.6 - * UKAS	3
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	17
CD 38mm Consolidated drained triaxial compression test on a set of three x 38 mm diameter specimens with the measurement of volume change and pore water pressure including saturation and consolidation, test duration four days per specimen. PLEASE NOTE IT IS LIKELY THIS TEST WILL INCUR EXTRA OVER DAY CHARGES. BS 1377:1990 - Part 8 : 8 - @ Non Accredited Test	1
Disposal of samples for job	1

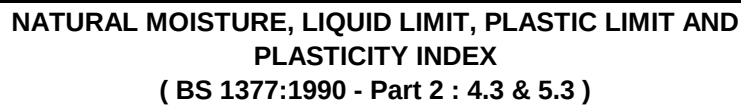
Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

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Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)







PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55665
Borehole/Pit No. BH5.01

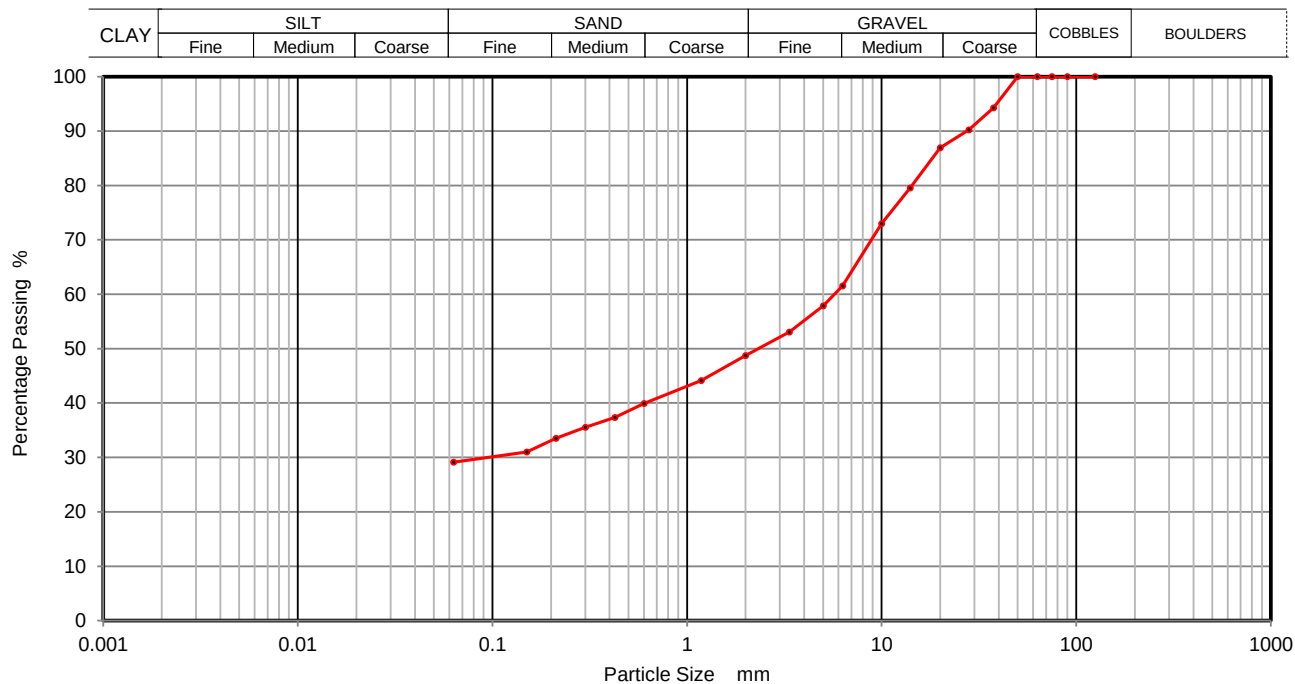
Site Name Dunsbury Park

Sample No.
Depth Top 3.00
Depth Base

Soil Description Brownish grey clayey/silty fine to coarse sandy fine to coarse GRAVEL

Date Tested 23-09-21

Sample Type D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	90		
20	87		
14	80		
10	73		
6.3	62		
5	58		
3.35	53		
2	49		
1.18	44		
0.6	40		
0.425	37		
0.3	36		
0.212	34		
0.15	31		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	51
Sand	20
Silt and Clay	29

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	29-09-21	Richard John	
David	Approved	30-09-21	Paul Evans	





Certificate of Analysis

Certificate Number 21-19230

Issued: 16-Sep-21

Client GEO Site and Testing Services Ltd
Unit 4
Heol Aur
Dafen Ind Est
Dafen
Carmarthenshire
SA14 8QN

Our Reference 21-19230

Client Reference 19453-GELO

Order No (not supplied)

Contract Title Dunsbury Park

Description 5 Soil samples.

Date Received 09-Sep-21

Date Started 09-Sep-21

Date Completed 16-Sep-21

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

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

Approved By

Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 21-19230
 Client Ref 19453-GELO
 Contract Title Dunsbury Park

Lab No	1902352	1902353	1902354	1902355	1902356
Sample ID	BH5.01	BH5.02	BH5.04	BH5.03	BH5.03
Depth	4.00	6.00	3.00	1.50	10.50
Other ID					
Sample Type	D	D	D	D	D
Sampling Date	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Inorganics								
pH	DETSC 2008#		pH	8.1	7.7	7.9	7.8	7.9
Sulphate Aqueous Extract as SO ₄	DETSC 2076#	10	mg/l	640	730	380	430	380
Sulphur as S, Total	DETSC 2320	0.01	%	0.45	0.46	0.58	0.36	0.49
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.18	0.18	0.16	0.17	0.14

Information in Support of the Analytical Results

Our Ref 21-19230
Client Ref 19453-GELO
Contract Dunsbury Park

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1902352	BH5.01 4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1902353	BH5.02 6.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1902354	BH5.04 3.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1902355	BH5.03 1.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1902356	BH5.03 10.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

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

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

Disposal

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

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

End of Report

Project Location Dunsbury Park

Sample No

Date Tested 24/09/2021

Depth Top 4.50

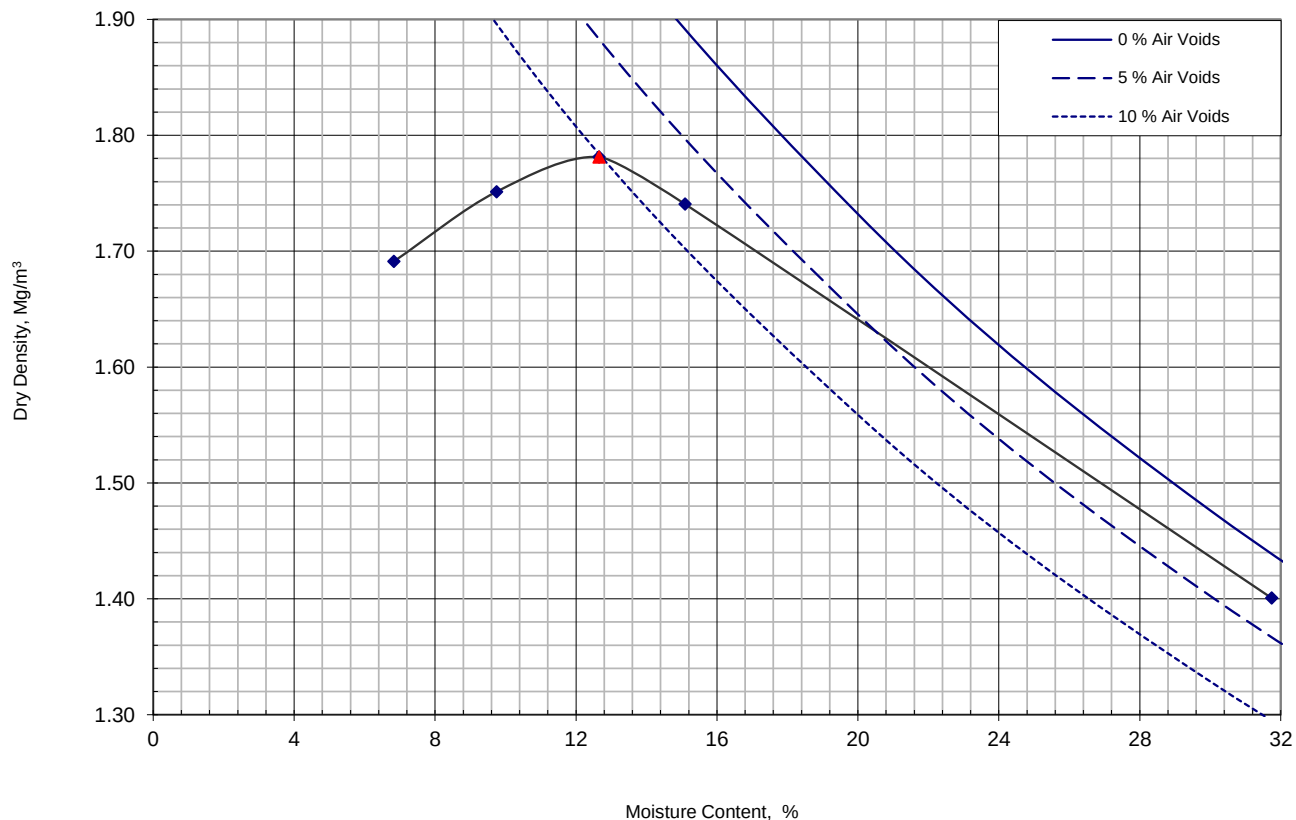
Compaction Method 4.5 Kg Rammer

Depth Base 5.00

Compaction Clause BS1377:Part 4:1990, Clause 3.5

Sample Type B

Sample Description Grey fine to medium gravelly silty sandy CLAY



Compaction Point	1	2	3	4	5							
Moisture Content	6.8	9.7	13	15	32							
Bulk Density	1.81	1.92	2.01	2.00	1.85							
Dry Density	1.69	1.75	1.78	1.74	1.40							

Initial Moisture Content	32	%
Maximum Dry Density	1.78	Mg/m ³
Optimum Moisture Content	13.0	%
Particle Density	2.65 Assumed	Mg/m ³
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operator Checked 27/09/2021 Richard John

Conal Approved 28/09/2021 Paul Evans

Project Location Dunsbury Park

Sample No

Date Tested 24/09/2021

Depth Top

5.50

Compaction Method 4.5 Kg Rammer

Depth Base

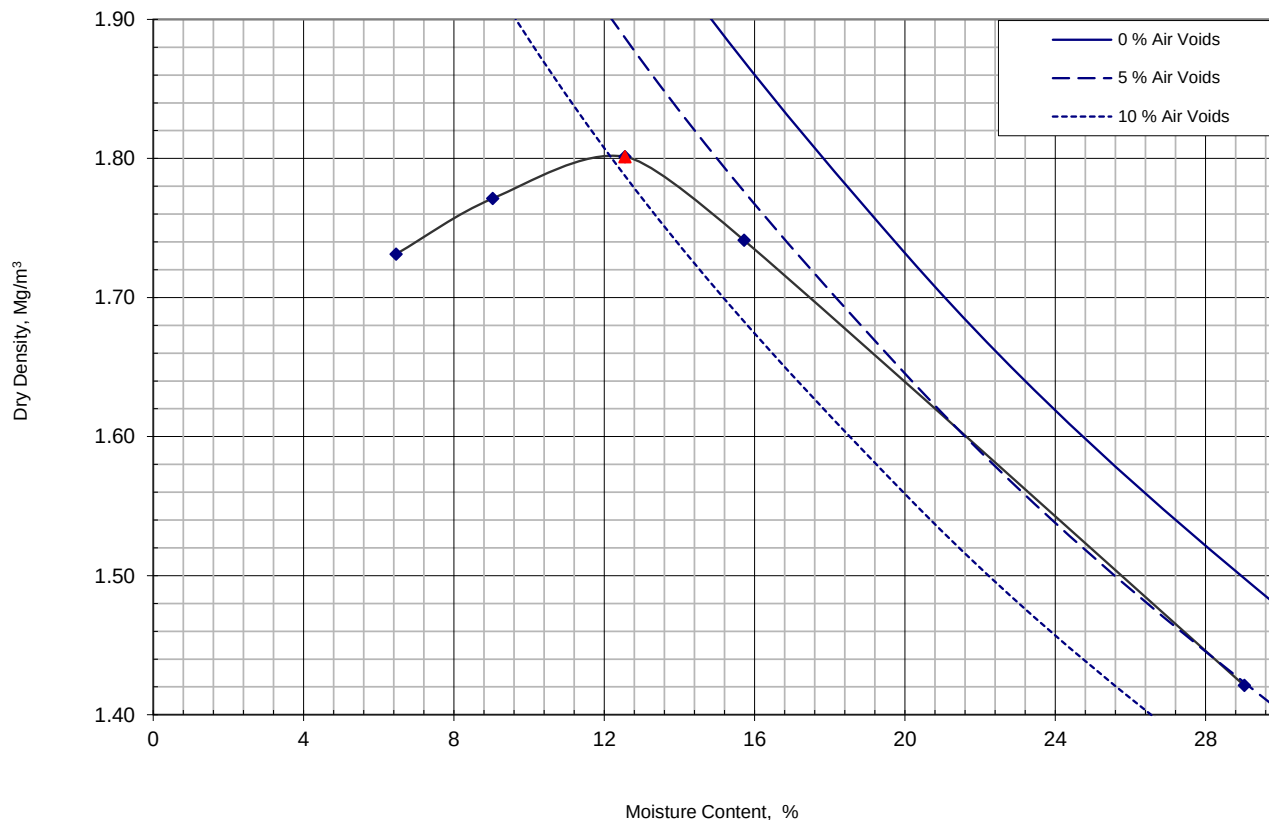
6.00

Compaction Clause BS1377:Part 4:1990, Clause 3.5

Sample Type

B

Sample Description Grey fine to medium gravelly silty sandy CLAY



Compaction Point	1	2	3	4	5							
Moisture Content	6.5	9.0	13	16	29							
Bulk Density	1.84	1.93	2.03	2.01	1.83							
Dry Density	1.73	1.77	1.80	1.74	1.42							

Initial Moisture Content	29	%
Maximum Dry Density	1.80	Mg/m ³
Optimum Moisture Content	13.0	%
Particle Density	2.65 Assumed	Mg/m ³
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operator	Checked	27/09/2021	Richard John	
Conal	Approved	28/09/2021	Paul Evans	

Project Location Dunsbury Park

Sample No

Date Tested 24/09/2021

Depth Top 0.50

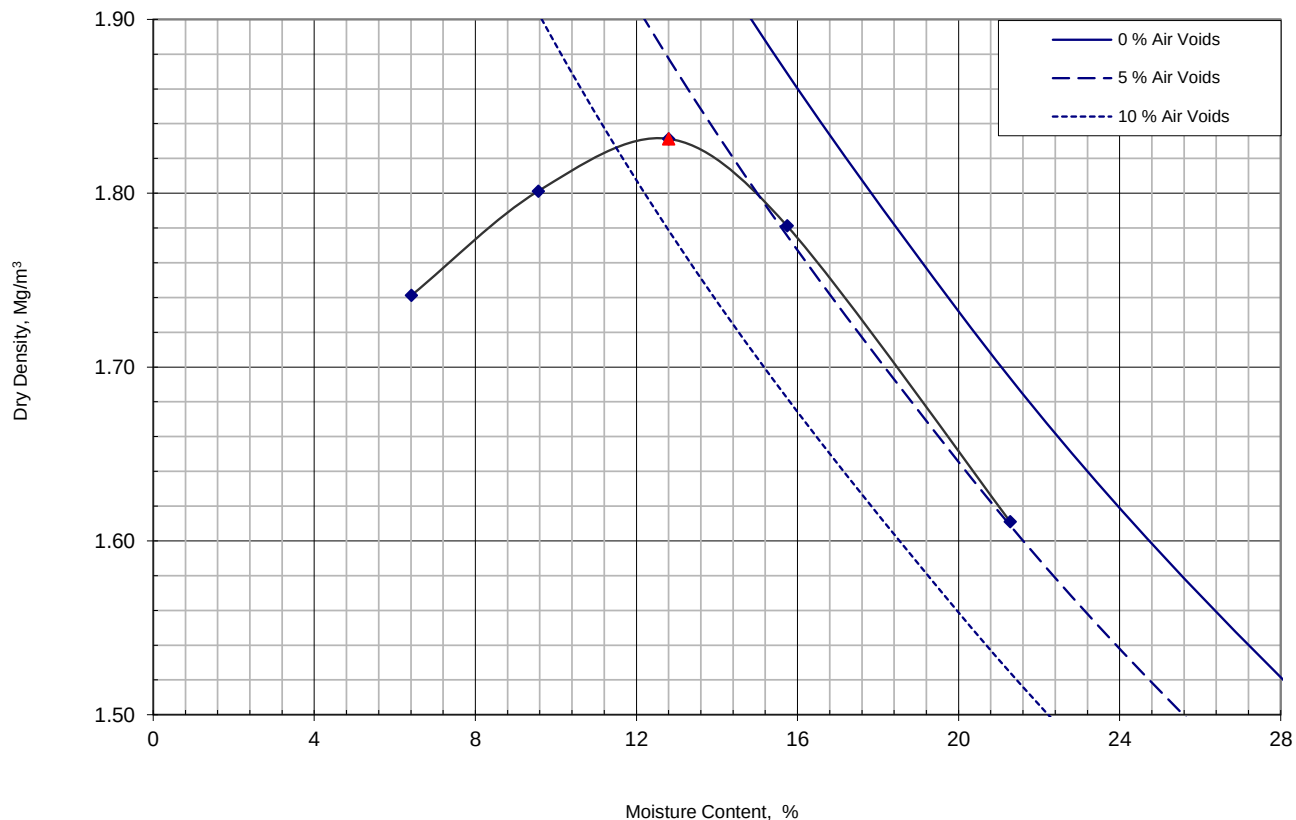
Compaction Method 4.5 Kg Rammer

Depth Base 1.00

Compaction Clause BS1377:Part 4:1990, Clause 3.5

Sample Type B

Sample Description Orange brown fine to medium gravelly silty sandy CLAY



Compaction Point	1	2	3	4	5						
Moisture Content	6.4	9.6	13	16	21						
Bulk Density	1.85	1.97	2.07	2.06	1.95						
Dry Density	1.74	1.80	1.83	1.78	1.61						

Initial Moisture Content	21	%
Maximum Dry Density	1.83	Mg/m3
Optimum Moisture Content	13.0	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operator	Checked	27/09/2021	Richard John	
Conal	Approved	28/09/2021	Paul Evans	

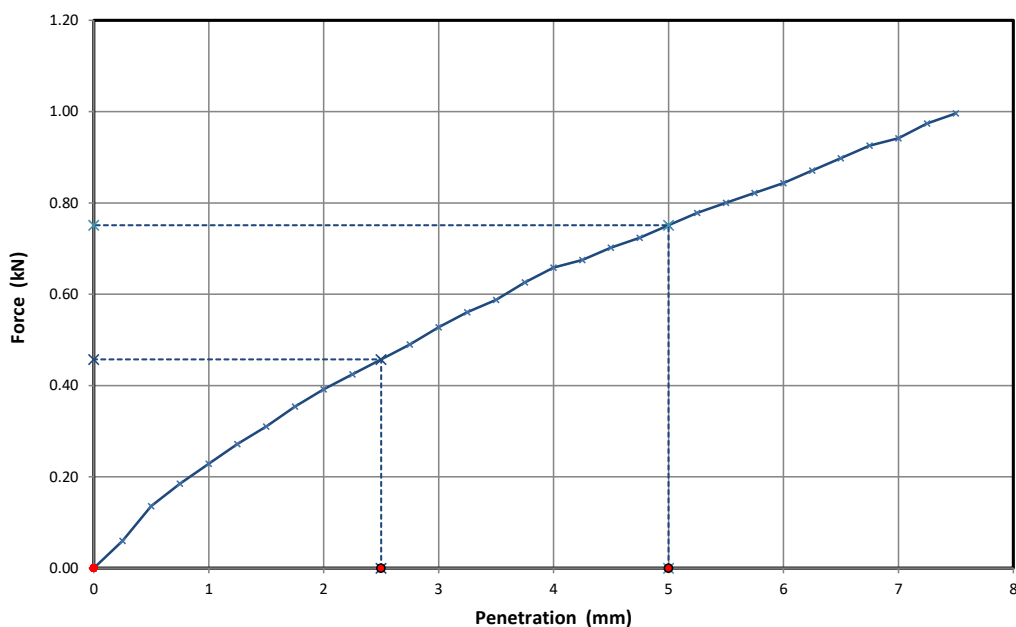


**California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7**

Contract Number 55665

Borehole/Pit No. BH5.01

Site Name	Dunsbury Park	Sample No.	
Soil Description	Orange brown fine to medium gravelly silty sandy CLAY	Depth Top	0.50
Compaction Method	2.5 Kg Rammer	Depth Base	1.00
Retained 20mm (%)	0	Sample Type	B
Date Tested	23/09/2021		



Initial Sample Conditions	
Moisture Content (%)	20
Moisture Top (%)	20
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.03
Dry Density (Mg/m3)	1.70

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	3.5	2.5mm Bottom	
5mm Top	3.8	5mm Bottom	
CBR Value %	3.8	CBR Value %	

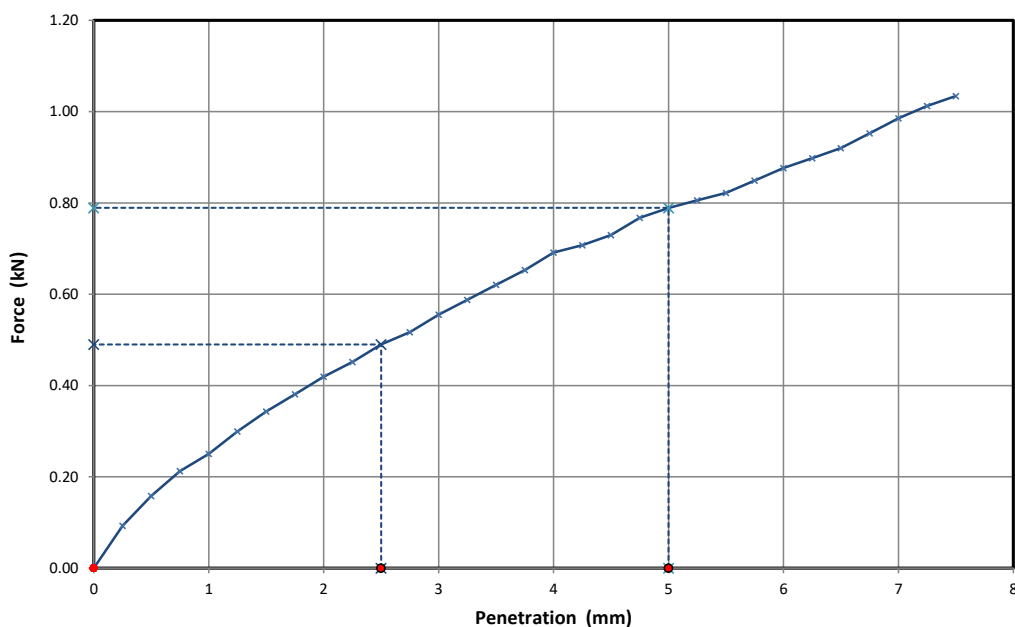
Operators	Checked	27/09/2021	Richard John	
Conal	Approved	28/09/2021	Paul Evans	





**California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7**

Contract Number	55665	Site Name	Dunsbury Park	Sample No.	
Borehole/Pit No.	BH5.02	Soil Description	Light brown fine to medium gravelly silty clayey SAND	Depth Top	0.50
Depth Base	1.00	Compaction Method	2.5 Kg Rammer	Retained 20mm (%)	0
Sample Type	B	Date Tested	23/09/2021		



Initial Sample Conditions	
Moisture Content (%)	23
Moisture Top (%)	23
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.05
Dry Density (Mg/m3)	1.67

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	3.7	2.5mm Bottom	
5mm Top	3.9	5mm Bottom	
CBR Value %	3.9	CBR Value %	

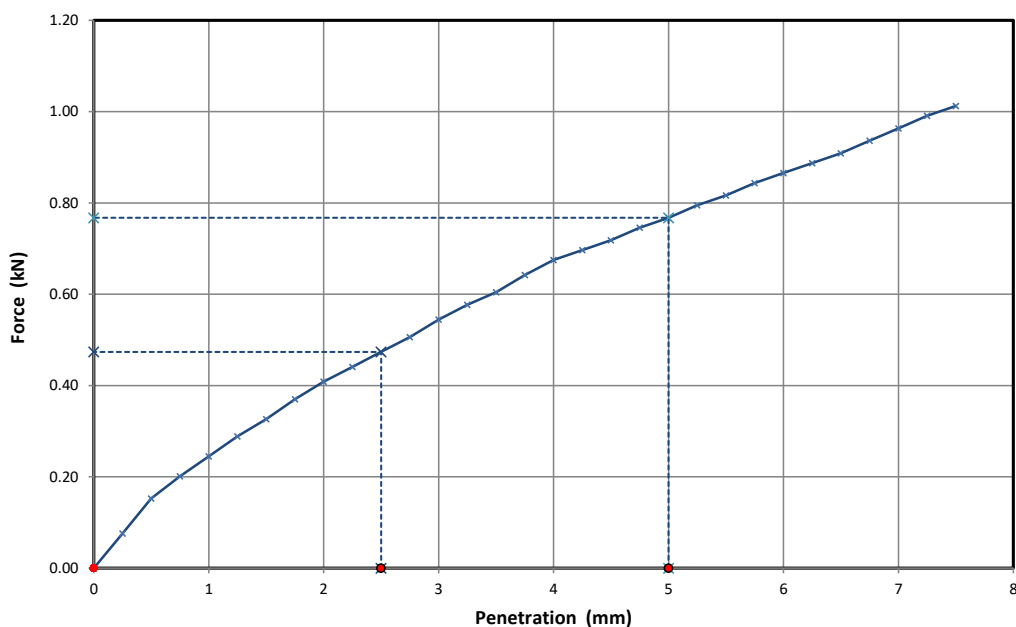
Operators	Checked	27/09/2021	Richard John	
Conal	Approved	28/09/2021	Paul Evans	





**California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7**

Contract Number	55665	Site Name	Dunsbury Park	Sample No.	
Borehole/Pit No.	BH5.04	Soil Description	Brown sandy silty CLAY	Depth Top	0.50
Depth Base	1.00	Compaction Method	2.5 Kg Rammer	Sample Type	B
Retained 20mm (%)	0	Date Tested	23/09/2021		



Initial Sample Conditions	
Moisture Content (%)	21
Moisture Top (%)	21
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.03
Dry Density (Mg/m3)	1.68

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	3.6	2.5mm Bottom	
5mm Top	3.8	5mm Bottom	
CBR Value %	3.8	CBR Value %	

Operators	Checked	27/09/2021	Richard John	
Conal	Approved	28/09/2021	Paul Evans	





Dry Density / Moisture Content Relationship **BS 1377:Part 4:1990**

Contract Number

55665

BH / TP No

BH5.03

Site Name

Dunsbury Park

Sample No

Sample Description

Brownish grey fine to medium gravelly silty sandy CLAY

Depth Top

0.5

Compaction Method

Vibrating Rammer

Depth Bottom

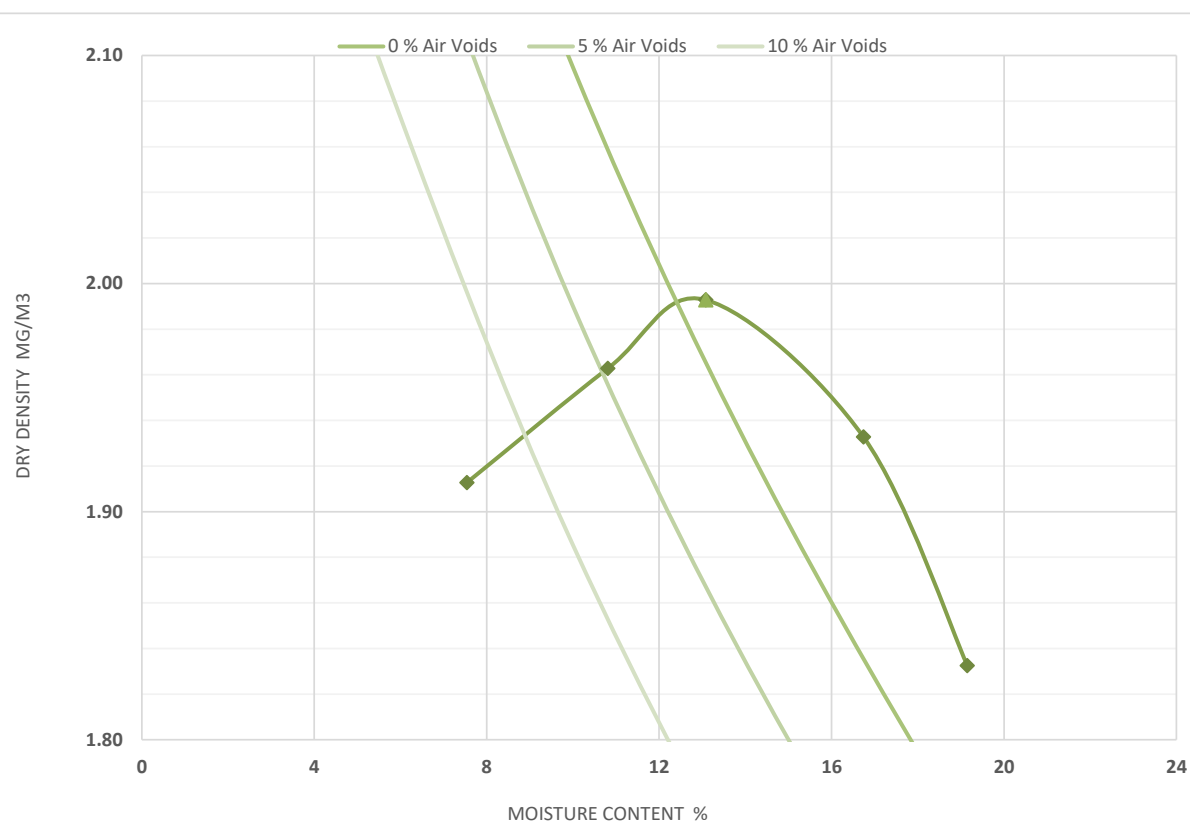
1

Date Tested

23/09/2021

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	7.5	11	13	17	19							
Bulk Density	2.06	2.17	2.25	2.26	2.18							
Dry Density	1.91	1.96	1.99	1.93	1.83							

Initial Moisture Content	19
Maximum Dry Density	1.99
Optimum Moisture Content	13
Particle Density	2.65
Material Retained 37.5mm	0
Material Retained 20mm	0

Operators	Checked	28/09/2021	Richard John	
Conor	Approved	29/09/2021	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number

55665

Borehole/Pit No.

BH501

Site Name

Dunsbury Park

Sample No.

Soil Description

Brown sandy silty CLAY

Depth Top (m)

4.50

Depth Base (m)

4.95

Date Tested

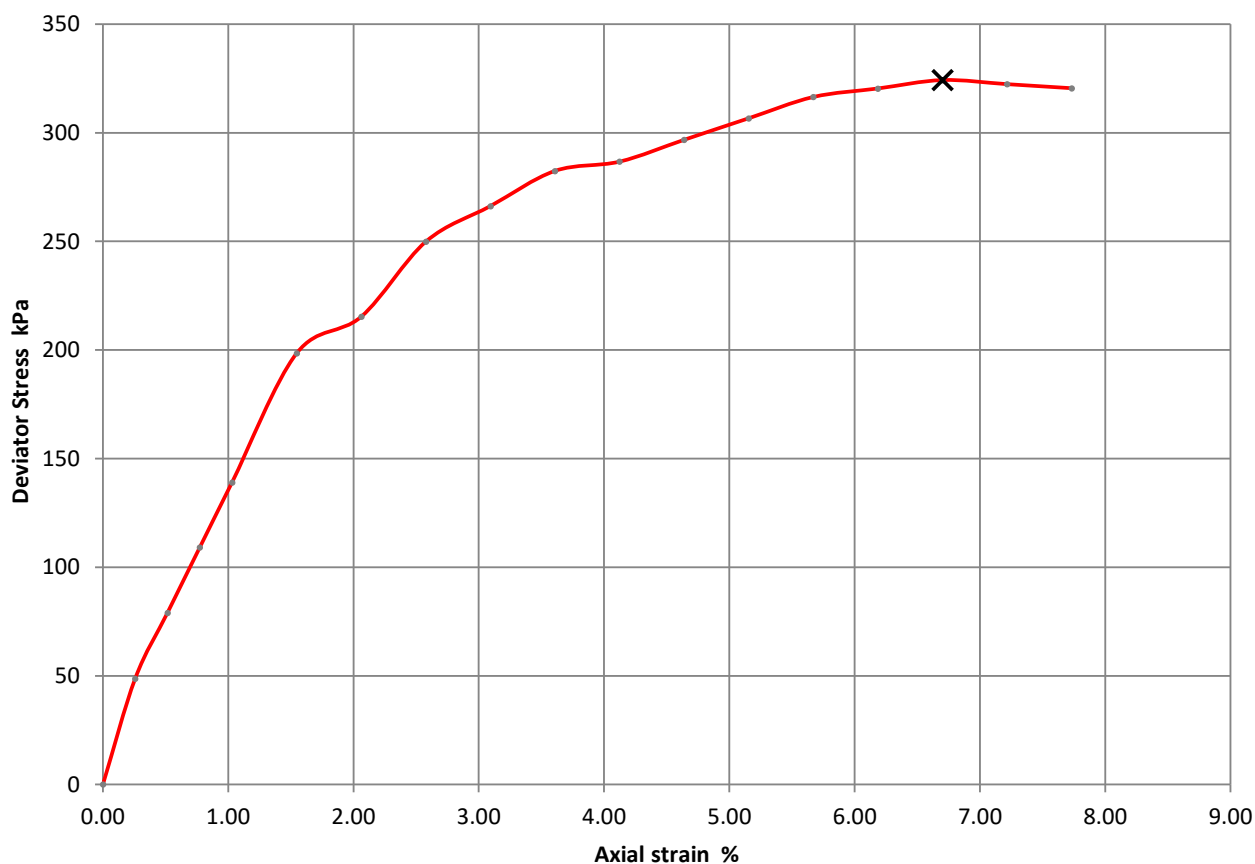
28-09-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	18
Bulk Density (Mg/m ³)	2.01
Dry Density (Mg/m ³)	1.71
Specimen Length (mm)	194
Specimen Diameter (mm)	105
Cell Pressure (kPa)	90
Deviator Stress (kPa)	324
Undrained Shear Strength (kPa)	162
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.55

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number

55665

Borehole/Pit No.

BH501

Site Name

Dunsbury Park

Sample No.

Soil Description

Brown sandy silty CLAY

Depth Top (m)

7.00

Depth Base (m)

7.45

Date Tested

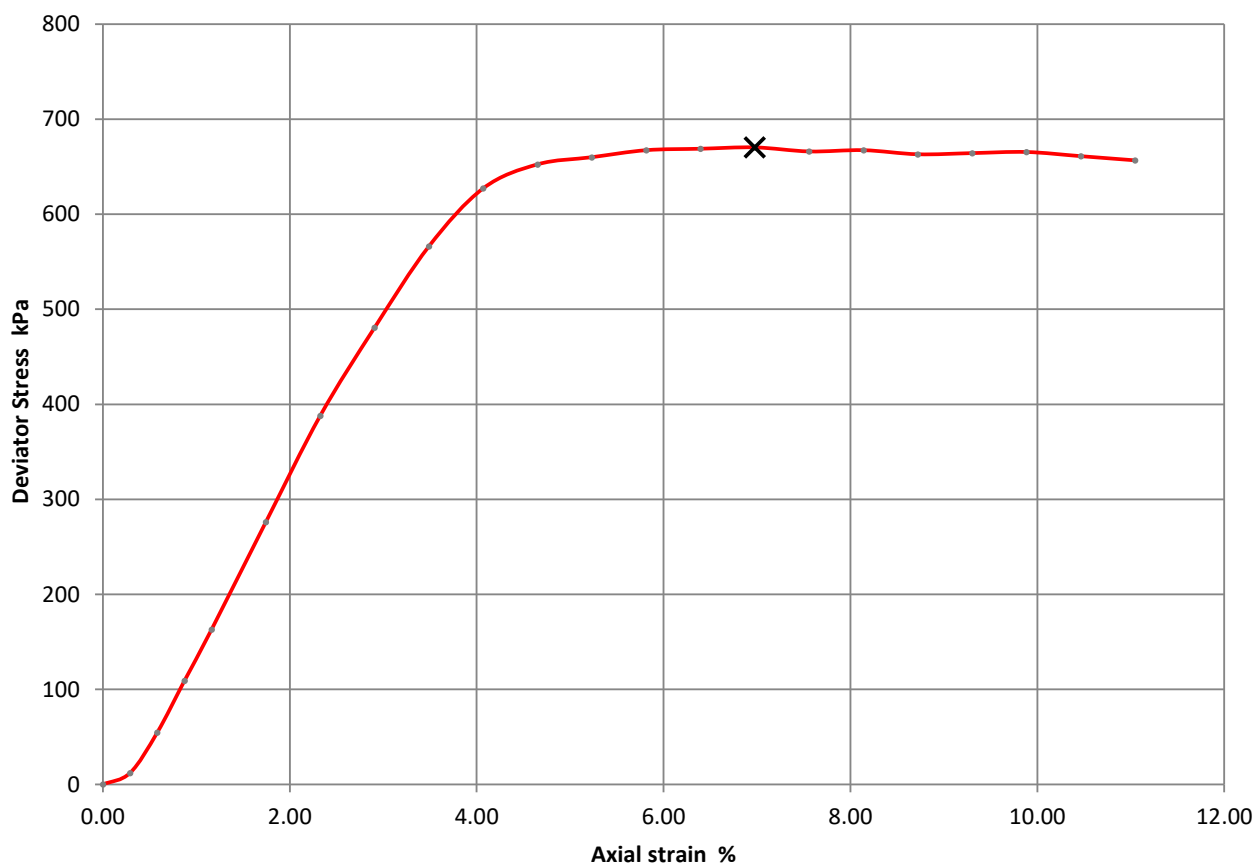
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	16
Bulk Density (Mg/m ³)	1.99
Dry Density (Mg/m ³)	1.72
Specimen Length (mm)	172
Specimen Diameter (mm)	105
Cell Pressure (kPa)	140
Deviator Stress (kPa)	670
Undrained Shear Strength (kPa)	335
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.74

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number 55665

Borehole/Pit No. BH501

Site Name Dunsbury Park

Sample No.

Soil Description Brown silty CLAY

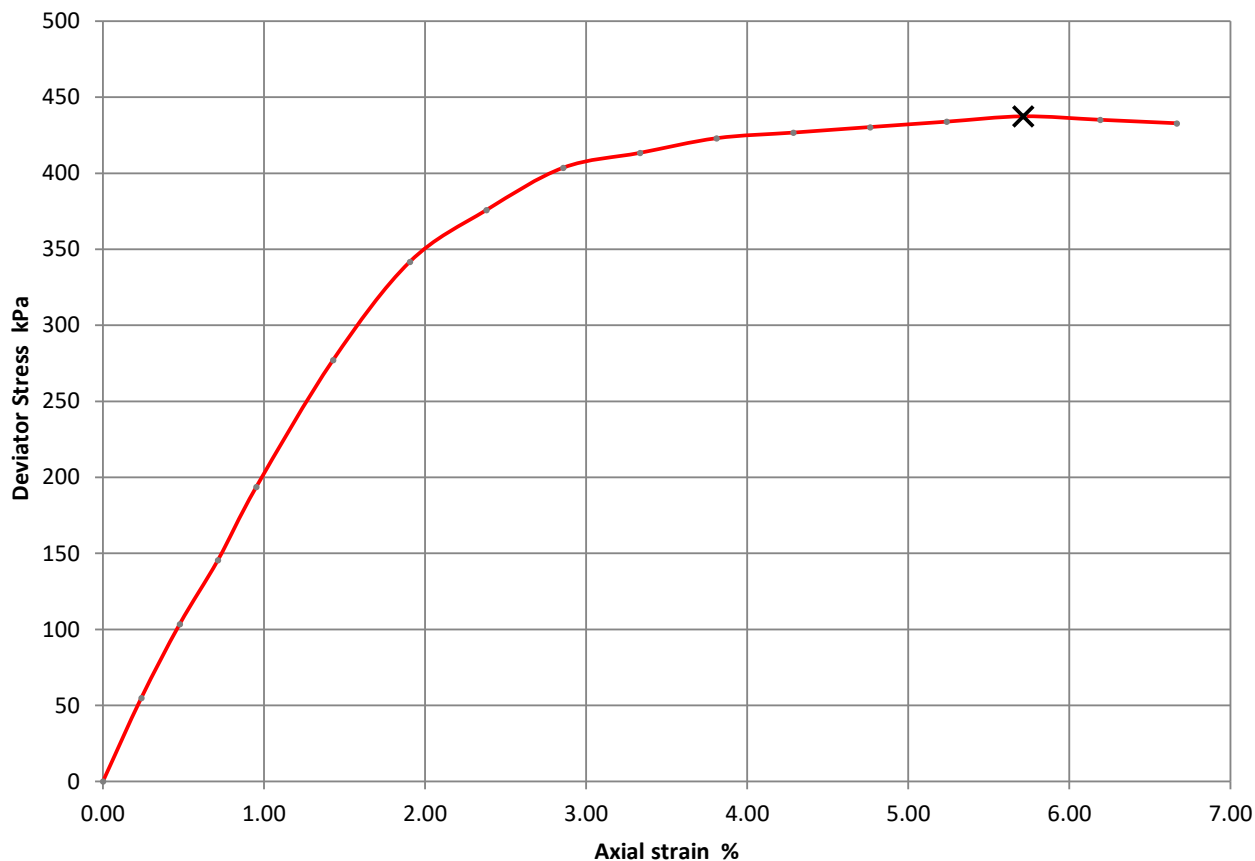
Depth Top (m) 13.00

Depth Base (m) 13.45

Date Tested 28-09-21

Sample Type U

Technician Daniel B



Moisture Content (%)	23
Bulk Density (Mg/m ³)	1.94
Dry Density (Mg/m ³)	1.58
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	260
Deviator Stress (kPa)	437
Undrained Shear Strength (kPa)	219
Failure Strain (%)	6
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number 55665

Borehole/Pit No. BH501

Site Name Dunsbury Park

Sample No.

Soil Description Brown silty CLAY

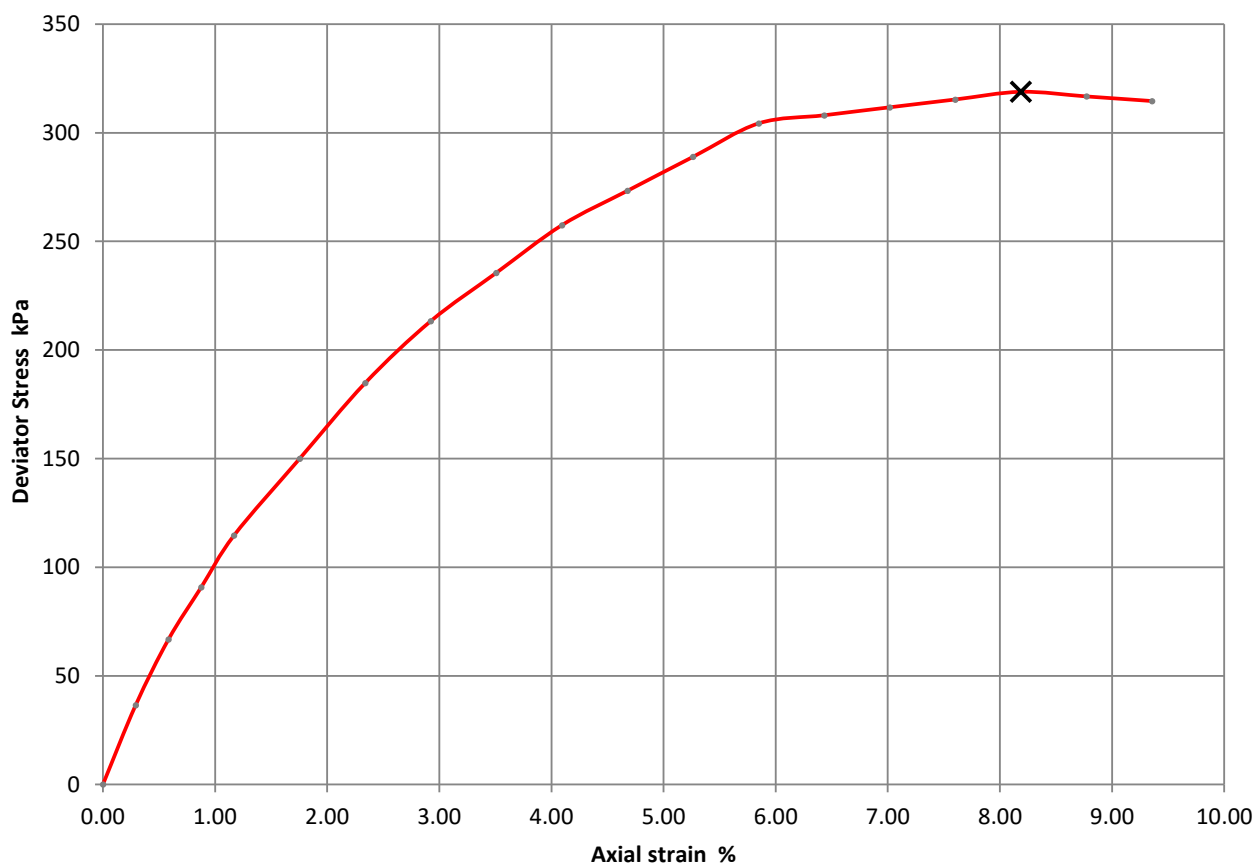
Depth Top (m) 16.00

Depth Base (m) 16.45

Date Tested 29-09-21

Sample Type U

Technician Daniel B



Moisture Content (%)	27
Bulk Density (Mg/m ³)	2.03
Dry Density (Mg/m ³)	1.60
Specimen Length (mm)	171
Specimen Diameter (mm)	105
Cell Pressure (kPa)	320
Deviator Stress (kPa)	319
Undrained Shear Strength (kPa)	159
Failure Strain (%)	8
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.75

Checked 27-09-21

Richard John

Approved 28-09-21

Paul Evans





Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number

55665

Borehole/Pit No.

BH502

Site Name

Dunsbury Park

Sample No.

Soil Description

Grey silty sandy CLAY

Depth Top (m)

3.50

Depth Base (m)

3.95

Date Tested

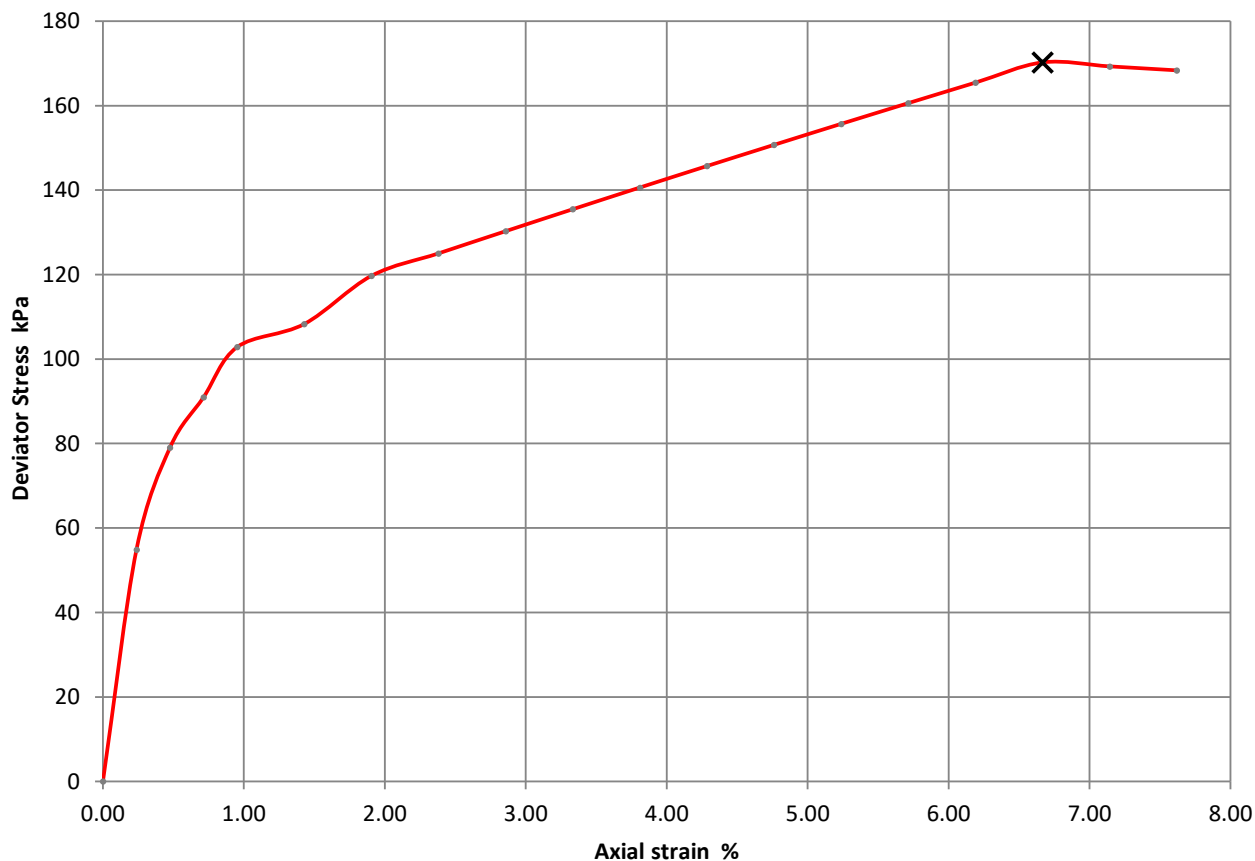
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	20
Bulk Density (Mg/m ³)	1.93
Dry Density (Mg/m ³)	1.61
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	70
Deviator Stress (kPa)	170
Undrained Shear Strength (kPa)	85
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number

55665

Borehole/Pit No.

BH502

Site Name

Dunsbury Park

Sample No.

Soil Description

Grey silty sandy CLAY

Depth Top (m)

11.50

Depth Base (m)

11.95

Date Tested

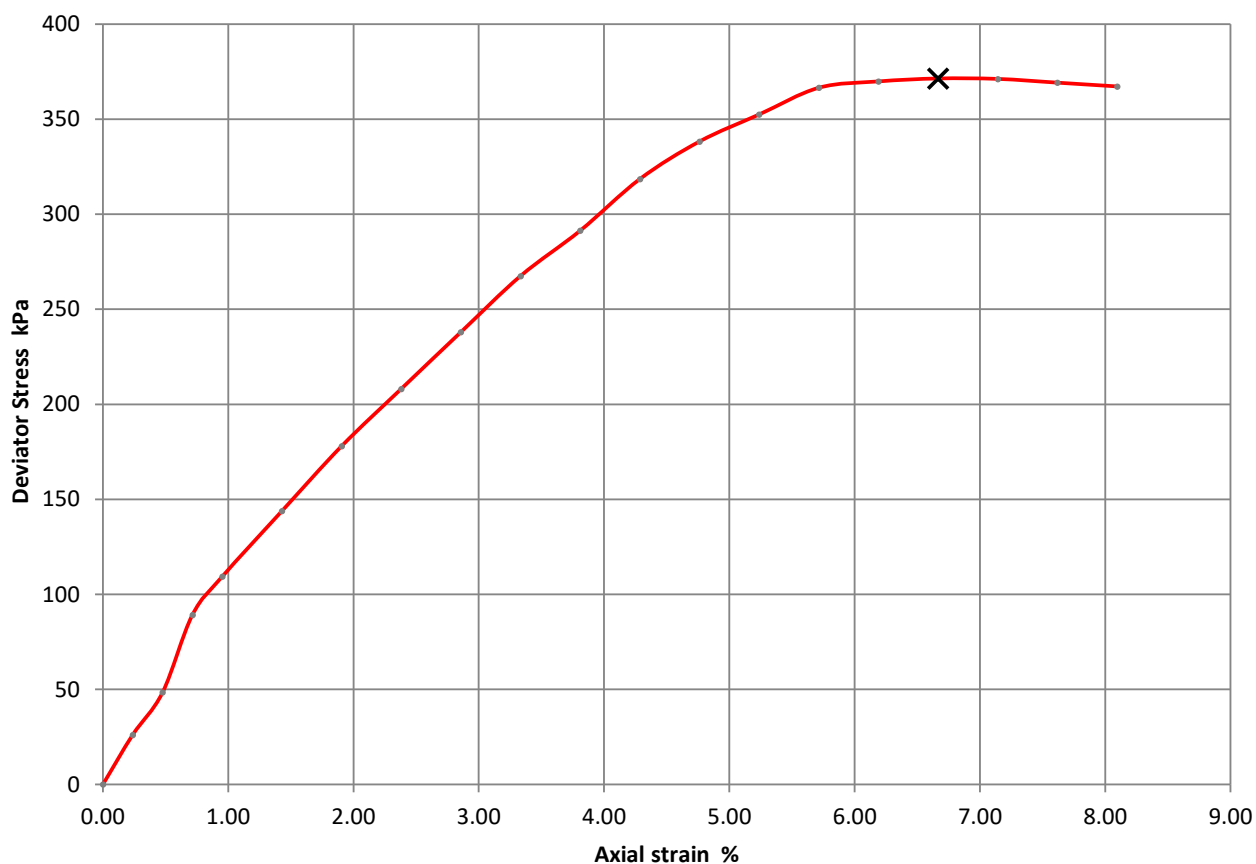
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	19
Bulk Density (Mg/m ³)	1.98
Dry Density (Mg/m ³)	1.66
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	230
Deviator Stress (kPa)	371
Undrained Shear Strength (kPa)	186
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number

55665

Borehole/Pit No.

BH502

Site Name

Dunsbury Park

Sample No.

Soil Description

Brown silty CLAY

Depth Top (m)

14.50

Depth Base (m)

14.95

Date Tested

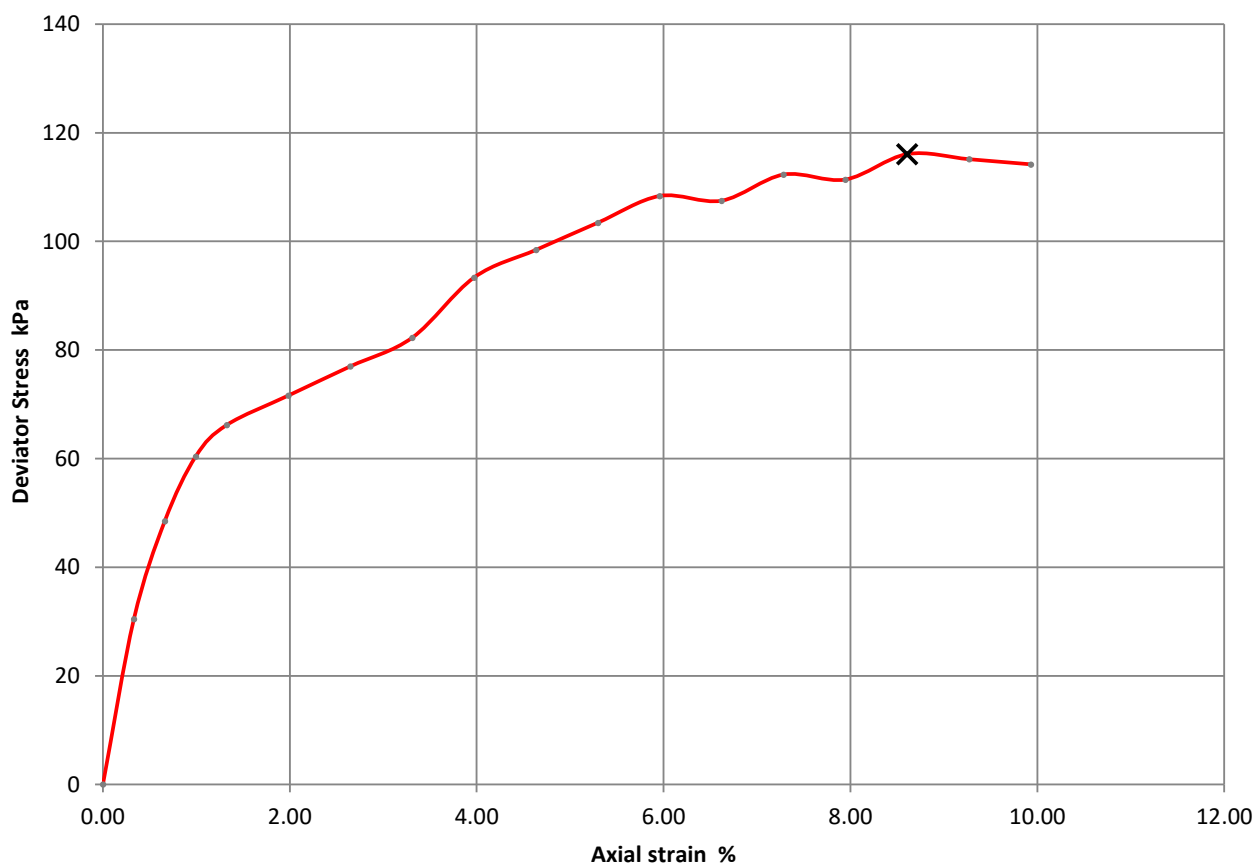
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	23
Bulk Density (Mg/m ³)	1.88
Dry Density (Mg/m ³)	1.53
Specimen Length (mm)	151.02
Specimen Diameter (mm)	105
Cell Pressure (kPa)	230
Deviator Stress (kPa)	116
Undrained Shear Strength (kPa)	58
Failure Strain (%)	9
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.99

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number 55665

Borehole/Pit No. BH503

Site Name Dunsbury Park

Sample No.

Soil Description Grey silty CLAY

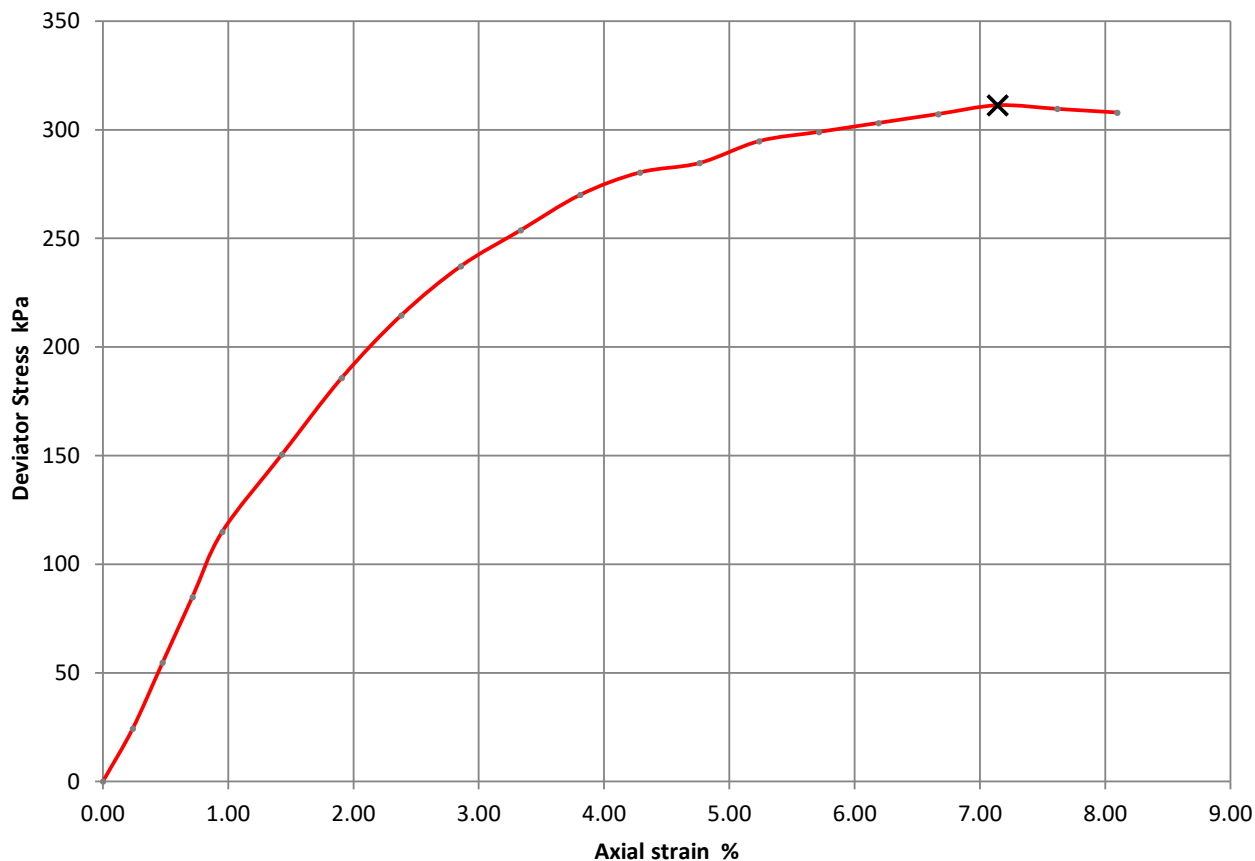
Depth Top (m) 2.50

Depth Base (m) 2.95

Date Tested 28-04-21

Sample Type U

Technician Daniel B



Moisture Content (%)	18
Bulk Density (Mg/m ³)	1.99
Dry Density (Mg/m ³)	1.69
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	50
Deviator Stress (kPa)	311
Undrained Shear Strength (kPa)	156
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number

55665

Borehole/Pit No.

BH503

Site Name

Dunsbury Park

Sample No.

Soil Description

Grey silty sandy CLAY

Depth Top (m)

10.00

Depth Base (m)

10.50

Date Tested

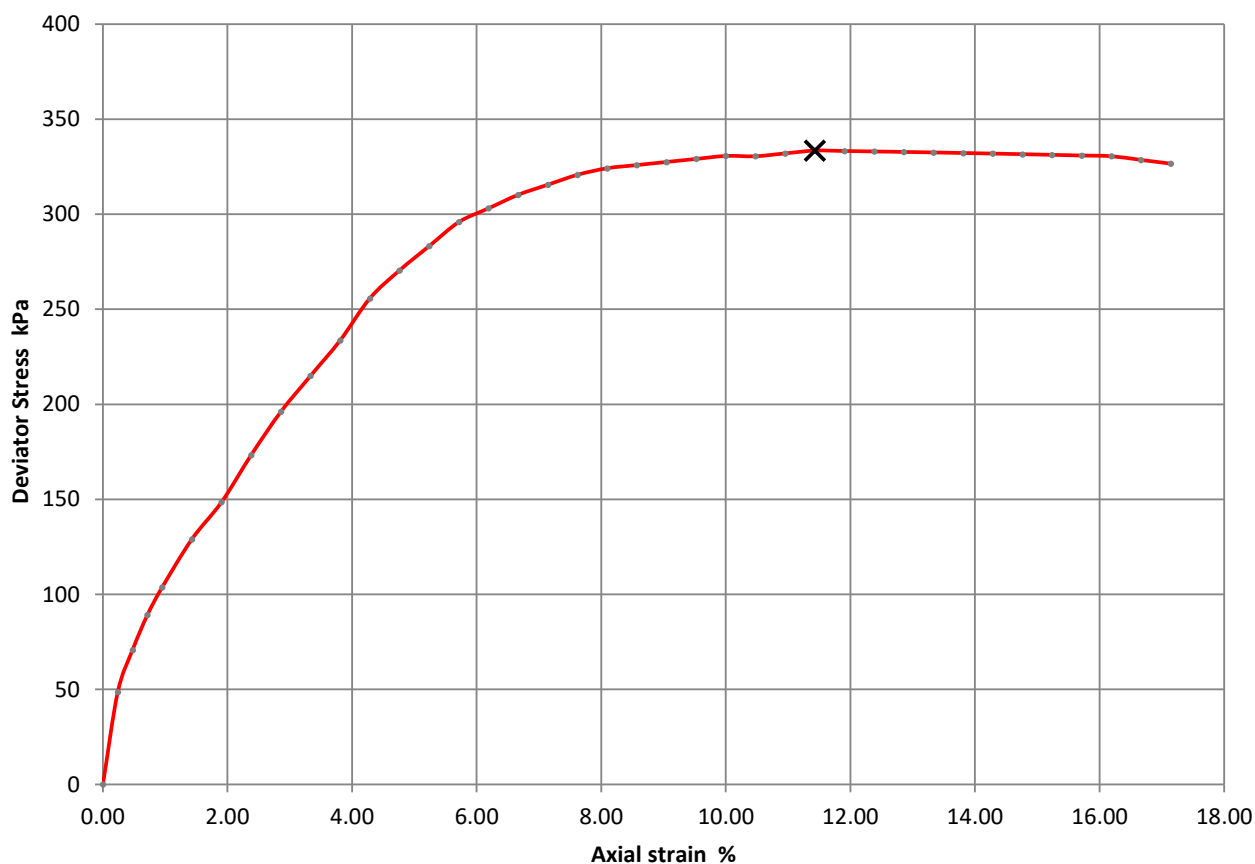
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	16
Bulk Density (Mg/m ³)	2.00
Dry Density (Mg/m ³)	1.73
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	200
Deviator Stress (kPa)	333
Undrained Shear Strength (kPa)	167
Failure Strain (%)	11
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number

55665

Borehole/Pit No.

BH504

Site Name

Dunsbury Park

Sample No.

Soil Description

Grey silty sandy CLAY

Depth Top (m)

2.50

Depth Base (m)

2.95

Date Tested

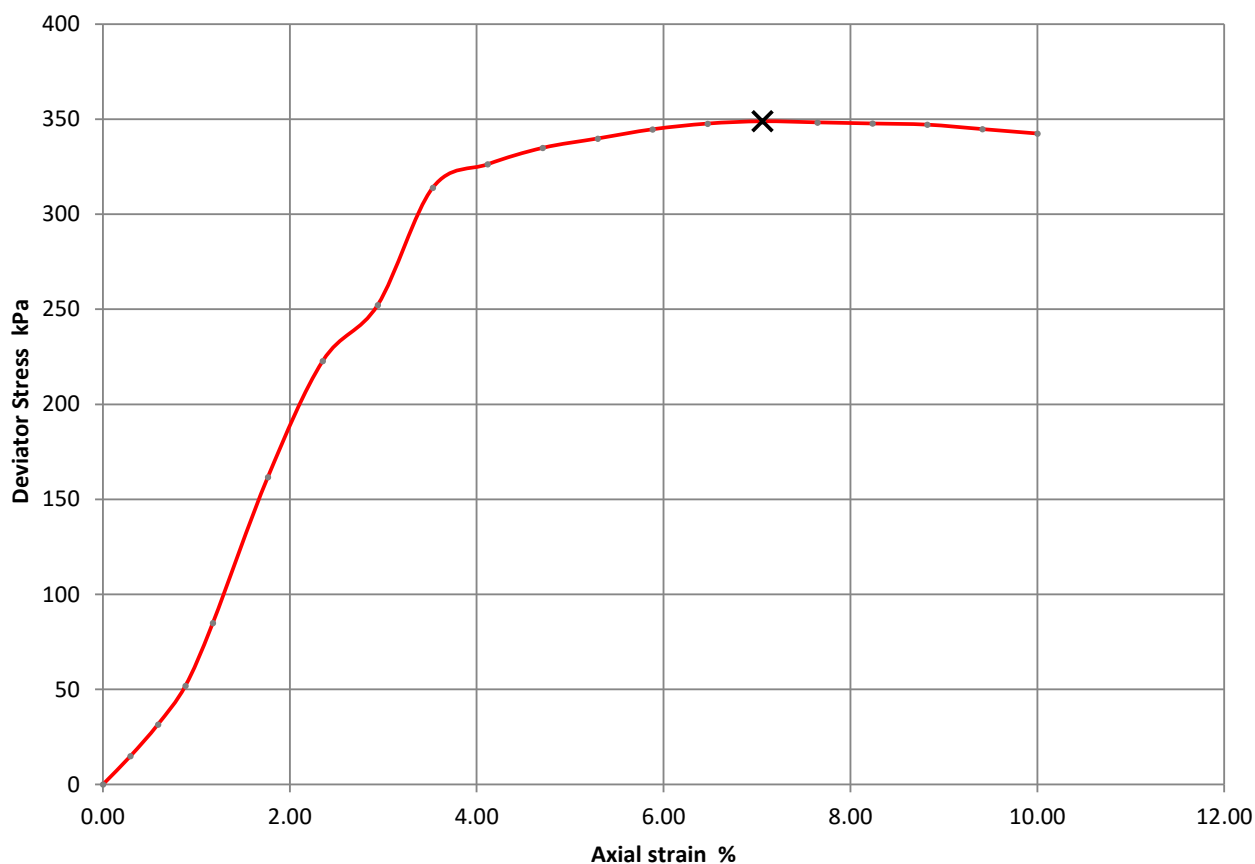
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	17
Bulk Density (Mg/m ³)	2.24
Dry Density (Mg/m ³)	1.92
Specimen Length (mm)	170
Specimen Diameter (mm)	105
Cell Pressure (kPa)	50
Deviator Stress (kPa)	349
Undrained Shear Strength (kPa)	174
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.76

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number 55665

Borehole/Pit No. BH504

Site Name Dunsbury Park

Sample No.

Soil Description Grey fine to coarse gravelly sandy silty CLAY

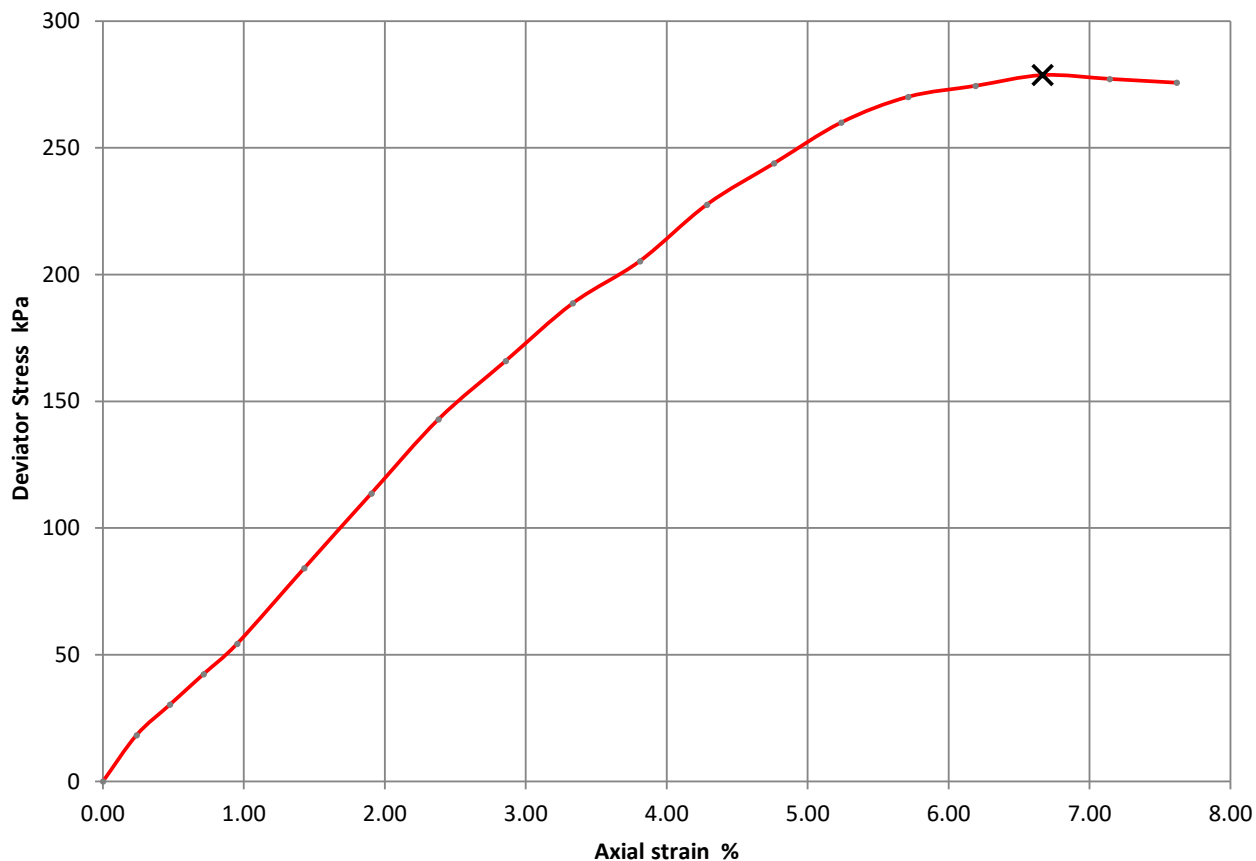
Depth Top (m) 4.50

Depth Base (m) 4.95

Date Tested 26-04-21

Sample Type U

Technician Daniel B



Moisture Content (%)	22
Bulk Density (Mg/m ³)	1.97
Dry Density (Mg/m ³)	1.61
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	90
Deviator Stress (kPa)	279
Undrained Shear Strength (kPa)	139
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number 55665

Borehole/Pit No. BH504

Site Name Dunsbury Park

Sample No.

Soil Description Brown sandy silty CLAY

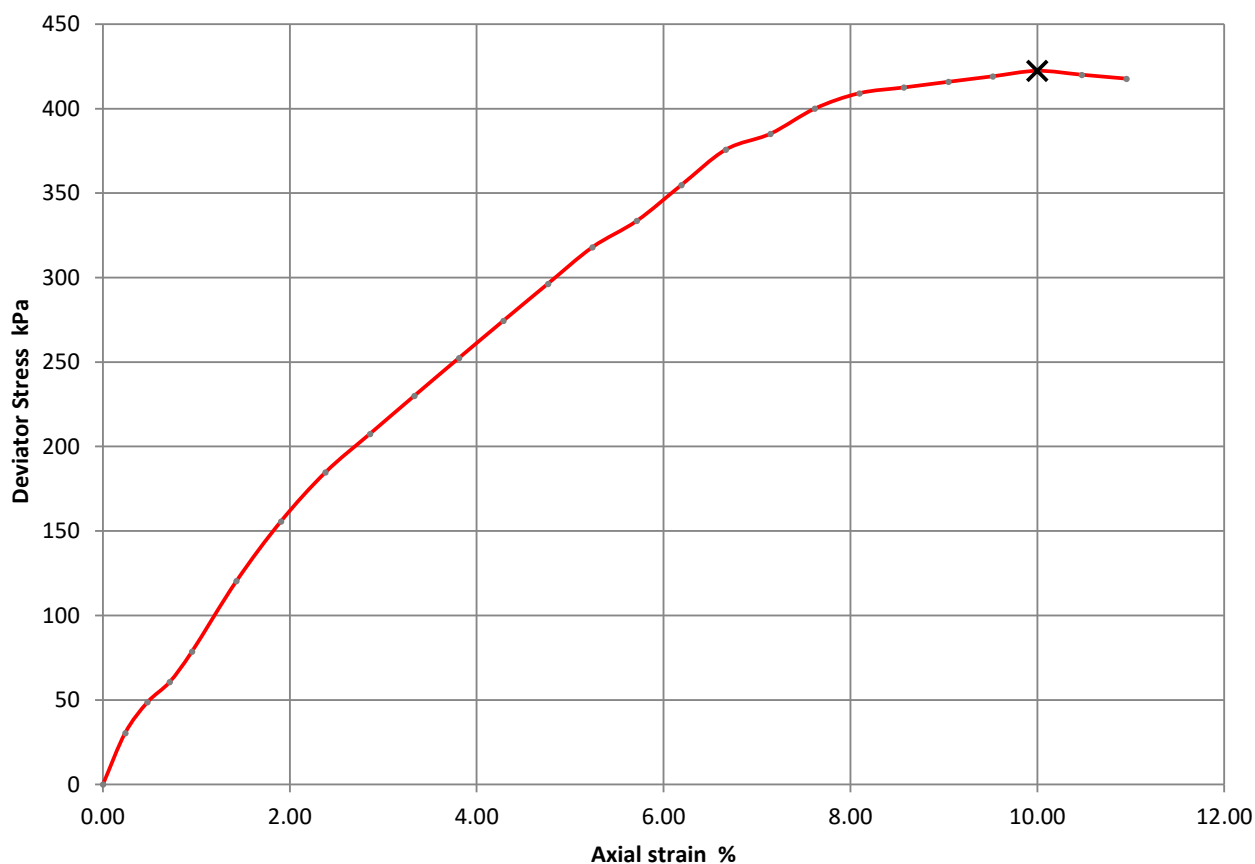
Depth Top (m) 7.00

Depth Base (m) 7.45

Date Tested 26-04-21

Sample Type U

Technician Daniel B



Moisture Content (%)	17
Bulk Density (Mg/m ³)	1.92
Dry Density (Mg/m ³)	1.64
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	140
Deviator Stress (kPa)	422
Undrained Shear Strength (kPa)	211
Failure Strain (%)	10
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





Single Stage Unconsolidated-Undrained Triaxial Test
BS 1377 : 1990 Part 7 : 8

Contract Number 55665

Borehole/Pit No. BH504

Site Name Dunsbury Park

Sample No.

Soil Description Grey fine to medium gravelly sandy silty CLAY

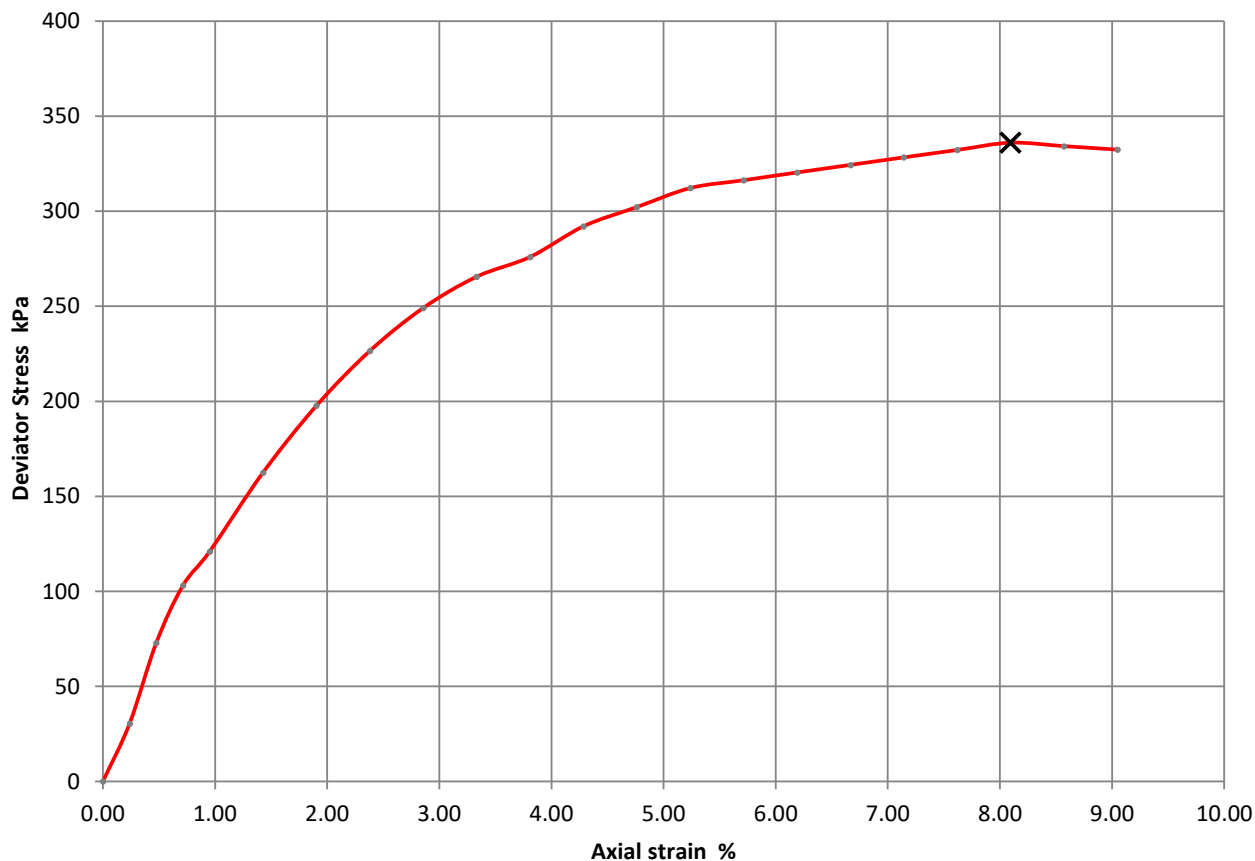
Depth Top (m) 13.00

Depth Base (m) 13.50

Date Tested 26-04-21

Sample Type U

Technician Daniel B



Moisture Content (%)	22
Bulk Density (Mg/m ³)	1.94
Dry Density (Mg/m ³)	1.58
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	260
Deviator Stress (kPa)	336
Undrained Shear Strength (kPa)	168
Failure Strain (%)	8
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number 55665

Borehole/Pit No. BH504

Site Name Dunsbury Park

Sample No.

Soil Description Brown silty CLAY

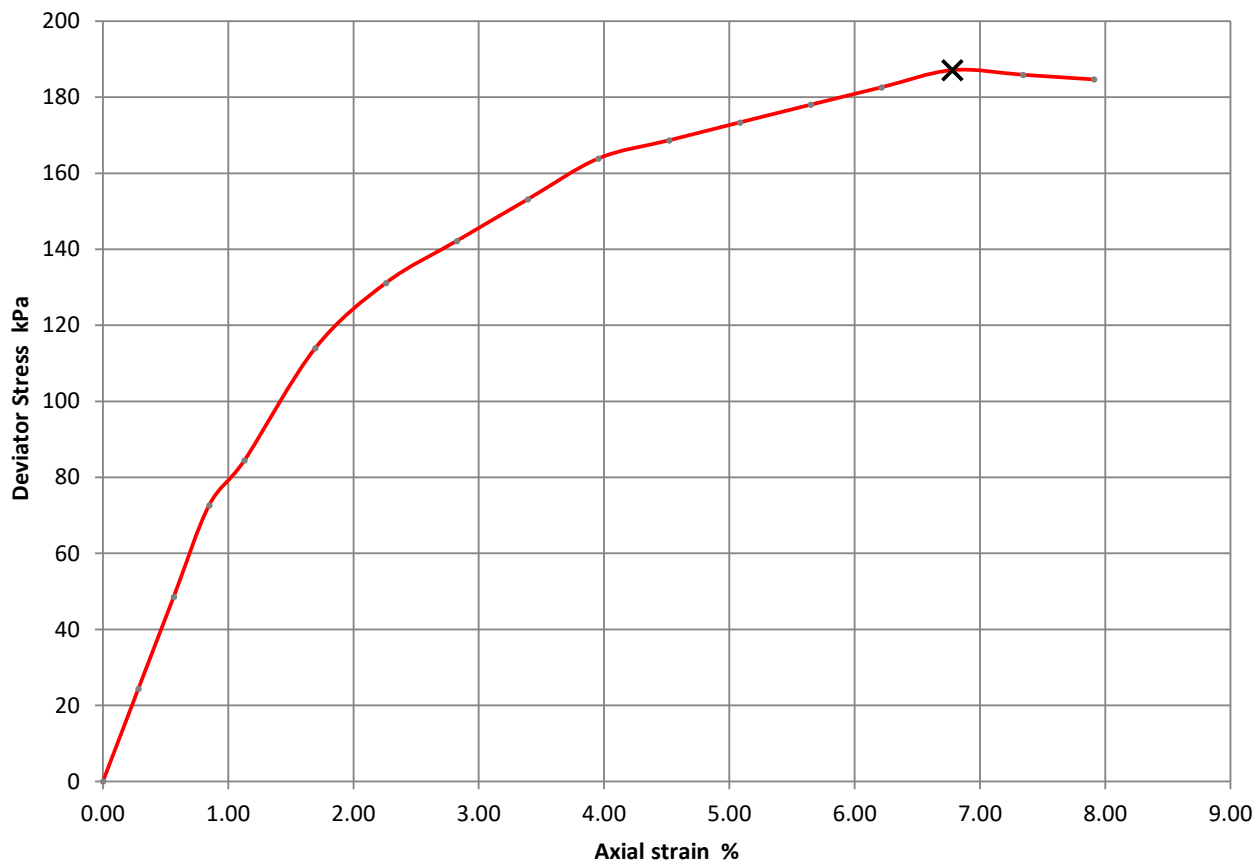
Depth Top (m) 19.50

Depth Base (m) 19.95

Date Tested 28-09-21

Sample Type U

Technician Daniel B



Moisture Content (%)	30
Bulk Density (Mg/m ³)	1.87
Dry Density (Mg/m ³)	1.44
Specimen Length (mm)	177
Specimen Diameter (mm)	105
Cell Pressure (kPa)	390
Deviator Stress (kPa)	187
Undrained Shear Strength (kPa)	94
Failure Strain (%)	7
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.69

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number

55665

Borehole/Pit No.

BH505

Site Name

Dunsbury Park

Sample No.

Soil Description

Brown silty CLAY

Depth Top (m)

5.50

Depth Base (m)

5.95

Date Tested

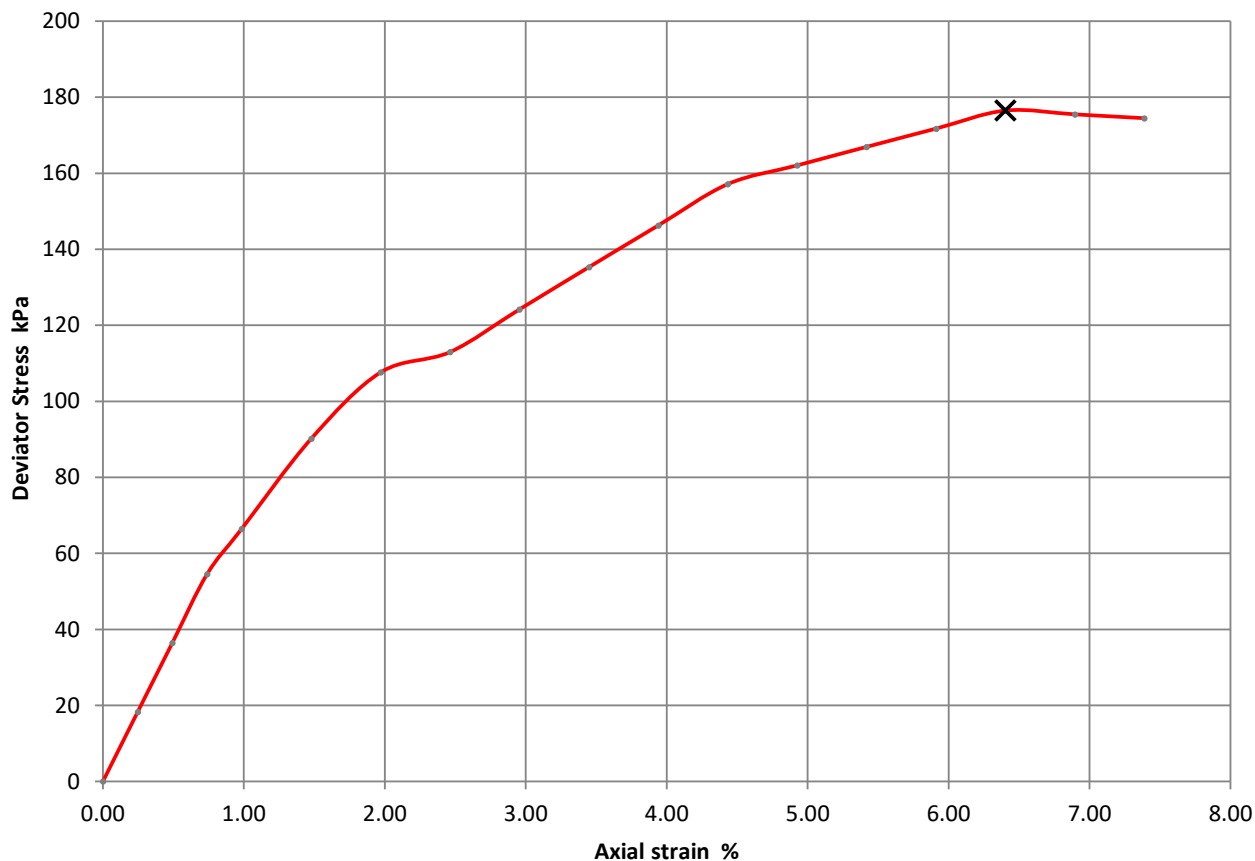
28-09-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	20
Bulk Density (Mg/m ³)	1.77
Dry Density (Mg/m ³)	1.48
Specimen Length (mm)	203
Specimen Diameter (mm)	105
Cell Pressure (kPa)	110
Deviator Stress (kPa)	176
Undrained Shear Strength (kPa)	88
Failure Strain (%)	6
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.48

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number

55665

Borehole/Pit No.

BH505

Site Name

Dunsbury Park

Sample No.

Soil Description

Grey silty CLAY

Depth Top (m)

14.50

Depth Base (m)

14.95

Date Tested

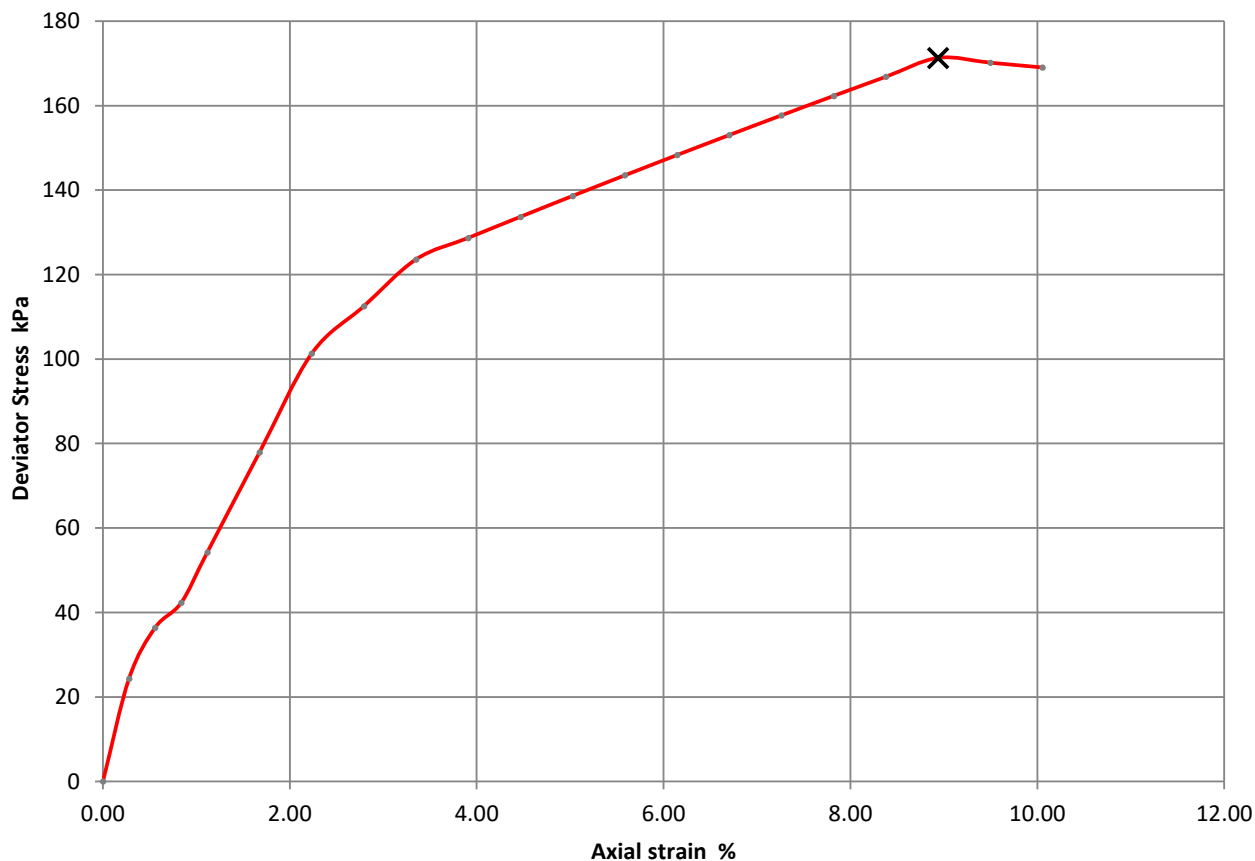
26-04-21

Sample Type

U

Technician

Daniel B



Moisture Content (%)	23
Bulk Density (Mg/m ³)	2.07
Dry Density (Mg/m ³)	1.68
Specimen Length (mm)	179
Specimen Diameter (mm)	105
Cell Pressure (kPa)	290
Deviator Stress (kPa)	171
Undrained Shear Strength (kPa)	86
Failure Strain (%)	9
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.68

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	





**Single Stage Unconsolidated-Undrained Triaxial
Test
BS 1377 : 1990 Part 7 : 8**

Contract Number 55665

Borehole/Pit No. BH505

Site Name Dunsbury Park

Sample No.

Soil Description Grey silty sandy CLAY

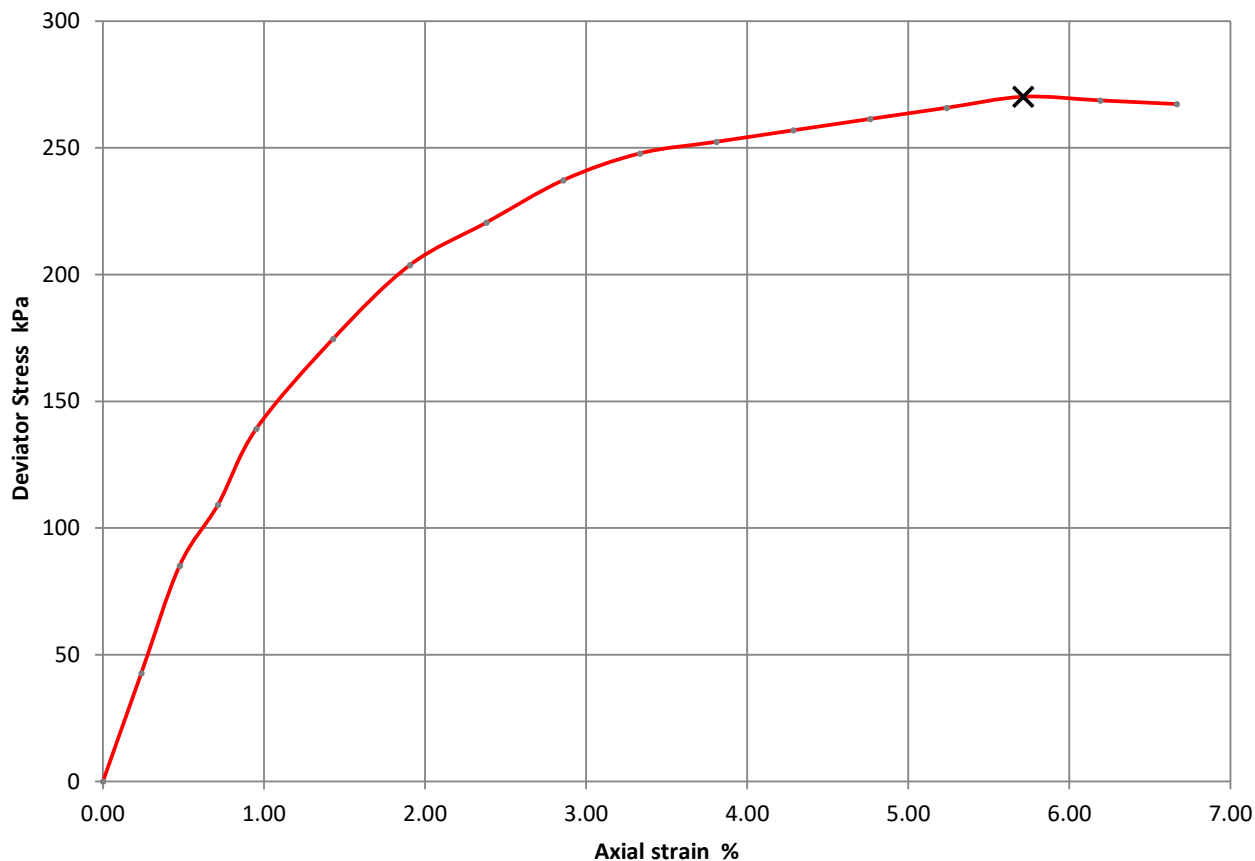
Depth Top (m) 20.50

Depth Base (m) 20.95

Date Tested 26-04-21

Sample Type U

Technician Daniel B



Moisture Content (%)	23
Bulk Density (Mg/m ³)	1.92
Dry Density (Mg/m ³)	1.55
Specimen Length (mm)	210
Specimen Diameter (mm)	105
Cell Pressure (kPa)	410
Deviator Stress (kPa)	270
Undrained Shear Strength (kPa)	135
Failure Strain (%)	6
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	27-09-21	Richard John	
Approved	28-09-21	Paul Evans	



Consolidated Drained Triaxial Compression Test

BS 1377 : Part 8 : 1990

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21
Disturbed / Undisturbed	D

Description of Specimen

Brownish Grey, F/C Gravel, Silty, Sandy, CLAY

Initial Specimen Conditions

Height	mm	76.00	76.00	76.00
Diameter	mm	38.00	38.00	38.00
Area	mm ²	1134.11	1134.11	1134.11
Volume	cm ³	86.19	86.19	86.19
Mass	g	171.80	171.90	172.20
Dry Mass	g	137.50	138.10	137.90
Density	Mg/m ³	1.99	1.99	2.00
Dry Density	Mg/m ³	1.60	1.60	1.60
Moisture Content	%	25	24	25
Specific Gravity	kN/m ³	2.65	2.65	2.65
(assumed/measured)		assumed	assumed	assumed

Final Specimen Conditions

Moisture Content	%	24	22	20
Density	Mg/m ³	2.52	2.17	2.17
Dry Density	Mg/m ³	2.03	1.78	1.81

D P Gland

Checked and Approved By

28-09-21
Date



Dunsbury Park

Client Ref
19543-GELO

Contract No

55665

Consolidated Drained Triaxial Compression Test

BS 1377 : Part 8 : 1990

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21

Test Setup

Date started	13-09-21	13-09-21	13-09-21
Date Finished	23-09-21	23-09-21	23-09-21
Top Drain Used	y	y	y
Base Drain Used	y	y	y
Side Drains Used	y	y	y
Pressure System Number	P12	P11	P10
Cell Number	C12	C11	C10

Saturation

Cell Pressure Incr.	kPa	100.00	100.00	100.00
Back Pressure Incr.	kPa	95.00	95.00	95.00
Differential Pressure	kPa	5.00	5.00	5.00
Final Cell Pressure	kPa	400.00	700.00	400.00
Final Pore Pressure	kPa	389.00	691.00	388.00
Final B Value		0.95	0.97	0.95

Consolidation

Effective Pressure	kPa	60.00	120.00	240.00
Cell Pressure	kPa	400.00	700.00	400.00
Back Pressure	kPa	340.00	580.00	160.00
Excess Pore Pressure	kPa	49.00	112.00	231.00
Pore Pressure at End	kPa	340.00	580.00	160.00
Consolidated Volume	cm ³	67.89	78.09	77.89
Consolidated Height	mm	70.62	73.62	73.56
Consolidated Area	mm ²	973.59	1063.06	1061.31
Vol. Compressibility	m ² /MN	0.62446	0.16203	0.60185
Consolidation Coef.	m ² /yr.	0.01745	1.41353	0.01802

D P Gans

Checked and Approved By

28-09-21
Date

Client Ref

19543-GELO

Contract No

55665



Dunsbury Park

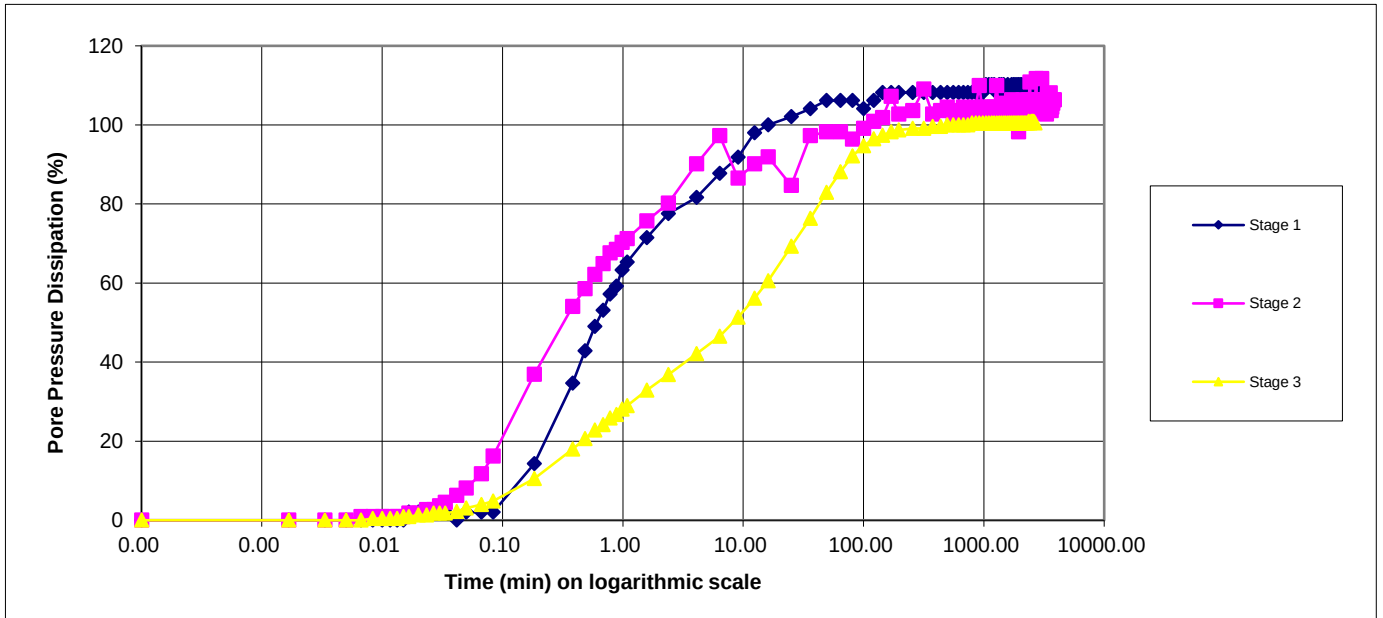
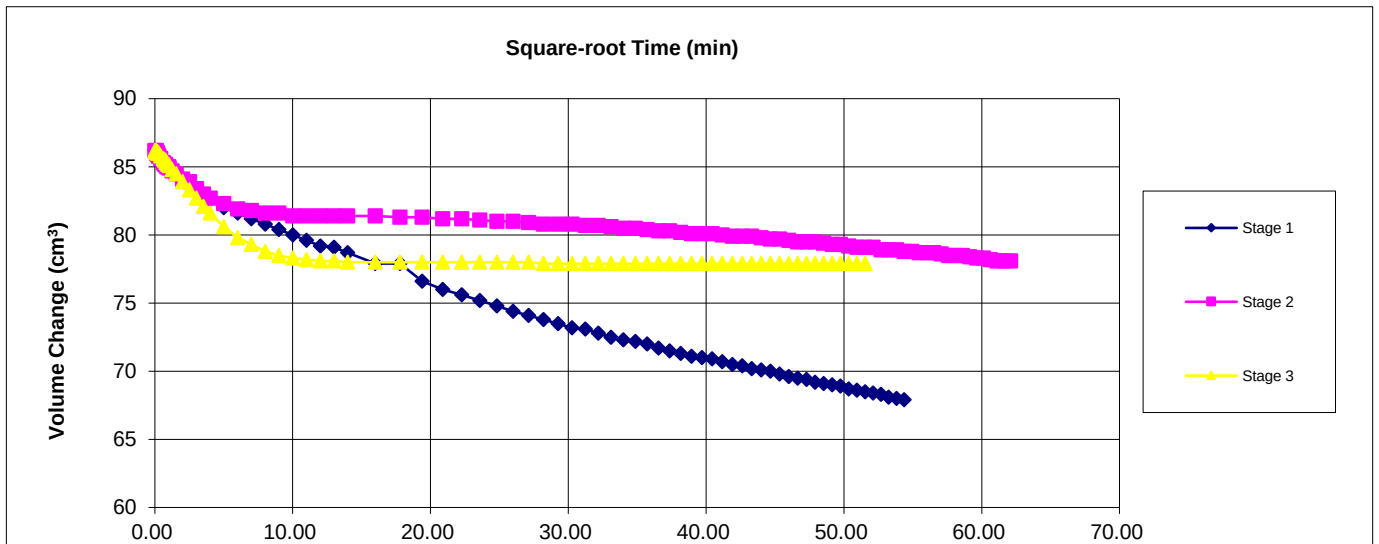
Consolidated Drained Triaxial Compression Test

BS 1377 : Part 8 : 1990

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21

Consolidation Stage



D P Gnan

Checked and Approved By

28-09-21

Date

GSTL
GEO Site & Testing Services Limited

Dunsbury Park

Client Ref

19543-GELO

Contract No

55665

Consolidated Drained Triaxial Compression Test

BS 1377 : Part 8 : 1990

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21

Shearing

Initial Cell Pressure	kPa	400	700	400
Initial Pore Pressure	kPa	340	580	160
Rate of Strain	mm/min	0.0009	0.0760	0.0010

Max Deviator Stress

Axial Strain		12.206	12.429	11.514
Axial Stress	kPa	141.576	206.85	324.33
Cor. Deviator stress	kPa	139.674	203.90	321.61
Effective Major Stress	kPa	198.674	323.90	561.61
Effective Minor Stress	kPa	60.000	120.00	240.00
Effective Stress Ratio		3.311	2.699	2.34
s'	kPa	129.337	221.95	400.81
t'	kPa	69.337	101.95	160.81

Max Effective Principle Stress Ratio

Axial Strain		8.142	12.429	11.039
Axial Stress	kPa	138.694	206.847	321.878
Cor. Deviator stress	kPa	136.625	203.899	319.241
Effective Major Stress	kPa	196.625	323.899	559.241
Effective Minor Stress	kPa	60.000	120.000	240.000
Effective Stress Ratio		3.277	2.699	2.330
s'	kPa	128.312	221.950	399.620
t'	kPa	68.312	101.950	159.620
Shear Resistance Angle	degs	19.7		
Cohesion c'	kPa	27		

D P Grant

Checked and Approved By

28-09-21
Date



Dunsbury Park

Client Ref
19543-GELO
Contract No

55665

Consolidated Drained Triaxial Compression Test

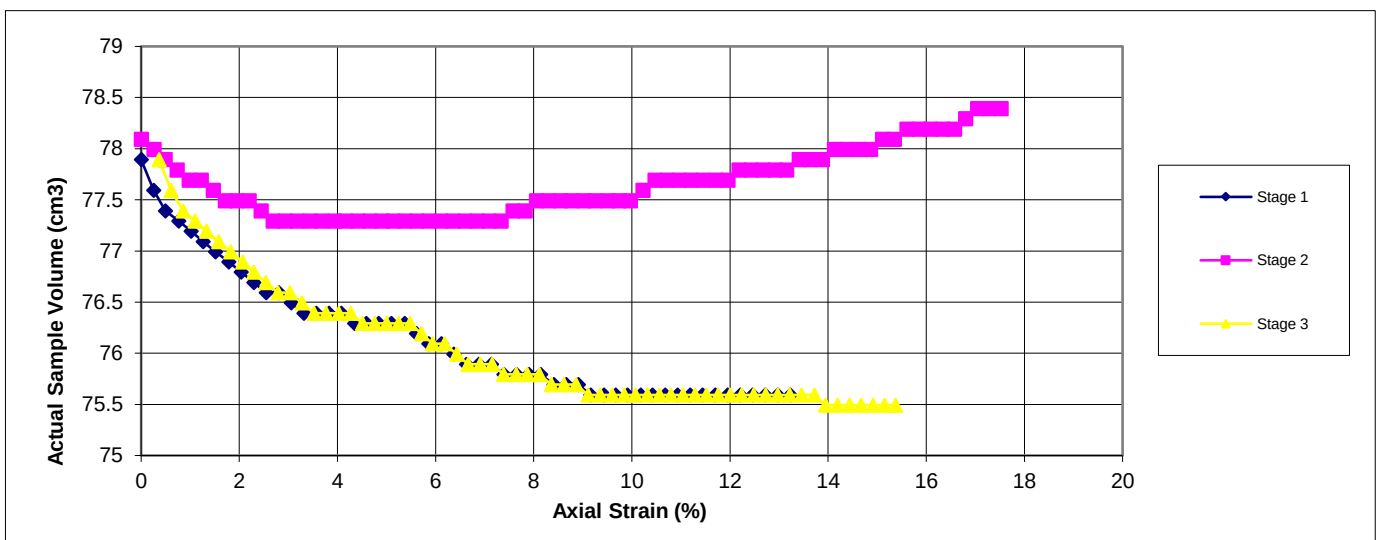
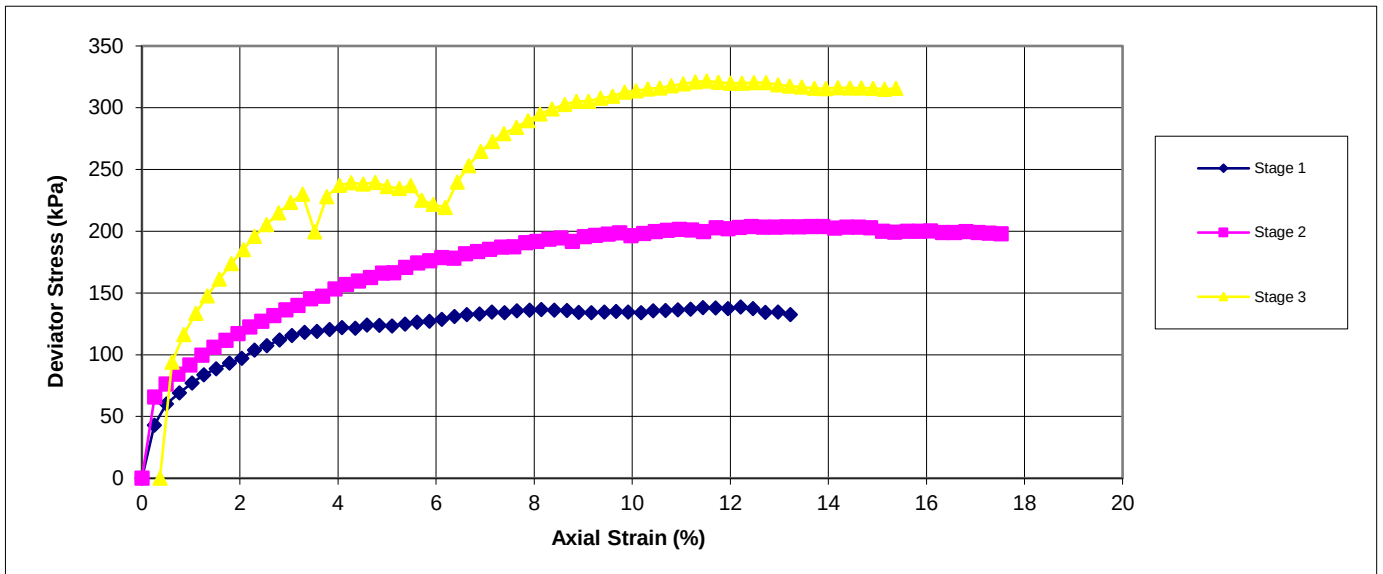
BS 1377 : Part 8 : 1990

Stage 1

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21

Shearing Stage



DP Gnan

Checked and Approved By

28-09-21

Date

Client Ref

19543-GELO

Contract No

55665

GSTL
GEO Site & Testing Services Limited

Dunsbury Park

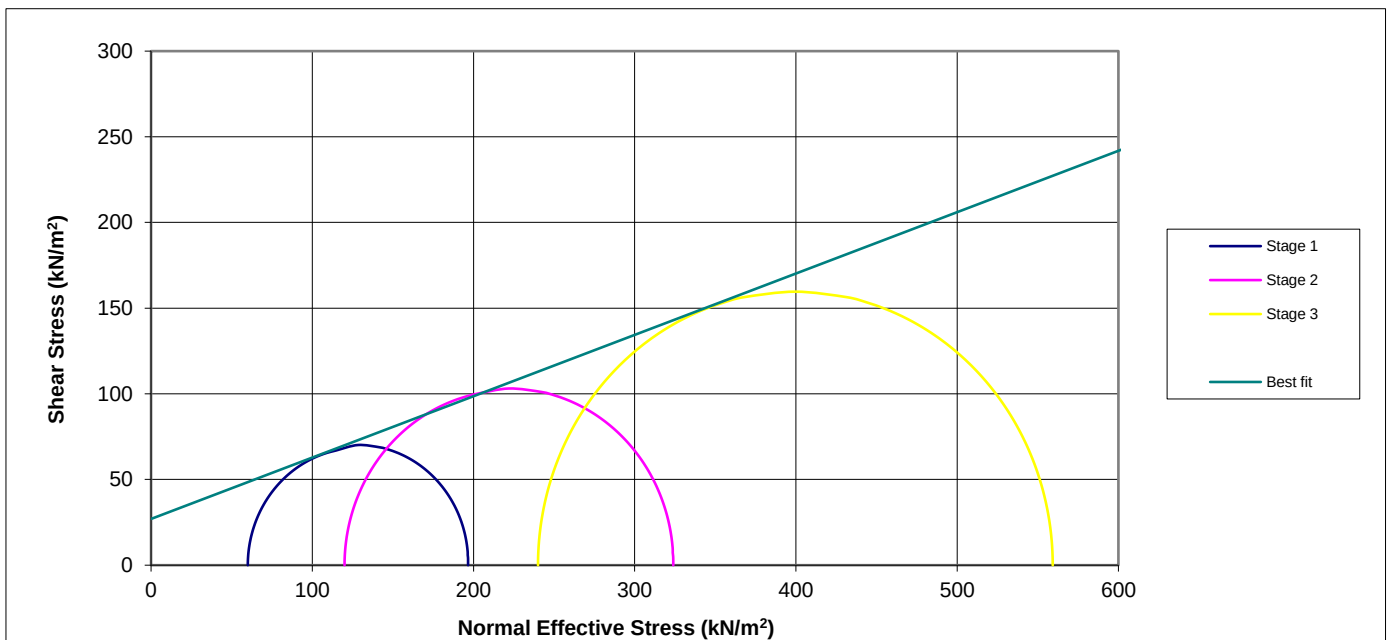
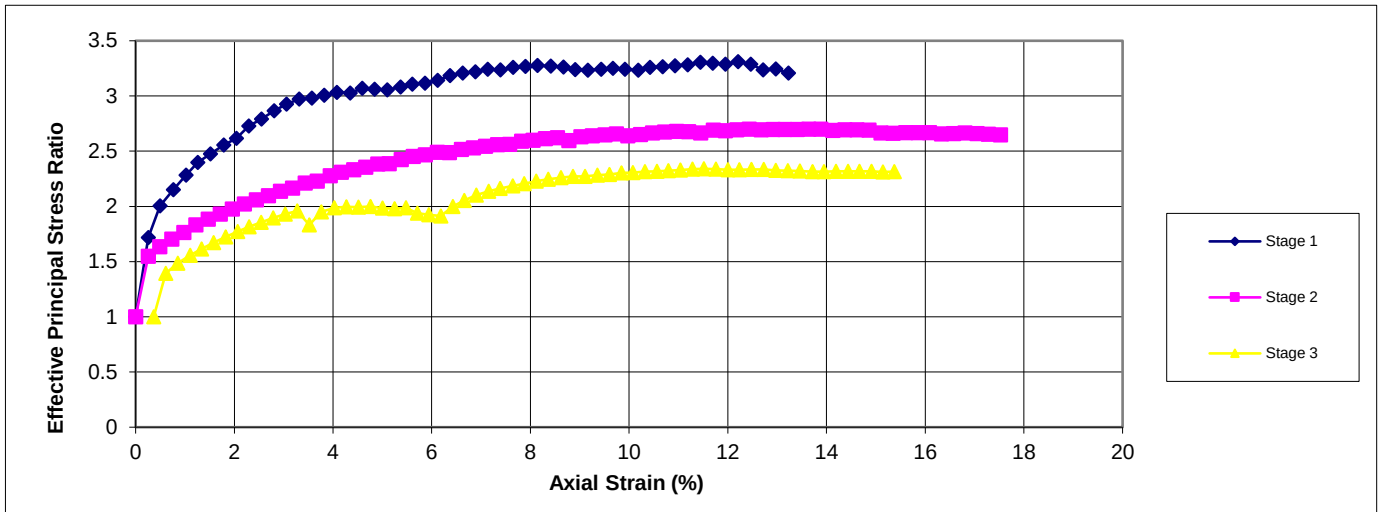
Consolidated Drained Triaxial Compression Test

BS 1377 : Part 8 : 1990

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21

Shearing Stage



D P Gons

Checked and Approved By

28-09-21

Date

Client Ref

19543-GELO

Contract No

55665

GSTL
GEO Site & Testing Services Limited

Dunsbury Park

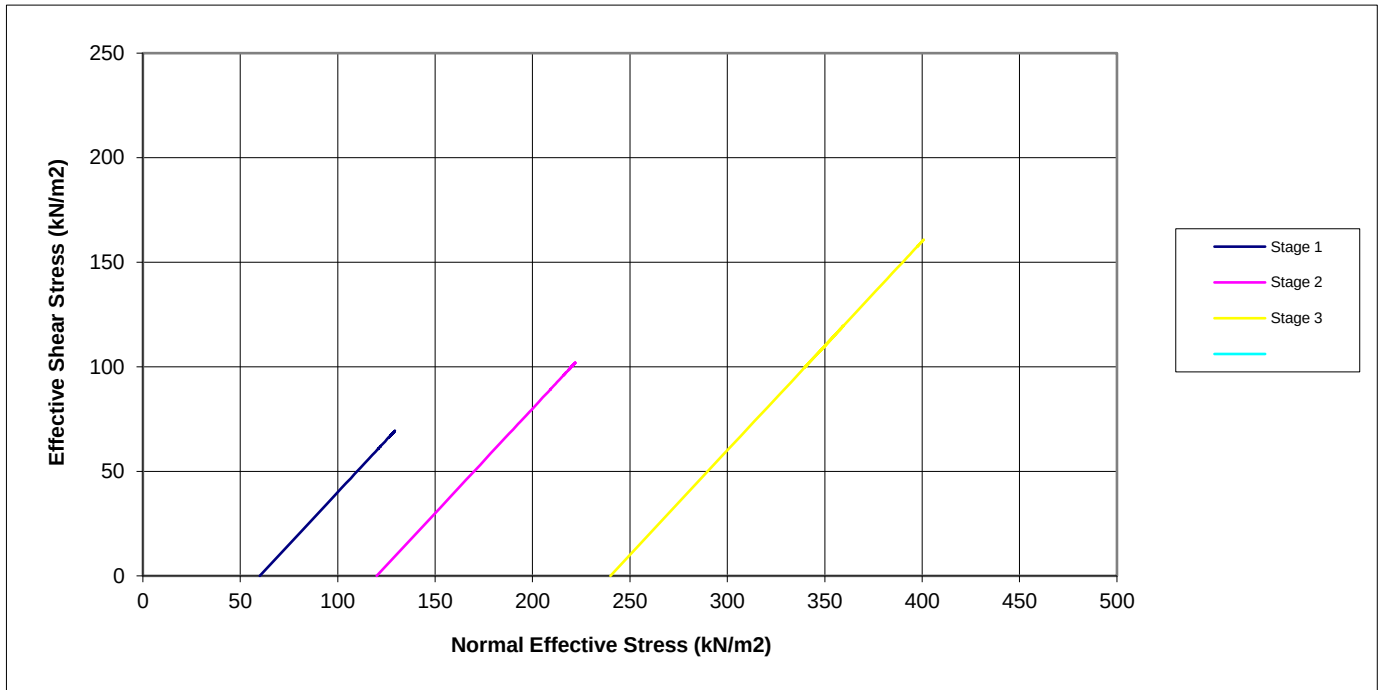
Consolidated Drained Triaxial Compression Test

BS 1377 : Part 8 : 1990

Specimen Details

Borehole	BH5.01
Sample No.	
Depth	3
Date	27-09-21

Shearing Stage



D P Gans

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Dunsbury Park

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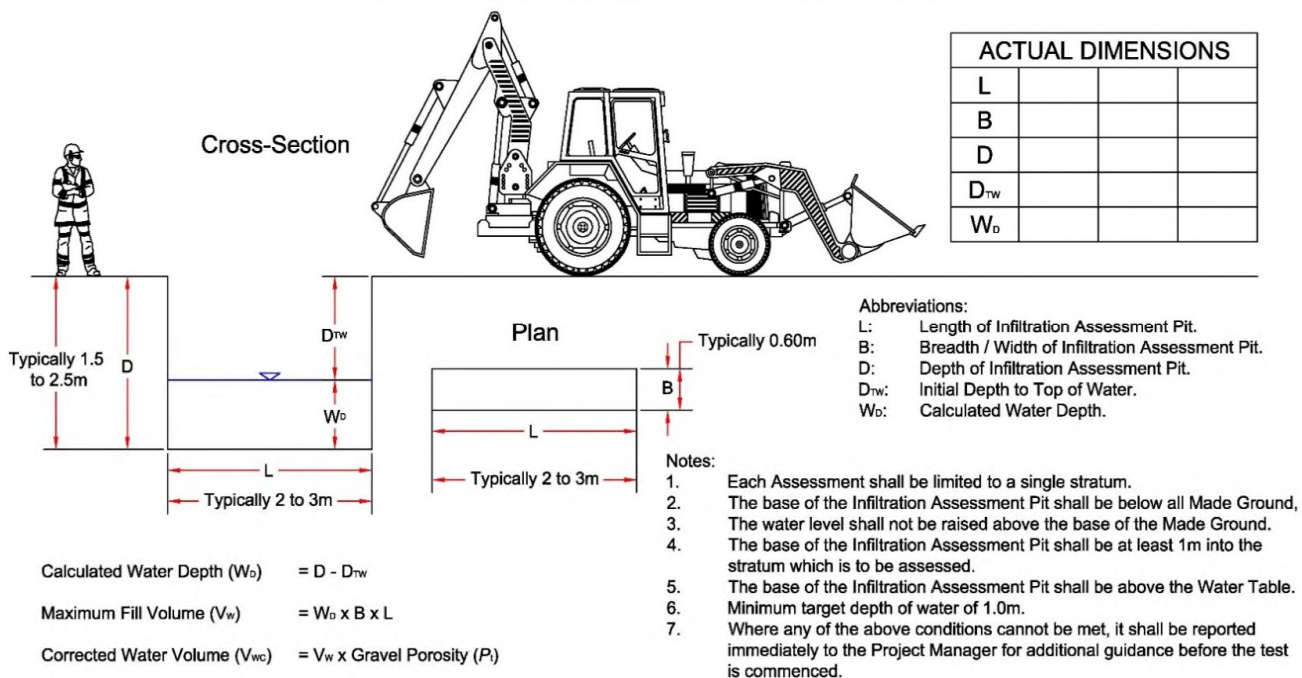
1 DAY INFILTRATION ASSESSMENT - AIDE MEMOIR

Site: Dunsbury Park unit 500
Client: Portsmouth City Council

Test Location SA101 Date of start 22/07/2021 Date at end 22/07/2021

ANTICIPATED GROUND PROFILE FROM DESK STUDY			ACTUAL GROUND PROFILE FROM EXCAVATION		
GROUND LEVEL			GROUND LEVEL		
BASE OF PIT			BASE OF PIT 1.70m		

INFILTRATION ASSESSMENT PIT TYPICAL DIMENSIONS



Infiltration	RUN 1		RUN 2		RUN 3		SITE OBSERVATIONS - VOLUME LOSS		
	W _D	D _{TW1}	W _D	D _{TW2}	W _D	D _{TW3}	Test Run	Infiltration Records up to 6 Hours	Comments
75% full									
25% full									
Assessment of Degree of Infiltration WD = 1.80 m WD = 1.60 m WD = 1.40 m WD = 1.20 m WD = 1.00 m WD = 0.80 m WD = 0.60 m WD = 0.40 m 1.40 m 1.20 m 1.00 m 0.80 m 0.60 m 0.40 m 0.20 m 0.00 m Measured Depth of Water During Assessment —○— 75 % full —△— 50 % full —□— 25 % full									
								1	<25% Unlikely without significant attenuation <75% Requires additional BRE DG365 testing >75% Refer to results of Run 2
								2	<25% Unlikely without significant attenuation <75% Requires additional BRE DG365 testing >75% Refer to results of Run 3
								3	<25% Unlikely without significant attenuation <75% Requires additional BRE DG365 testing >75% Indicative Infiltration Rate achieved.

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site: Dunsbury Park unit 500

Client: Portsmouth City Council

NOTE: Test abandoned due to no infiltration recorded.

Test Location SA101

Date of start 22/07/2021

Date at end 22/07/2021

[illegible]

Client Portsmouth City Council	Location or material to which this assessment applies Made Ground	
Project Dunsbury Park Plots 500-502		
Job number 19453-GELO		

Concrete in aggressive ground		After BRE Special Digest 1, 2005
Soil data		
	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)
Number of tests	2	2
No. tests in 20% data set	0	0
No. tests with suspected pyrite		0
Maximum value	62	0.4
Mean of highest two values	40	0
Mean of highest 20%		
Characteristic Value	62	0.4
		Mg not required
	[no pyrite]	[pyrite suspected]
DS Class	DS-1	DS-2
If pyrite suspected, DS Class limited to		DS-2
Is pyrite assumed to be present?	No	Adopted DS Class = DS-1
Water data		
	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value	0	0
(Maximum Level)		Mg not required
DS Class		
pH data		
	Soil	Water
Number of tests	2	0
No. tests in 20% data set	0	
Lowest pH	7.7	
Mean of lowest 20%		
Characteristic value	7.7	
Design value	7.7	
Number of soil pH results less than 5.5	0	
DS Class design value		ACEC Class design value
Based on higher of soil and water data		Brownfield
		Mobile groundwater
		AC-1

Client Portsmouth City Council	Location or material to which this assessment applies Bognor Sand Member	
Project Dunsbury Park Plots 500-502		
Job number 19453-GELO		

Concrete in aggressive ground		After BRE Special Digest 1, 2005
Soil data		
	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)
Number of tests	3	3
No. tests in 20% data set	1	1
No. tests with suspected pyrite		0
Maximum value	31	0
Mean of highest two values	27	0
Mean of highest 20%		
Characteristic Value	31	0
		Mg not required
	[no pyrite]	[pyrite suspected]
DS Class	DS-1	DS-1
If pyrite suspected, DS Class limited to		DS-1
Is pyrite assumed to be present?	No	Adopted DS Class = DS-1
Water data		
	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value	0	0
(Maximum Level)		Mg not required
DS Class		
pH data		
	Soil	Water
Number of tests	3	0
No. tests in 20% data set	1	
Lowest pH	7.7	
Mean of lowest 20%	7.7	
Characteristic value	7.7	
Design value	7.7	
Number of soil pH results less than 5.5	0	
DS Class design value		ACEC Class design value
Based on higher of soil and water data		Brownfield
DS-1		Mobile groundwater AC-1

Client Portsmouth City Council	Location or material to which this assessment applies London Clay Formation (weathered)	
Project Dunsbury Park Plots 500-502		
Job number 19453-GELO		

Concrete in aggressive ground		After BRE Special Digest 1, 2005
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Soil data			
	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	1	1	0
No. tests in 20% data set	0	0	
No. tests with suspected pyrite		0	
Maximum value	44	0	
Mean of highest two values	44	0	
Mean of highest 20%			
Characteristic Value	44	0	
			Mg not required
	[no pyrite]	[pyrite suspected]	
DS Class	DS-1	DS-1	
If pyrite suspected, DS Class limited to		DS-1	
Is pyrite assumed to be present?	No	Adopted DS Class =	DS-1

Water data		
	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value (Maximum Level)	0	0
		Mg not required
DS Class		

pH data		
	Soil	Water
Number of tests	1	0
No. tests in 20% data set	0	
Lowest pH	7.6	
Mean of lowest 20%		
Characteristic value	7.6	
Design value	7.6	
Number of soil pH results less than 5.5	0	

DS Class design value	ACEC Class design value
Based on higher of soil and water data	Brownfield Mobile groundwater
DS-1	AC-1

Client Portsmouth City Council	Location or material to which this assessment applies London Clay Formation	
Project Dunsbury Park Plots 500-502		
Job number 19453-GELO		

Concrete in aggressive ground		After BRE Special Digest 1, 2005
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Soil data			
	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	9	9	0
No. tests in 20% data set	2	2	
No. tests with suspected pyrite		8	
Maximum value	730	14.4	
Mean of highest two values	685	9	
Mean of highest 20%	700	9	
Characteristic Value	685	9	

	[no pyrite]	[pyrite suspected]	Mg not required
DS Class	DS-2	DS-5 m	

If pyrite suspected, DS Class limited to	DS-4 m
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Is pyrite assumed to be present?	Yes	Adopted DS Class =	DS-4 m
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Water data		
	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value	0	0
(Maximum Level)		Mg not required

DS Class

pH data		
	Soil	Water
Number of tests	9	0
No. tests in 20% data set	2	
Lowest pH	7.4	
Mean of lowest 20%	7.6	
Characteristic value	7.6	

Design value	7.6
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Number of soil pH results less than 5.5	0
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DS Class design value	ACEC Class design value
Based on higher of soil and water data	Brownfield
	Mobile groundwater
DS-4 m	AC-4m

Appendix E Site Monitoring Data and Ground Gas Risk Assessment

Site: Dunsbury Park, Portsmouth Job number: Q2021.594 Client: Hydrock Gas analyser: GA5000; GA505316 Equipment check OK: Y Service in date: Y Calibration check OK: Y Name of person monitoring: Alex Thackray							Notes on site conditions: Area of site with WS4 points was busy with site traffic so didn't feel safe access was possible. Point WS6.01 has a post to mark the location but on arrival there is no borehole there to monitor. Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																	
Monitoring round		Borehole details					Pressure and flow			Gas concentrations										Local conditions				
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	VOC (as ppm using PID)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Notes on condition of borehole and surrounding ground		
												Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	CO (PPM)	H ₂ S (PPM)			
11/08/21	11:28	WS1.01		5.40	2.66		1017		0.0	0.0	ND	ND	ND	ND	ND	0.1	0.1	19.8	17.2	1.0	1			
11/08/21	NR	WS4.03		NR	NR		NR		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unsafe access, site traffic		
11/08/21	NR	WS4.04		NR	NR		NR		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unsafe access, site traffic		
11/08/21	NR	WS4.05		NR	NR		NR		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unsafe access, site traffic		
11/08/21	12:50	WS5.02		5.30	3.56		1017		0.1	0.0	ND	ND	ND	ND	ND	ND	ND	20.0	20.4	1.0	ND			
11/08/21	11:45	WS5.04		5.47	2.06		1017		0.0	0.0	ND	ND	ND	ND	ND	ND	ND	20.2	20.0	1.0	1			
11/08/21	11:41	WS5.05		5.54	1.54		1018		-0.1	0.1	ND	ND	ND	ND	ND	ND	ND	20.3	20.3	1.0	1			
11/08/21	11:35	WS5.08		5.47	0.86		1018		0.0	0.1	ND	ND	ND	ND	ND	ND	ND	20.4	20.4	1.0	1			
11/08/21	NR	WS6.01		NR	NR		NR		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	No borehole at location, see corresponding photo.		
11/08/21	12:00	WS6.03		5.34	2.13		1017		0.1	0.0	0.1	ND	ND	ND	ND	3.3	3.5	18.3	14.2	1.0	1			
11/08/21	12:18	WS6.04		5.30	2.16		1016		0.1	0.0	0.1	ND	ND	ND	ND	2.1	2.1	19.8	15.5	1.0	ND			
11/08/21	12:08	WS6.06		5.45	2.43		1017		0.1	0.0	ND	ND	ND	ND	ND	2.5	2.5	18.0	16.1	2.0	1			
11/08/21	12:40	WS7.03		5.46	3.01		1015		0.2	0.0	ND	ND	ND	ND	ND	0.1	0.1	20.3	20.3	2.0	ND			
11/08/21	12:35	WS7.04		5.35	1.60		1015		0.1	0.0	ND	ND	ND	ND	ND	4.3	4.6	19.3	12.1	2.0	ND			

Site: Dunsbury Park, Portsmouth Job number: Q2021.594 Client: Hydrock							Notes on site conditions: Sunny. dry, ground dry, moderate breeze.																
Gas analyser: GA5000; G500691																							
Equipment check OK: Y																							
Service in date: Y																							
Calibration check OK: Y																							
Name of person monitoring: Richard Ward							Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																
Monitoring round		Borehole details					Pressure and flow				Gas concentrations										Local conditions		
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	VOC (as ppm using PID)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Notes on condition of borehole and surrounding ground	
												Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	CO (PPM)	H ₂ S (PPM)		
27/08/21	10:29	WS1.01		5.39	2.74		1021		-0.1	0.1	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.5	1.0	ND	All good.	
27/08/21	11:42	WS4.03		5.49	2.48		1020		-27.0	-5.0	NA	ND	ND	ND	ND	0.1	1.6	20.8	18.4	3.0	ND	All good.	
27/08/21	12:11	WS4.04		5.36	3.13		1021		0.1	0.0	NA	ND	ND	ND	ND	0.1	0.0	20.8	17.7	2.0	ND	All good.	
27/08/21	11:58	WS4.05		5.45	2.57		1021		0.0	0.0	NA	ND	ND	ND	ND	0.1	0.3	20.8	18.6	2.0	ND	All good.	
27/08/21	08:10	WS5.02		5.23	3.72		1019		2.6	0.0	NA	ND	4.0	ND	80	0.1	0.1	20.8	9.4	ND	ND	All good.	
27/08/21	08:07	WS5.04		5.54	2.14		1019		-21.9	-5.2	NA	ND	0.2	ND	4	0.1	ND	20.8	10.9	1.0	1	All good.	
27/08/21	08:02	WS5.05		5.51	1.61		1019		-46.3	-9.4	NA	ND	ND	ND	ND	0.1	0.4	20.8	17.5	ND	ND	All good.	
27/08/21	07:56	WS5.08		5.44	1.13		1019		-12.2	-0.6	NA	ND	ND	ND	ND	0.1	0.2	20.8	20.5	1.0	ND	All good.	
27/08/21	08:47	WS6.01		5.38	1.87		1017		-0.5	0.0	NA	ND	ND	ND	ND	0.1	6.5	20.8	17.3	1.0	ND	All good.	
27/08/21	08:52	WS6.03		5.30	2.23		1018		-0.2	0.0	NA	ND	ND	ND	ND	0.1	10.4	20.8	13.8	1.0	ND	All good.	
27/08/21	09:01	WS6.04		5.27	2.36		1019		-0.3	0.0	NA	ND	ND	ND	ND	0.1	5.5	20.8	17.4	2.0	ND	All good.	
27/08/21	08:56	WS6.06		5.42	2.49		1019		-0.1	0.0	NA	ND	ND	ND	ND	0.1	5.1	20.8	18.0	2.0	ND	All good.	
27/08/21	08:29	WS7.03		5.47	3.13		1017		-0.3	0.0	NA	ND	ND	ND	ND	0.1	0.8	20.8	20.0	ND	ND	All good.	
27/08/21	09:16	WS7.04		5.32	2.00		1018		6.6	0.1	NA	ND	ND	ND	ND	0.1	8.7	20.8	14.9	1.0	ND	All good.	
27/08/21	10:33	BH1.01		10.47	4.16		1022		0.2	0.0	NA	ND	0.1	ND	2	0.1	0.6	20.8	19.8	7.0	ND	All good.	
27/08/21	NR	BH4.02		NR	NR		NR		NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unable to access borehole, bolt has been overscrewed during installation resulting in the cover being impossible to open with an allen key.	
27/08/21	10:00	BH5.01		10.48	1.58		1019		0.0	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	19.7	1.0	ND	All good.	
27/08/21	10:05	BH5.02		5.46	2.49		1020		0.0	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	20.3	2.0	ND	All good.	
27/08/21	10:10	BH5.03		10.44	0.34		1020		14.5	4.5	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.8	ND	ND	All good.	
27/08/21	10:17	BH5.05		10.02	1.78		1021		0.0	0.0	NA	ND	ND	ND	ND	0.1	0.2	20.8	19.2	4.0	ND	All good.	
27/08/21	09:45	BH6.02		10.33	2.57		1018		-0.2	0.1	NA	ND	ND	ND	ND	0.1	2.2	20.8	18.1	2.0	ND	All good.	
27/08/21	09:50	BH6.03		5.48	2.63		1019		0.0	0.0	NA	ND	ND	ND	ND	0.1	4.1	20.8	17.8	ND	ND	All good.	
27/08/21	09:29	BH7.01		20.34	3.65		1018		-0.1	0.0	NA	ND	ND	ND	ND	0.1	1.4	20.8	17.7	2.0	ND	All good.	
27/08/21	09:37	BH7.03		5.06	2.33		1018		-0.2	0.0	NA	ND	ND	ND	ND	0.1	1.3	20.8	19.4	3.0	ND	All good.	

Site: Dunsbury Park, Portsmouth Job number: Q2021.594 Client: Hydrock							Notes on site conditions: Sunny, dry, ground dry, moderate breeze. Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																
Gas analyser: GA5000; G500691																							
Equipment check OK: Y																							
Service in date: Y																							
Calibration check OK: Y																							
Name of person monitoring: Richard Ward																							
Monitoring round		Borehole details					Pressure and flow				Gas concentrations										Local conditions		
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	VOC (as ppm using PID)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Notes on condition of borehole and surrounding ground	
												Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	CO (PPM)	H ₂ S (PPM)		
07/09/21	08:26	WS1.01		5.39	2.81		1019		-0.2	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.2	1.0	ND	All good.	
07/09/21	09:16	WS4.03		5.49	2.14		1019		-0.3	0.0	NA	ND	ND	ND	ND	0.1	2.8	20.8	16.6	1.0	ND	All good.	
07/09/21	09:19	WS4.04		5.36	3.31		1019		0.1	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	16.1	2.0	ND	All good.	
07/09/21	09:25	WS4.05		5.45	2.68		1019		0.2	0.0	NA	ND	ND	ND	ND	0.1	1.2	20.8	14.9	1.0	1	All good.	
07/09/21	09:04	WS5.02		5.23	3.85		1019		0.2	0.0	NA	ND	4.1	ND	82	0.1	0.1	20.8	4.8	1.0	ND	All good.	
07/09/21	08:58	WS5.04		5.54	2.18		1019		-13.6	-3.4	NA	ND	0.1	ND	2	0.1	ND	20.8	9.9	2.0	ND	All good.	
07/09/21	08:54	WS5.05		5.51	1.70		1020		-51.1	-11.7	NA	ND	ND	ND	ND	0.1	0.5	20.8	15.3	1.0	ND	All good.	
07/09/21	08:44	WS5.08		5.44	1.31		1019		-15.6	-4.8	NA	ND	ND	ND	ND	0.1	0.4	20.8	19.3	4.0	ND	All good.	
07/09/21	10:27	WS6.01		5.38	1.99		1017		0.1	0.0	NA	ND	ND	ND	ND	0.1	4.1	20.8	18.2	1.0	ND	All good.	
07/09/21	10:32	WS6.03		5.30	2.26		1018		0.2	0.0	NA	ND	ND	ND	ND	0.1	8.3	20.8	15.8	1.0	1	All good.	
07/09/21	10:44	WS6.04		5.27	2.42		1019		6.5	0.0	NA	ND	ND	ND	ND	0.1	1.5	20.8	19.5	2.0	ND	All good.	
07/09/21	10:37	WS6.06		5.42	2.54		1019		0.4	0.0	NA	ND	ND	ND	ND	0.1	3.3	20.8	18.6	2.0	ND	All good.	
07/09/21	10:16	WS7.03		5.47	3.18		1017		0.3	0.0	NA	ND	ND	ND	ND	0.1	0.4	20.8	20.2	1.0	ND	All good.	
07/09/21	10:12	WS7.04		5.32	2.15		1017		0.2	0.0	NA	ND	ND	ND	ND	0.1	5.6	20.8	17.4	2.0	ND	All good.	
07/09/21	08:29	BH1.01		10.47	4.23		1020		-0.2	0.0	NA	ND	0.1	ND	2	0.1	1.0	20.8	18.9	2.0	ND	All good.	
27/08/21	NR	BH4.02		NR	NR		NR		NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unable to access borehole, bolt has been overscrewed during installation resulting in the cover being impossible to open with an allen key.	
07/09/21	09:07	BH5.01		10.48	1.81		1019		0.1	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	18.6	1.0	1	All good.	
07/09/21	09:00	BH5.02		5.46	2.60		1019		0.1	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	19.5	1.0	1	All good.	
07/09/21	08:50	BH5.03		10.44	0.38		1019		0.0	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.0	1.0	ND	All good.	
07/09/21	08:41	BH5.05		10.02	1.81		1019		-0.2	0.0	NA	ND	ND	ND	ND	0.1	0.3	20.8	19.2	1.0	ND	All good.	
07/09/21	10:35	BH6.02		10.33	2.61		1018		0.3	0.0	NA	ND	ND	ND	ND	0.1	2.2	20.8	18.7	2.0	ND	All good.	
07/09/21	10:40	BH6.03		5.48	2.69		1019		0.0	0.0	NA	ND	ND	ND	ND	0.1	2.7	20.8	18.8	1.0	1	All good.	
07/09/21	10:20	BH7.01		20.34	3.71		1017		0.2	0.0	NA	ND	ND	ND	ND	0.1	1.9	20.8	17.7	2.0	ND	All good.	
07/09/21	10:08	BH7.03		5.06	2.47		1017		0.1	0.0	NA	ND	ND	ND	ND	0.1	2.0	20.8	19.0	2.0	ND	All good.	

Site: Dunsbury Park, Portsmouth Job number: Client: Hydrock							Notes on site conditions: Sunny, dry, ground dry, moderate breeze. Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																
Gas analyser: G500691																							
Equipment check OK: Y																							
Service in date: Y																							
Calibration check OK: Y																							
Name of person monitoring: Richard Ward																							
Monitoring round		Borehole details					Pressure and flow				Gas concentrations										Local conditions		
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	VOC (as ppm using PID)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Notes on condition of borehole and surrounding ground	
												Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	CO (PPM)	H ₂ S (PPM)		
15/09/21	09:41	WS1.01		5.39	2.86		1012		-0.4	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.1	1.0	ND	All good.	
15/09/21	11:48	WS4.03		5.49	2.25		1011		0.5	0.0	NA	ND	ND	ND	ND	0.1	5.6	20.8	14.6	1.0	ND	All good.	
15/09/21	11:51	WS4.04		5.36	3.40		1011		0.4	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	16.2	1.0	ND	All good.	
15/09/21	11:55	WS4.05		5.45	2.73		1011		-0.1	0.0	NA	ND	ND	ND	ND	0.1	1.5	20.8	15.0	1.0	ND	All good.	
15/09/21	11:34	WS5.02		5.23	3.91		1012		-0.2	0.0	NA	ND	4.1	ND	82	0.1	0.1	20.8	5.3	1.0	ND	All good.	
15/09/21	11:24	WS5.04		5.54	2.21		1012		-24.3	-6.4	NA	ND	0.2	ND	4	0.1	ND	20.8	8.7	2.0	ND	All good.	
15/09/21	11:21	WS5.05		5.51	1.83		1012		-5.1	-7.9	NA	ND	ND	ND	ND	0.1	0.9	20.8	12.9	1.0	ND	All good.	
15/09/21	11:08	WS5.08		5.44	1.40		1012		-1.3	0.1	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.3	1.0	ND	All good.	
15/09/21	12:52	WS6.01		5.38	2.08		1009		-0.1	0.0	NA	ND	ND	ND	ND	0.1	3.2	20.8	19.2	1.0	ND	All good.	
15/09/21	12:56	WS6.03		5.30	2.28		1011		0.2	0.0	NA	ND	ND	ND	ND	0.1	7.7	20.8	17.2	1.0	ND	All good.	
15/09/21	13:17	WS6.04		5.27	2.45		1012		0.2	0.0	NA	ND	ND	ND	ND	0.1	2.8	20.8	19.3	1.0	ND	All good.	
15/09/21	13:06	WS6.06		5.42	2.56		1011		0.0	0.0	NA	ND	ND	ND	ND	0.1	3.0	20.8	19.1	1.0	ND	All good.	
15/09/21	12:47	WS7.03		5.47	3.21		1009		0.0	0.0	NA	ND	ND	ND	ND	0.1	1.1	20.8	20.3	1.0	ND	All good.	
15/09/21	12:33	WS7.04		5.32	2.29		1010		0.1	0.0	NA	ND	ND	ND	ND	0.1	4.6	20.8	18.3	1.0	ND	All good.	
15/09/21	09:46	BH1.01		10.47	4.29		1011		-0.5	0.0	NA	ND	0.1	ND	ND	0.1	1.2	20.8	18.3	1.0	ND	All good.	
15/09/21	NR	BH4.02		NR	NR		NR		NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unable to access borehole, bolt has been overscrewed during installation resulting in the cover being impossible to open with an allen key.	
15/09/21	11:37	BH5.01		10.48	1.88		1011		0.1	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	18.9	1.0	ND	All good.	
15/09/21	11:27	BH5.02		5.46	2.64		1012		-0.2	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	19.8	1.0	1	All good.	
15/09/21	11:13	BH5.03		10.44	0.56		1012		-0.1	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	19.6	1.0	ND	All good.	
15/09/21	11:01	BH5.05		10.02	1.92		1012		-0.2	0.0	NA	ND	ND	ND	ND	0.1	0.4	20.8	19.7	1.0	ND	All good.	
15/09/21	12:59	BH6.02		10.33	2.63		1011		0.3	0.0	NA	ND	ND	ND	ND	0.1	2.3	20.8	19.3	1.0	ND	All good.	
15/09/21	13:09	BH6.03		5.48	2.71		1011		0.3	0.0	NA	ND	ND	ND	ND	0.1	2.4	20.8	19.7	1.0	ND	All good.	
15/09/21	12:39	BH7.01		20.34	3.86		1009		0.0	0.0	NA	ND	ND	ND	ND	0.1	2.2	20.8	18.3	1.0	ND	All good.	
15/09/21	12:30	BH7.03		5.06	2.50		1010		0.2	0.0	NA	ND	ND	ND	ND	0.1	2.3	20.8	19.0	1.0	ND	All good.	

Site: Dunsbury Park, Portsmouth Job number: Client: Hydrock							Notes on site conditions: Sunny, dry, ground dry, moderate breeze.																
Gas analyser: G500691																							
Equipment check OK: Y																							
Service in date: Y																							
Calibration check OK: Y																							
Name of person monitoring: Richard Ward							Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																
Monitoring round		Borehole details					Pressure and flow				Gas concentrations										Local conditions		
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow * (l/hr)	VOC (as ppm using PID)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Notes on condition of borehole and surrounding ground	
												Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	CO (PPM)	H ₂ S (PPM)		
20/09/21	10:00	WS1.01		5.39	2.90		1019		-0.6	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.6	ND	ND	All good.	
20/09/21	13:31	WS4.03		5.49	2.20		1019		3.1	0.0	NA	ND	ND	ND	ND	0.1	5.8	20.8	14.7	1.0	ND	All good.	
20/09/21	13:33	WS4.04		5.36	3.47		1020		7.1	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	16.4	2.0	ND	All good.	
20/09/21	13:37	WS4.05		5.45	2.77		1020		0.2	0.0	NA	ND	ND	ND	ND	0.1	1.5	20.8	15.7	1.0	ND	All good.	
20/09/21	12:34	WS5.02		5.23	3.97		1020		-0.1	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	4.4	1.0	1	All good.	
20/09/21	12:21	WS5.04		5.54	2.21		1020		-16.1	-5.1	NA	ND	4.2	ND	84	0.1	ND	20.8	11.2	1.0	1	All good.	
20/09/21	12:09	WS5.05		5.51	2.03		1020		-11.7	-3.9	NA	ND	ND	ND	ND	0.1	1.1	20.8	11.9	1.0	1	All good.	
20/09/21	11:54	WS5.08		5.44	1.43		1020		-6.3	-1.8	NA	ND	ND	ND	ND	0.1	0.5	20.8	19.6	2.0	ND	All good.	
20/09/21	14:03	WS6.01		5.38	2.13		1018		0.1	0.0	NA	ND	ND	ND	ND	0.1	2.9	20.8	19.2	1.0	ND	All good.	
		WS6.02																					
20/09/21	14:10	WS6.03		5.30	2.30		1019		0.1	0.0	NA	ND	ND	ND	ND	0.1	4.1	20.8	18.8	1.0	ND	All good.	
20/09/21	14:19	WS6.04		5.27	2.49		1020		0.2	0.0	NA	ND	ND	ND	ND	0.1	2.5	20.8	19.4	1.0	ND	All good.	
20/09/21	14:15	WS6.06		5.42	2.58		1020		6.3	0.1	NA	ND	ND	ND	ND	0.1	2.7	20.8	19.3	1.0	ND	All good.	
20/09/21	13:54	WS7.03		5.47	3.24		1019		0.2	-0.1	NA	ND	ND	ND	ND	0.1	0.3	20.8	20.6	1.0	ND	All good.	
20/09/21	13:51	WS7.04		5.32	2.25		1019		0.1	0.0	NA	ND	ND	ND	ND	0.1	3.3	20.8	18.9	1.0	ND	All good.	
20/09/21	10:02	BH1.01		10.47	4.34		1018		-0.2	-0.1	NA	ND	ND	ND	ND	0.1	0.7	20.8	19.5	ND	ND	All good.	
20/09/21	NR	BH4.02		NR	NR		NR		NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unable to access borehole, bolt has been overscrewed during installation resulting in the cover being impossible to open with an allen key.	
20/09/21	12:58	BH5.01		10.48	1.95		1018		0.4	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	19.1	1.0	ND	All good.	
20/09/21	12:19	BH5.02		5.46	2.68		1019		-0.1	0.0	NA	ND	0.2	ND	4	0.1	ND	20.8	20.0	1.0	1	All good.	
20/09/21	12:03	BH5.03		10.44	0.75		1020		-0.1	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	18.9	1.0	ND	All good.	
20/09/21	11:51	BH5.05		10.02	1.95		1019		-0.4	0.0	NA	ND	ND	ND	ND	0.1	0.4	20.8	19.7	ND	ND	All good.	
20/09/21	14:12	BH6.02		10.33	2.66		1020		0.1	0.0	NA	ND	ND	ND	ND	0.1	2.1	20.8	19.5	1.0	ND	All good.	
20/09/21	14:17	BH6.03		5.48	2.74		1020		0.2	0.0	NA	ND	ND	ND	ND	0.1	2.1	20.8	19.4	1.0	ND	All good.	
20/09/21	13:57	BH7.01		20.34	3.92		1018		3.4	0.0	NA	ND	ND	ND	ND	0.1	2.2	20.8	18.4	1.0	ND	All good.	
20/09/21	13:48	BH7.03		5.06	2.53		1020		0.3	0.0	NA	ND	ND	ND	ND	0.1	2.3	20.8	19.1	1.0	ND	All good.	

Site: Dunsbury Park, Portsmouth Job number: Client: Hydrock Gas analyser: G500691 Equipment check OK: Y Service in date: Y Calibration check OK: Y Name of person monitoring: Richard Ward							Notes on site conditions: Sunny, dry, ground dry, moderate breeze.															
Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																						
Monitoring round		Borehole details					Pressure and flow				Gas concentrations										Local conditions	
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	VOC (as ppm using PID)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Notes on condition of borehole and surrounding ground
												Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	CO (PPM)	H ₂ S (PPM)	
24/09/21	09:19	WS1.01		5.39	2.92		1015		-0.5	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	19.5	ND	ND	All good.
24/09/21	10:23	WS4.03		5.49	2.24		1014		-0.1	0.0	NA	ND	ND	ND	ND	0.1	5.8	20.8	14.7	ND	ND	All good.
24/09/21	10:45	WS4.04		5.36	3.47		1014		0.1	-0.1	NA	ND	ND	ND	ND	0.1	ND	20.8	16.1	1.0	ND	All good.
24/09/21	10:49	WS4.05		5.45	2.78		1015		0.0	0.0	NA	ND	ND	ND	ND	0.1	1.5	20.8	15.1	1.0	ND	All good.
24/09/21	09:46	WS5.02		5.23	4.00		1015		0.1	0.0	NA	ND	2.6	ND	52	0.1	0.1	20.8	6.9	1.0	1	All good.
24/09/21	09:41	WS5.04		5.54	2.47		1015		-3.6	-0.7	NA	ND	0.4	ND	8	0.1	ND	20.8	4.4	1.0	1	All good.
24/09/21	09:39	WS5.05		5.51	2.20		1015		5.9	0.0	NA	ND	ND	ND	ND	0.1	1.2	20.8	12.9	ND	1	All good.
24/09/21	09:34	WS5.08		5.44	1.55		1015		12.0	4.1	NA	ND	ND	ND	ND	0.1	0.1	20.8	18.3	2.0	1	All good.
24/09/21	11:55	WS6.01		5.38	2.19		1012		3.0	0.0	NA	ND	ND	ND	ND	0.1	2.6	20.8	19.6	1.0	ND	All good.
25/09/21	11:59	WS6.02		5.37	2.49		1010		0.9	0.0	NA	ND	ND	ND	ND	0.1	3.8	20.8	19.3	1.0	ND	All good.
24/09/21	12:08	WS6.03		5.30	2.43		1014		0.2	0.0	NA	ND	ND	ND	ND	0.1	5.9	20.8	17.8	1.0	ND	All good.
24/09/21	12:18	WS6.04		5.27	2.56		1014		2.5	0.0	NA	ND	ND	ND	ND	0.1	2.3	20.8	19.6	1.0	ND	All good.
24/09/21	12:13	WS6.06		5.42	2.67		1014		2.5	0.0	NA	ND	ND	ND	ND	0.1	2.4	20.8	19.8	1.0	ND	All good.
24/09/21	11:38	WS7.03		5.47	3.62		1013		0.1	0.0	NA	ND	ND	ND	ND	0.1	0.7	20.8	20.5	1.0	ND	All good.
24/09/21	11:28	WS7.04		5.32	2.39		1012		2.7	0.1	NA	ND	ND	ND	ND	0.1	3.6	20.8	19.0	1.0	ND	All good.
24/09/21	09:23	BH1.01		10.47	4.35		1015		-0.5	0.0	NA	ND	ND	ND	ND	0.1	0.8	20.8	19.1	1.0	ND	All good.
24/09/21	NR	BH4.02		NR	NR		NR		NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Unable to access borehole, bolt has been overscrewed during installation resulting in the cover being impossible to open with an allen key.
24/09/21	09:49	BH5.01		10.48	2.00		1015		5.2	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	18.9	1.0	1	All good.
24/09/21	09:43	BH5.02		5.46	2.69		1015		-0.1	0.0	NA	ND	ND	ND	ND	0.1	ND	20.8	19.7	1.0	1	All good.
24/09/21	09:36	BH5.03		10.44	0.56		1015		-0.2	-0.1	NA	ND	ND	ND	ND	0.1	0.1	20.8	19.8	ND	1	All good.
24/09/21	09:31	BH5.05		10.02	1.98		1015		1.9	0.1	NA	ND	ND	ND	ND	0.1	0.4	20.8	19.6	1.0	ND	All good.
24/09/21	12:10	BH6.02		10.33	2.67		1014		3.8	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.6	1.0	ND	All good.
24/09/21	12:15	BH6.03		5.48	2.76		1014		0.3	0.0	NA	ND	ND	ND	ND	0.1	0.1	20.8	20.7	1.0	ND	All good.
24/09/21	11:48	BH7.01		20.34	3.94		1013		3.1	0.0	NA	ND	ND	ND	ND	0.1	2.2	20.8	18.4	1.0	ND	All good.
24/09/21	11:13	BH7.03		5.06	2.54		1015		0.2	0.0	NA	ND	ND	ND	ND	0.1	2.2	20.8	19.1	1.0	ND	All good.

Ground Gas Risk Assessment



Job Number 19453
Job Name Dunsbury Park
Client Portsmouth City Council

Data All Data

Max CH4	Max CO2	Worst Case Flow	Worst Case GSV Methane	Worst Case GSV CO ₂
4.2	1.2	4.5	0.1890	0.0540

Number of Readings	44
Number of Monitoring Routs	9
Number of Readings with Flow Rate	44

NHBC Assessment				
	Methane		Carbon Dioxide	
	Max Value	GSV	Max Value	GSV
Green	39	44	44	44
Amber 1	5	0	0	0
Amber 2	0	0	0	0
Red	0	0	0	0

CIRIA C665 Assessment				
	Methane		Carbon Dioxide	
	Max Value	GSV	Max Value	GSV
CS1	39	44	44	44
CS2	5	0	0	0
CS3	N/A	0	N/A	0
CS4	N/A	0	N/A	0
CS5	N/A	0	N/A	0
CS6	N/A	0	N/A	0

Location	Pressure Tre0	Date	Relative Pressure (mb)	Flow Rate (l/hr)	Atmos. Pressure (m.bar)	CH ₄ (% vol)		(%LEL)		CO ₂ (% vol)		O ₂ (% vol)		GSV - CH4	GSV - CO ₂
						Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady		
WS5.02		11/08/21	0.07	0.0	1017	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.4	0.0000	0.0000
WS5.04		11/08/21	0.00	0.0	1017	0.0	0.0	0.0	0.0	0.0	0.0	20.2	20.0	0.0000	0.0000
WS5.05		11/08/21	-0.07	0.1	1018	0.0	0.0	0.0	0.0	0.0	0.0	20.3	20.3	0.0000	0.0000
WS5.08		11/08/21	0.00	0.1	1018	0.0	0.0	0.0	0.0	0.0	0.0	20.4	20.4	0.0000	0.0000
WS5.02		27/08/21	2.59	0.0	1019	0.0	4.0	0.0	80.0	0.1	0.1	20.8	9.4	0.0000	0.0000
WS5.04		27/08/21	-21.92	-5.2	1019	0.0	0.2	0.0	4.0	0.1	0.0	20.8	10.9	-0.0104	0.0000
WS5.05		27/08/21	-46.33	-9.4	1019	0.0	0.0	0.0	0.0	0.1	0.4	20.8	17.5	0.0000	-0.0376
WS5.08		27/08/21	-12.18	-0.6	1019	0.0	0.0	0.0	0.0	0.1	0.2	20.8	20.5	0.0000	-0.0012
BH5.01		27/08/21	0.00	0.0	1019	0.0	0.0	0.0	0.0	0.1	0.1	20.8	19.7	0.0000	0.0000
BH5.02		27/08/21	0.03	0.0	1020	0.0	0.0	0.0	0.0	0.1	0.0	20.8	20.3	0.0000	0.0000
BH5.03		27/08/21	14.46	4.5	1020	0.0	0.0	0.0	0.0	0.1	0.1	20.8	20.8	0.0000	0.0045
BH5.05		27/08/21	0.02	0.0	1021	0.0	0.0	0.0	0.0	0.1	0.2	20.8	19.2	0.0000	0.0000
WS5.02		07/09/21	0.16	0.0	1019	0.0	4.1	0.0	82.0	0.1	0.1	20.8	4.8	0.0000	0.0000
WS5.04		07/09/21	-13.58	-3.4	1019	0.0	0.1	0.0	2.0	0.1	0.0	20.8	9.9	-0.0034	0.0000
WS5.05		07/09/21	-51.06	-11.7	1020	0.0	0.0	0.0	0.0	0.1	0.5	20.8	15.3	0.0000	-0.0585
WS5.08		07/09/21	-15.58	-4.8	1019	0.0	0.0	0.0	0.0	0.1	0.4	20.8	19.3	0.0000	-0.0192
BH5.01		07/09/21	0.14	0.0	1019	0.0	0.0	0.0	0.0	0.1	0.0	20.8	18.6	0.0000	0.0000
BH5.02		07/09/21	0.09	0.0	1019	0.0	0.0	0.0	0.0	0.1	0.0	20.8	19.5	0.0000	0.0000
BH5.03		07/09/21	0.00	0.0	1019	0.0	0.0	0.0	0.0	0.1	0.1	20.8	20.0	0.0000	0.0000
BH5.05		07/09/21	-0.22	0.0	1019	0.0	0.0	0.0	0.0	0.1	0.3	20.8	19.2	0.0000	0.0000
WS5.02		15/09/21	-0.17	0.0	1012	0.0	4.1	0.0	82.0	0.1	0.1	20.8	5.3	0.0000	0.0000
WS5.04		15/09/21	-24.25	-6.4	1012	0.0	0.2	0.0	4.0	0.1	0.0	20.8	8.7	-0.0128	0.0000
WS5.05		15/09/21	-5.11	-7.9	1012	0.0	0.0	0.0	0.0	0.1	0.9	20.8	12.9	0.0000	-0.0711
WS5.08		15/09/21	-1.29	0.1	1012	0.0	0.0	0.0	0.0	0.1	0.1	20.8	20.3	0.0000	0.0001
BH5.01		15/09/21	0.14	0.0	1011	0.0	0.0	0.0	0.0	0.1	0.1	20.8	18.9	0.0000	0.0000
BH5.02		15/09/21	-0.21	0.0	1012	0.0	0.0	0.0	0.0	0.1	0.0	20.8	19.8	0.0000	0.0000
BH5.03		15/09/21	-0.10	0.0	1012	0.0	0.0	0.0	0.0	0.1	0.1	20.8	19.6	0.0000	0.0000
BH5.05		15/09/21	-0.22	0.0	1012	0.0	0.0	0.0	0.0	0.1	0.4	20.8	19.7	0.0000	0.0000
WS5.02		20/09/21	-0.07	0.0	1020	0.0	0.0	0.0	0.0	0.1	0.1	20.8	4.4	0.0000	0.0000
WS5.04		20/09/21	-16.08	-5.1	1020	0.0	4.2	0.0	84.0	0.1	0.0	20.8	11.2	-0.2142	0.0000
WS5.05		20/09/21	-11.73	-3.9	1020	0.0	0.0	0.0	0.0	0.1	1.1	20.8	11.9	0.0000	-0.0429
WS5.08		20/09/21	-6.26	-1.8	1020	0.0	0.0	0.0	0.0	0.1	0.5	20.8	19.6	0.0000	-0.0090
BH5.01		20/09/21	0.35	0.0	1018	0.0	0.0	0.0	0.0	0.1	0.1	20.8	19.1	0.0000	0.0000
BH5.02		20/09/21	-0.09	0.0	1019	0.0	0.2	0.0	4.0	0.1	0.0	20.8	20.0	0.0000	0.0000
BH5.03		20/09/21	-0.09	0.0	1020	0.0	0.0	0.0	0.0	0.1	0.1	20.8	18.9	0.0000	0.0000
BH5.05		20/09/21	-0.40	0.0	1019	0.0	0.0	0.0	0.0	0.1	0.4	20.8	19.7	0.0000	0.0000
WS5.02		24/09/21	0.12	0.0	1015	0.0	2.6	0.0	52.0	0.1	0.1	20.8	6.9	0.0000	0.0000
WS5.04		24/09/21	-3.64	-0.7	1015	0.0	0.4	0.0	8.0	0.1	0.0	20.8	4.4	-0.0028	0.0000
WS5.05		24/09/21	5.88	0.0	1015	0.0	0.0	0.0	0.0	0.1	1.2	20.8	12.9	0.0000	0.0000
WS5.08		24/09/21	11.98	4.1	1015	0.0	0.0	0.0	0.0	0.1	0.1	20.8	18.3	0.0000	0.0041
BH5.01		24/09/21	5.19	0.0	1015	0.0	0.0	0.0	0.0	0.1	0.1	20.8	18.9	0.0000	0.0000
BH5.02		24/09/21	-0.07	0.0	1015	0.0	0.0	0.0	0.0	0.1	0.0	20.8	19.7	0.0000	0.0000
BH5.03		24/09/21	-0.22	-0.1	1015	0.0	0.0	0.0	0.0	0.1	0.1	20.8	19.8	0.0000	-0.0001
BH5.05		24/09/21	1.86	0.1	1015	0.0	0.0	0.0	0.0	0.1	0.4	20.8	19.6	0.0000	0.0004

Appendix F Contamination Test Results and Statistical Analysis

**Yacklin Panza**

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Analytical Report Number : 21-11194

Project / Site name:	Dunsbury Park	Samples received on:	21/09/2021
Your job number:	19453-GELO ALL UNITS	Samples instructed on/ Analysis started on:	21/09/2021
Your order number:	PO10051	Analysis completed by:	28/09/2021
Report Issue Number:	1	Report issued on:	28/09/2021
Samples Analysed:	5 water samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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



Analytical Report Number: 21-11194
Project / Site name: Dunsbury Park

Your Order No: PO10051

Lab Sample Number	2017861				2017862	2017863	2017864	2017865
Sample Reference	WS1.01				WS5.02	WS5.04	WS5.05	WS5.08
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	2.90				3.97	2.21	2.03	1.43
Date Sampled	20/09/2021				20/09/2021	20/09/2021	20/09/2021	20/09/2021
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	6.9	8.4	7.6	8.0	7.7
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	580	1400	670	590	630
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	4.8	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate as SO ₄	µg/l	45	ISO 17025	39000	12500	29200	62100	79600
Chloride	mg/l	0.15	ISO 17025	35	110	70	52	53
Fluoride	µg/l	50	ISO 17025	120	640	430	300	210
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	64	5700	120	37	45
Ammoniacal Nitrogen as NH ₃	µg/l	15	ISO 17025	77	6900	140	45	54
Ammoniacal Nitrogen as NH ₄	µg/l	15	ISO 17025	82	7300	150	47	58
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	3.52	24.6	4.94	1.83	16.3
Nitrate as N	mg/l	0.01	ISO 17025	3.60	0.48	0.06	0.05	0.09
Nitrate as NO ₃	mg/l	0.05	ISO 17025	15.9	2.12	0.26	0.21	0.41
Nitrite as N	µg/l	1	ISO 17025	150	< 1.0	4.7	1.4	< 1.0
Nitrite as NO ₂	µg/l	5	ISO 17025	500	< 5.0	16	< 5.0	< 5.0

Hardness - Total	mgCaCO ₃ /l	1	ISO 17025	272	794	296	264	301
Bromate by IC	mg/l	0.002	ISO 17025	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	9400	4.1	2.5	2.0
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.04	NONE	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
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Analytical Report Number: 21-11194
Project / Site name: Dunsbury Park

Your Order No: PO10051

Lab Sample Number				2017861	2017862	2017863	2017864	2017865
Sample Reference				WS1.01	WS5.02	WS5.04	WS5.05	WS5.08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	3.97	2.21	2.03	1.43
Date Sampled				20/09/2021	20/09/2021	20/09/2021	20/09/2021	20/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	86	110	160	120	99
Calcium (dissolved)	mg/l	0.012	ISO 17025	73	280	74	71	82
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	2.4	2.3	2.1	1.6	2.2
Iron (dissolved)	mg/l	0.004	ISO 17025	0.008	0.11	0.49	0.14	< 0.004
Iron (dissolved)	µg/l	4	ISO 17025	8.0	110	490	140	< 4.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	22	24	27	21	23
Sodium (dissolved)	mg/l	0.01	ISO 17025	34	71	45	43	31

Aluminium (dissolved)	µg/l	1	ISO 17025	1.5	19	1.4	22	260
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.6	1.2	0.5	< 0.4	< 0.4
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.24	32.6	1.61	3.51	3.60
Barium (dissolved)	µg/l	0.06	ISO 17025	67	55	120	50	60
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.17	0.08	0.02	0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.4	2.3	2.1	1.6	2.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	6.0	4.6	0.7	0.3	1.0
Copper (dissolved)	µg/l	0.5	ISO 17025	2.7	1.8	5.5	2.8	1.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	300	210	120	46	260
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	13	77	2.7	1.6	2.1
Selenium (dissolved)	µg/l	0.6	ISO 17025	0.6	13	1.1	< 0.6	< 0.6
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.45	0.33	0.79	0.74
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.2	6.1	0.5	0.6	1.5
Zinc (dissolved)	µg/l	0.5	ISO 17025	8.4	3.2	5.3	4.5	2.3

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	31.9	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sum of m, p & o-Xylene	µg/l	2	ISO 17025	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0



Analytical Report Number: 21-11194

Project / Site name: Dunsbury Park

Your Order No: PO10051

Lab Sample Number				2017861	2017862	2017863	2017864	2017865
Sample Reference				WS1.01	WS5.02	WS5.04	WS5.05	WS5.08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	3.97	2.21	2.03	1.43
Date Sampled				20/09/2021	20/09/2021	20/09/2021	20/09/2021	20/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	32	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	32	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	< 10	32	< 10	< 10	< 10

TPH-CWG Total C5 - C44	µg/l	10	NONE	< 10	32	< 10	< 10	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 21-11194
Project / Site name: Dunsbury Park

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE



Analytical Report Number : 21-11194
Project / Site name: Dunsbury Park

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

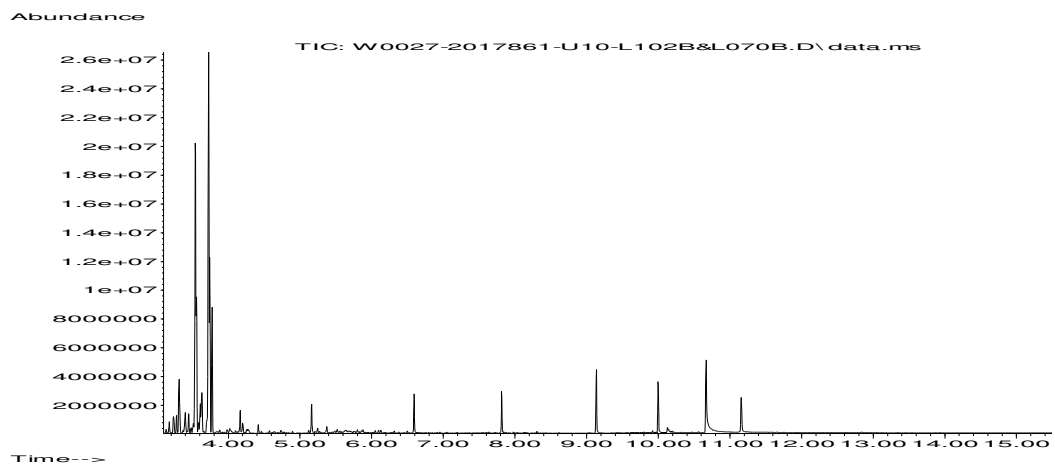
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	ISO 17025
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride (dissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

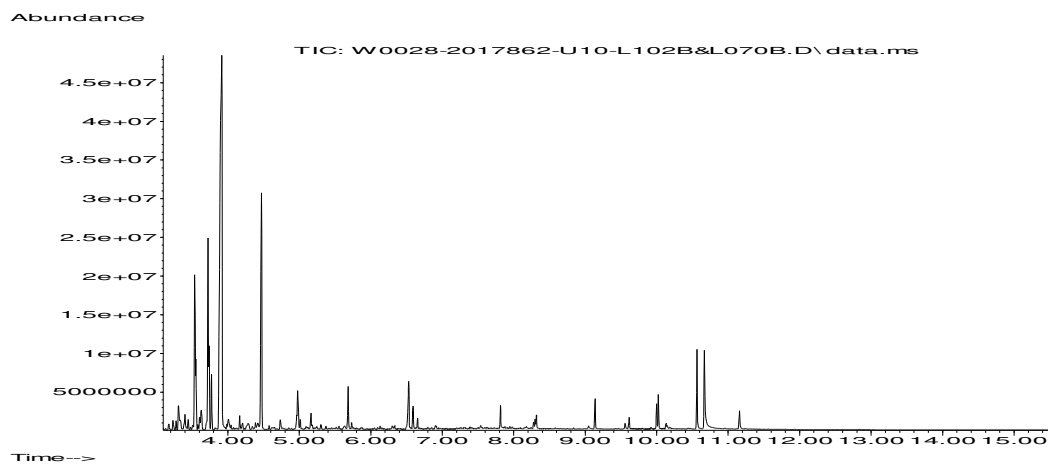
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

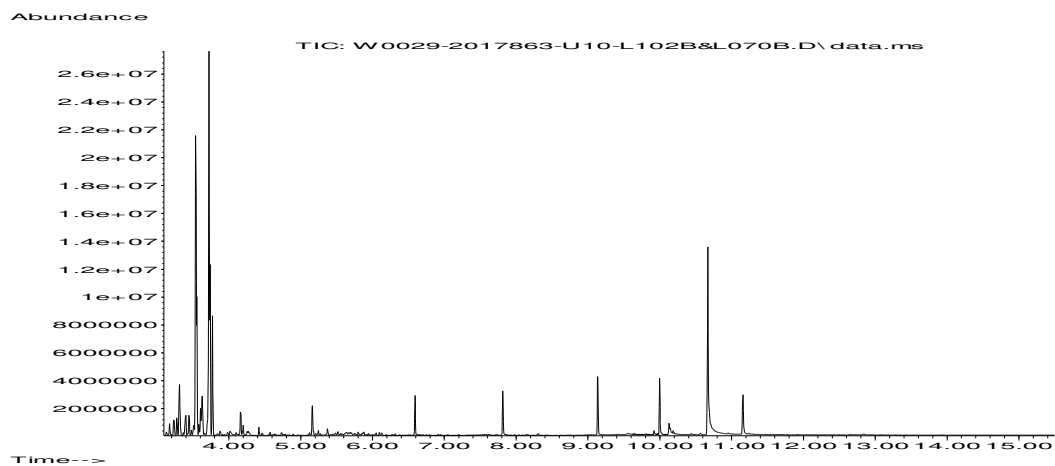
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

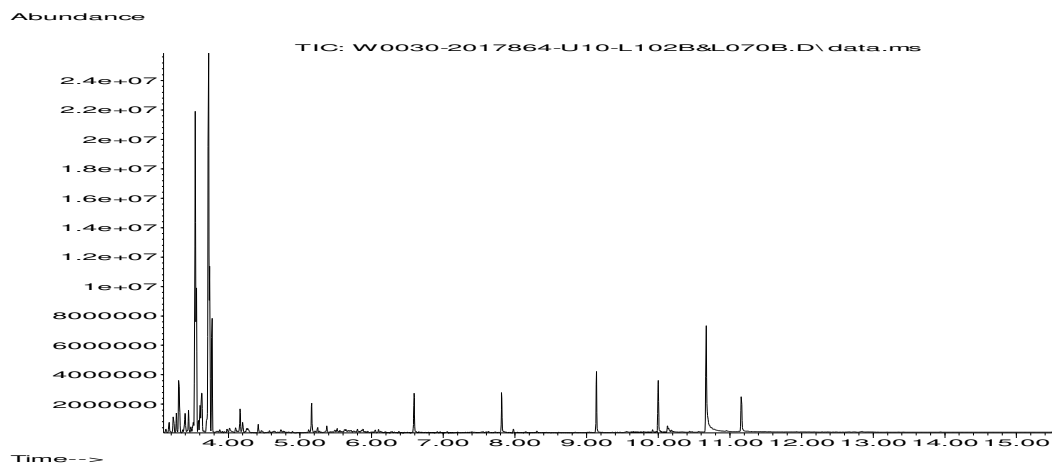
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

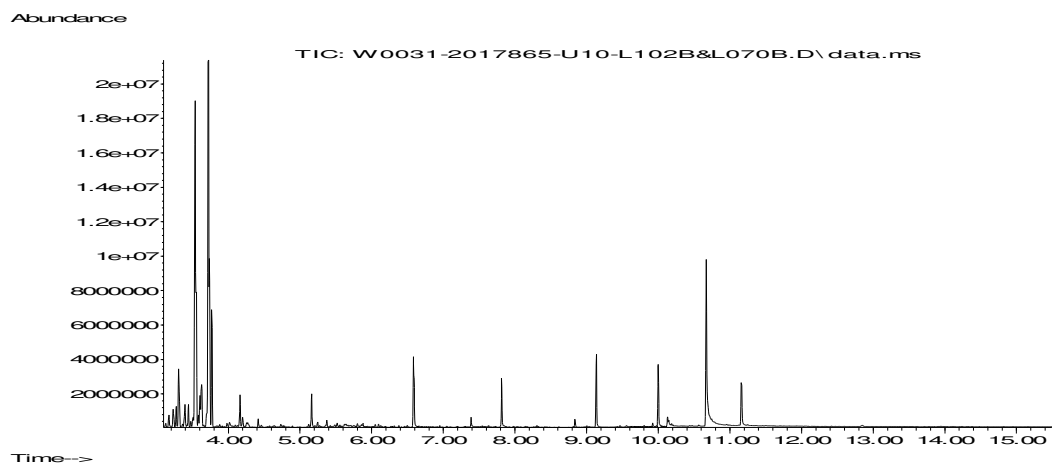
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.











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Analytical Report Number : 21-95123

Project / Site name:	Dunsbury Park	Samples received on:	25/08/2021
Your job number:	19453-GELO	Samples instructed on/ Analysis started on:	25/08/2021
Your order number:	PO09395	Analysis completed by:	02/09/2021
Report Issue Number:	1	Report issued on:	02/09/2021
Samples Analysed:	7 soil samples		

Signed:

Izabela Wójcik

Izabela Wójcik
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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

Analytical Report Number: 21-95123
Project / Site name: Dunsbury Park
Your Order No: P009395

Lab Sample Number				1985519	1985520	1985521	1985522	1985523
Sample Reference				BH5.01	BH5.02	BH5.05	BH1.01	BH4.01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05	0.05	0.20	1.00	0.50
Date Sampled				09/08/2021	10/08/2021	13/08/2021	23/08/2021	23/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	4.7	13	15	19
Total mass of sample received	kg	0.001	NONE	1.2	1.2	1.2	1.2	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.9	9.6	10.6	9.8	6.5
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.044	0.055	0.29	0.24	0.045
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0061	0.0033	0.0052	0.0061	0.0028

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 21-95123
Project / Site name: Dunsbury Park
Your Order No: P009395

Lab Sample Number	1985519	1985520	1985521	1985522	1985523
Sample Reference	BH5.01	BH5.02	BH5.05	BH1.01	BH4.01
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.05	0.05	0.20	1.00	0.50
Date Sampled	09/08/2021	10/08/2021	13/08/2021	23/08/2021	23/08/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	11	8.3	8.1	6.9
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.44	0.21	0.63	0.57	0.76
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.2	0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.9	< 0.2	0.4	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	18	9.5	28	26	25
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	9.6	29	26	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.1	3.9	12	64	8.7
Lead (aqua regia extractable)	mg/kg	1	MCERTS	35	22	14	24	8.1
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	6.0	12	16	16
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	28	12	42	39	31
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	79	100	66	150	49

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 21-95123
Project / Site name: Dunsbury Park
Your Order No: P009395

Lab Sample Number				1985519	1985520	1985521	1985522	1985523
Sample Reference				BH5.01	BH5.02	BH5.05	BH1.01	BH4.01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05	0.05	0.20	1.00	0.50
Date Sampled				09/08/2021	10/08/2021	13/08/2021	23/08/2021	23/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	-	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	< 10	< 10	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	-	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-95123
Project / Site name: Dunsbury Park
Your Order No: P009395

Lab Sample Number				1985524	1985525
Sample Reference				BH4.02	BH6.01
Sample Number				None Supplied	None Supplied
Depth (m)				0.50	0.40
Date Sampled				24/08/2021	17/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	15
Total mass of sample received	kg	0.001	NONE	1.2	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.1	7.7
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.22	0.0055
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0031	0.0070

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80
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Analytical Report Number: 21-95123
 Project / Site name: Dunsbury Park
 Your Order No: P009395

Lab Sample Number				1985524	1985525
Sample Reference				BH4.02	BH6.01
Sample Number				None Supplied	None Supplied
Depth (m)				0.50	0.40
Date Sampled				24/08/2021	17/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.5	6.0
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.66	0.31
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	32	21
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	5.4
Lead (aqua regia extractable)	mg/kg	1	MCERTS	6.3	9.2
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	5.6
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	56	27

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0

Analytical Report Number: 21-95123
Project / Site name: Dunsbury Park
Your Order No: P009395

Lab Sample Number				1985524	1985525
Sample Reference				BH4.02	BH6.01
Sample Number				None Supplied	None Supplied
Depth (m)				0.50	0.40
Date Sampled				24/08/2021	17/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Petroleum Hydrocarbons					
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-95123

Project / Site name: Dunsbury Park

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1985519	BH5.01	None Supplied	0.05	Brown clay and sand with gravel and vegetation.
1985520	BH5.02	None Supplied	0.05	Brown loam and sand with gravel and vegetation.
1985521	BH5.05	None Supplied	0.2	Brown loam and sand with gravel.
1985522	BH1.01	None Supplied	1	Brown clay and loam with gravel and vegetation.
1985523	BH4.01	None Supplied	0.5	Brown clay and loam.
1985524	BH4.02	None Supplied	0.5	Brown loam and sand with gravel.
1985525	BH6.01	None Supplied	0.4	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 21-95123
Project / Site name: Dunsbury Park

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS

Analytical Report Number : 21-95123
Project / Site name: Dunsbury Park

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

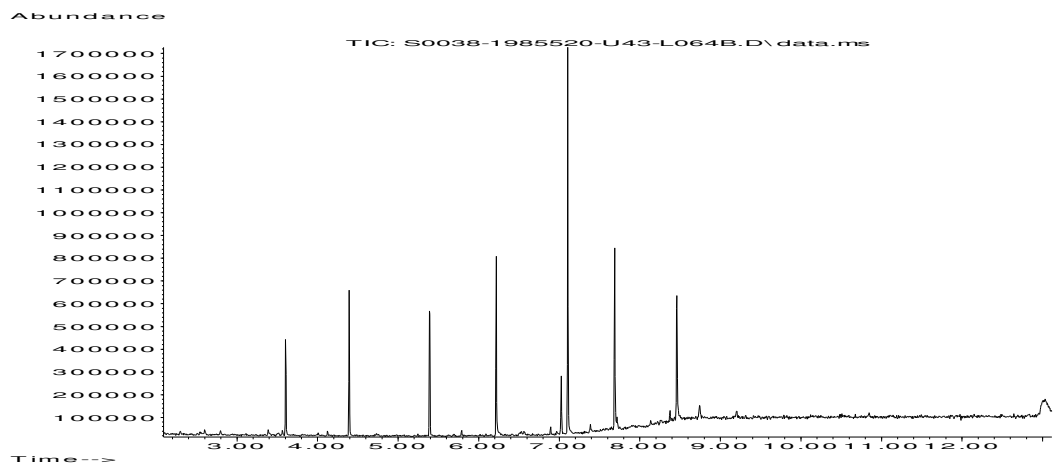
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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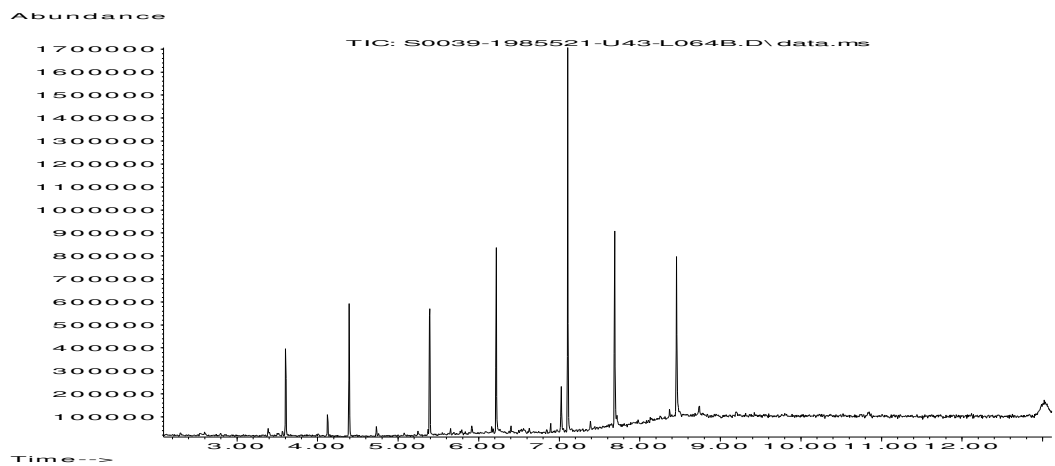
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

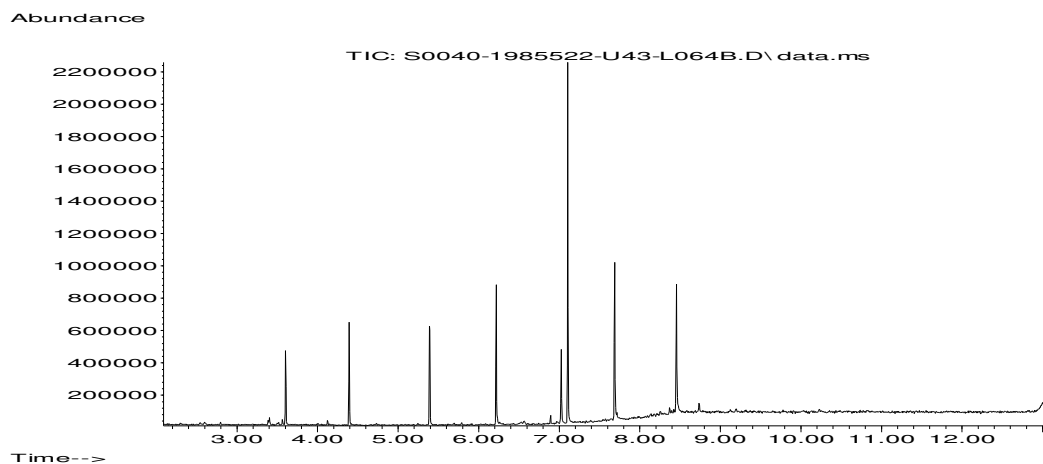
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

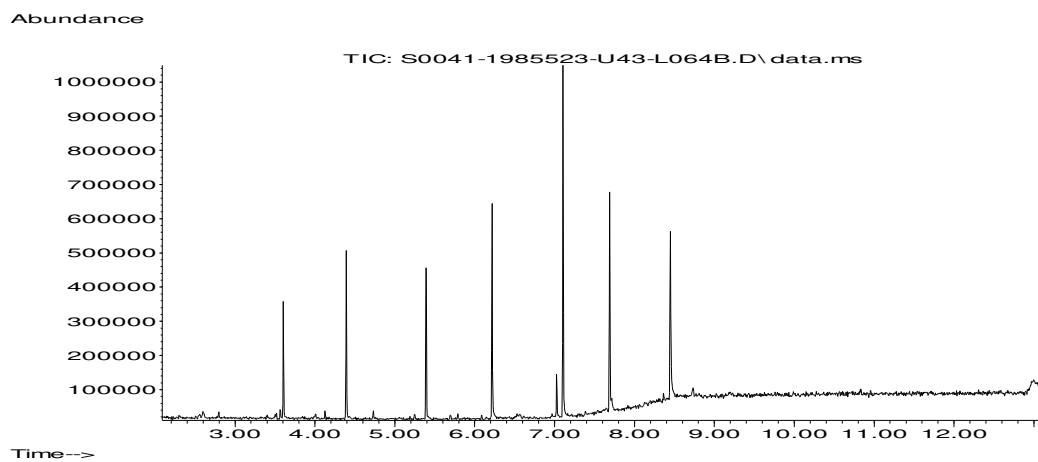
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

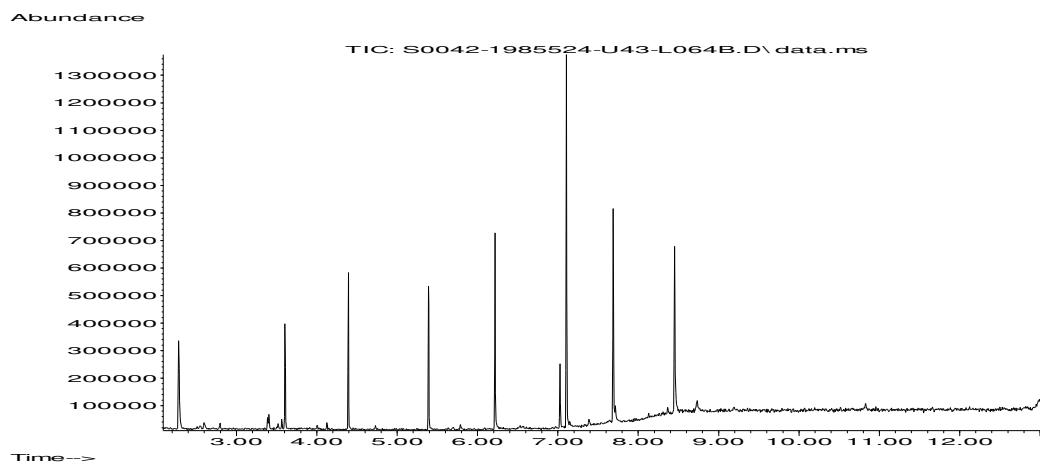
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

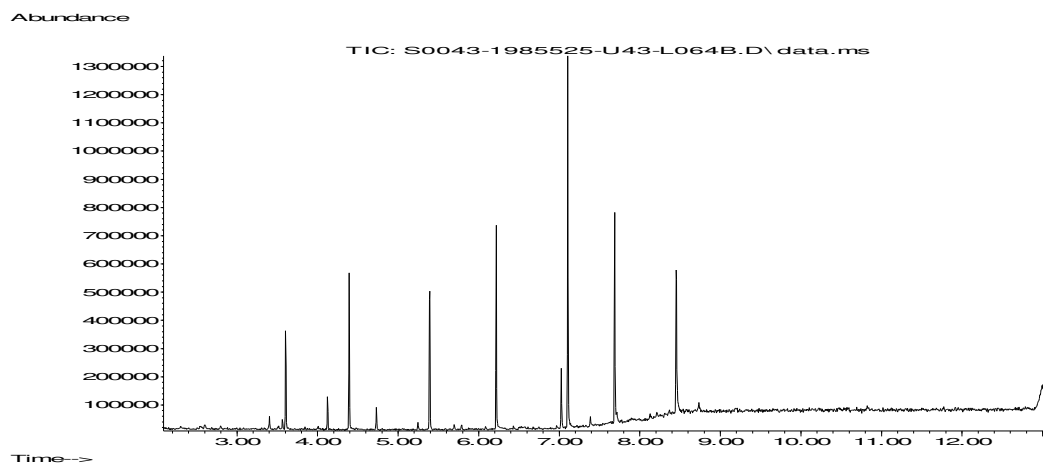












Analytical Report Number : 21-95123
Project / Site name: Dunsbury Park

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH1.01	None Supplied	S	1985522	c	Fraction Organic Carbon FOC Automated	L009	c
BH4.01	None Supplied	S	1985523	c	Fraction Organic Carbon FOC Automated	L009	c
BH4.02	None Supplied	S	1985524	c	Fraction Organic Carbon FOC Automated	L009	c
BH5.01	None Supplied	S	1985519	c	Free cyanide in soil	L080-PL	c
BH5.01	None Supplied	S	1985519	c	Fraction Organic Carbon FOC Automated	L009	c
BH5.01	None Supplied	S	1985519	c	Organic matter in soil	L023-PL	c
BH5.02	None Supplied	S	1985520	c	Free cyanide in soil	L080-PL	c
BH5.02	None Supplied	S	1985520	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
BH5.02	None Supplied	S	1985520	c	Fraction Organic Carbon FOC Automated	L009	c
BH5.02	None Supplied	S	1985520	c	Organic matter in soil	L023-PL	c
BH5.02	None Supplied	S	1985520	c	TPH in (Soil)	L076-PL	c
BH5.05	None Supplied	S	1985521	c	Free cyanide in soil	L080-PL	c
BH5.05	None Supplied	S	1985521	c	Fraction Organic Carbon FOC Automated	L009	c
BH6.01	None Supplied	S	1985525	c	Free cyanide in soil	L080-PL	c
BH6.01	None Supplied	S	1985525	c	Fraction Organic Carbon FOC Automated	L009	c

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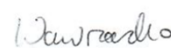
e: reception@i2analytical.com

e: Group Southampton cc engineer

Analytical Report Number : 21-90870

Project / Site name:	Dunsbury Park	Samples received on:	29/07/2021
Your job number:	19453-GELO UNIT 500	Samples instructed on/ Analysis started on:	04/08/2021
Your order number:	PO08918	Analysis completed by:	10/08/2021
Report Issue Number:	1	Report issued on:	10/08/2021
Samples Analysed:	16 soil samples		

Signed:



Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961867	1961868	1961869	1961870	1961871
Sample Reference				TP5.01	TP5.03	TP5.05	TP5.06	WS5.01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.30	0.30	0.40	0.30
Date Sampled				20/07/2021	20/07/2021	20/07/2021	20/07/2021	27/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	4.5	15	18	15	17
Total mass of sample received	kg	0.001	NONE	1.3	1.0	1.3	1.0	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	8.9	7.8	10.5	-
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.052	0.098	0.051	0.33	-
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0012	0.0026	0.0017	0.0025	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
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Speciated PAHs

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	< 0.05	< 0.05	< 0.05	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 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	< 0.05	< 0.05	< 0.05	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	9.1	7.6	8.8	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.24	0.51	0.80	0.64	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.3	< 0.2	0.3	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.9	< 0.2	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	-
Chromium (III)	mg/kg	1	NONE	8.4	31	28	26	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.7	31	28	27	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.9	7.1	8.1	9.2	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	41	8.2	7.8	11	-
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	5.9	9.7	15	15	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	13	47	37	38	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	83	35	42	63	-

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961867	1961868	1961869	1961870	1961871
Sample Reference				TP5.01	TP5.03	TP5.05	TP5.06	WS5.01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.30	0.30	0.40	0.30
Date Sampled				20/07/2021	20/07/2021	20/07/2021	20/07/2021	27/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	3.6	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	21	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	-	21	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	-	< 8.4	-	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	32	-	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	-	32	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	-	< 8.4	-	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	-	< 10	-	< 10

TPH Total C5 - C44	mg/kg	10	NONE	< 10	-	32	-	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961872	1961873	1961874	1961875	1961876
Sample Reference				WS5.01	WS5.02	WS5.04	WS5.05	WS5.06
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.90	0.40	0.20	0.50
Date Sampled				27/07/2021	27/07/2021	27/07/2021	27/07/2021	26/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	15	14	11	17
Total mass of sample received	kg	0.001	NONE	1.2	1.2	0.90	1.2	1.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	9.3	10.9	10.1	-
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.028	0.20	0.20	0.24	-
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0013	0.0038	< 0.0010	0.0071	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
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Speciated PAHs

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	< 0.05	< 0.05	< 0.05	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 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	< 0.05	< 0.05	< 0.05	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	8.5	5.4	9.7	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.85	0.56	0.53	0.45	-
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.4	0.9	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	-
Chromium (III)	mg/kg	1	NONE	35	24	27	25	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	24	27	25	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	8.7	8.3	6.8	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	11	6.1	12	-
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	26	12	11	9.3	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	45	38	40	37	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	59	49	40	60	-

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961872	1961873	1961874	1961875	1961876
Sample Reference				WS5.01	WS5.02	WS5.04	WS5.05	WS5.06
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.90	0.40	0.20	0.50
Date Sampled				27/07/2021	27/07/2021	27/07/2021	27/07/2021	26/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	3.8
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	8.7
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	70
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	-	-	-	-	79
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	82
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	-	-	-	82

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	-	-	-	< 10

TPH Total C5 - C44	mg/kg	10	NONE	-	-	-	-	82
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961877	1961878	1961879	1961880	1961881
Sample Reference				WS5.06	WS5.08	WS5.09	WS5.10	WS5.10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.70	0.30	0.40	1.00
Date Sampled				26/07/2021	27/07/2021	26/07/2021	26/07/2021	26/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	14	9.1	10	16
Total mass of sample received	kg	0.001	NONE	0.90	1.0	1.1	1.1	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	9.3	10.6	-	9.1
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.38	0.030	0.059	-	0.033
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0033	0.0034	0.0023	-	< 0.0010

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
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Speciated PAHs

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	< 0.05	< 0.05	< 0.05	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 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	< 0.05	< 0.05	< 0.05	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	-	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.7	7.7	8.7	-	6.4
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.76	0.71	0.41	-	0.67
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	< 0.2	0.4	-	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	28	24	22	-	25
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	24	22	-	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	8.2	14	-	7.8
Lead (aqua regia extractable)	mg/kg	1	MCERTS	8.7	6.8	12	-	7.6
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	19	13	8.8	-	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	41	35	33	-	37
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	54	47	59	-	44

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961877	1961878	1961879	1961880	1961881
Sample Reference				WS5.06	WS5.08	WS5.09	WS5.10	WS5.10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.70	0.30	0.40	1.00
Date Sampled				26/07/2021	27/07/2021	26/07/2021	26/07/2021	26/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	< 10	-	< 10	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	< 10	-	< 10	-

TPH Total C5 - C44	mg/kg	10	NONE	-	< 10	-	< 10	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: PO08918

Lab Sample Number				1961882
Sample Reference				SA101
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				21/07/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	11
Total mass of sample received	kg	0.001	NONE	1.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.5
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.066
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0017

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.54
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2
Chromium (III)	mg/kg	1	NONE	25
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	7.5
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	52

Analytical Report Number: 21-90870
Project / Site name: Dunsbury Park
Your Order No: P008918

Lab Sample Number				1961882
Sample Reference				SA101
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				21/07/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Monoaromatics & Oxygenates				
Benzene	µg/kg	1	MCERTS	-
Toluene	µg/kg	1	MCERTS	-
Ethylbenzene	µg/kg	1	MCERTS	-
p & m-xylene	µg/kg	1	MCERTS	-
o-xylene	µg/kg	1	MCERTS	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-

TPH Total C5 - C44	mg/kg	10	NONE	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-90870

Project / Site name: Dunsbury Park

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1961867	TP5.01	None Supplied	0.1	Brown clay and sand with gravel and vegetation.
1961868	TP5.03	None Supplied	0.3	Light brown sandy clay.
1961869	TP5.05	None Supplied	0.3	Light brown sandy clay with vegetation.
1961870	TP5.06	None Supplied	0.4	Light brown clay and sand with gravel and vegetation.
1961871	WS5.01	None Supplied	0.3	Brown clay and sand with gravel and vegetation.
1961872	WS5.01	None Supplied	1.3	Brown clay and sand.
1961873	WS5.02	None Supplied	0.9	Brown clay and sand with vegetation and gravel
1961874	WS5.04	None Supplied	0.4	Brown sandy clay.
1961875	WS5.05	None Supplied	0.2	Light brown clay and sand with gravel and vegetation.
1961876	WS5.06	None Supplied	0.5	Brown clay and sand with gravel.
1961877	WS5.06	None Supplied	1.5	Grey clay.
1961878	WS5.08	None Supplied	0.7	Light brown sandy clay.
1961879	WS5.09	None Supplied	0.3	Light brown sand with gravel.
1961880	WS5.10	None Supplied	0.4	Light brown sand with gravel and plastic.
1961881	WS5.10	None Supplied	1	Brown sand with gravel.
1961882	SA101	None Supplied	0.3	Light brown sand with gravel.

Analytical Report Number : 21-90870
Project / Site name: Dunsbury Park

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE



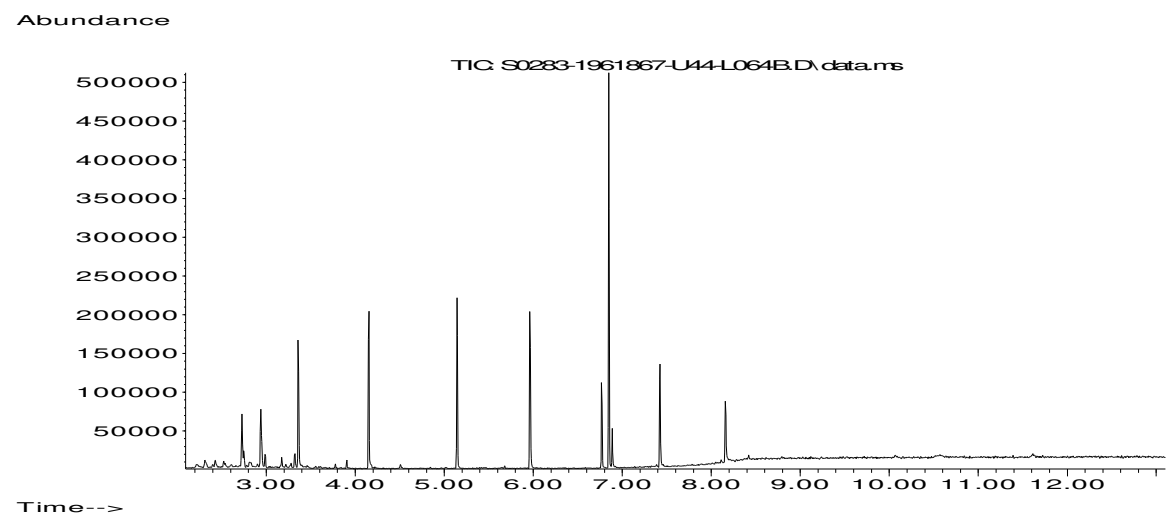
Analytical Report Number : 21-90870
Project / Site name: Dunsbury Park

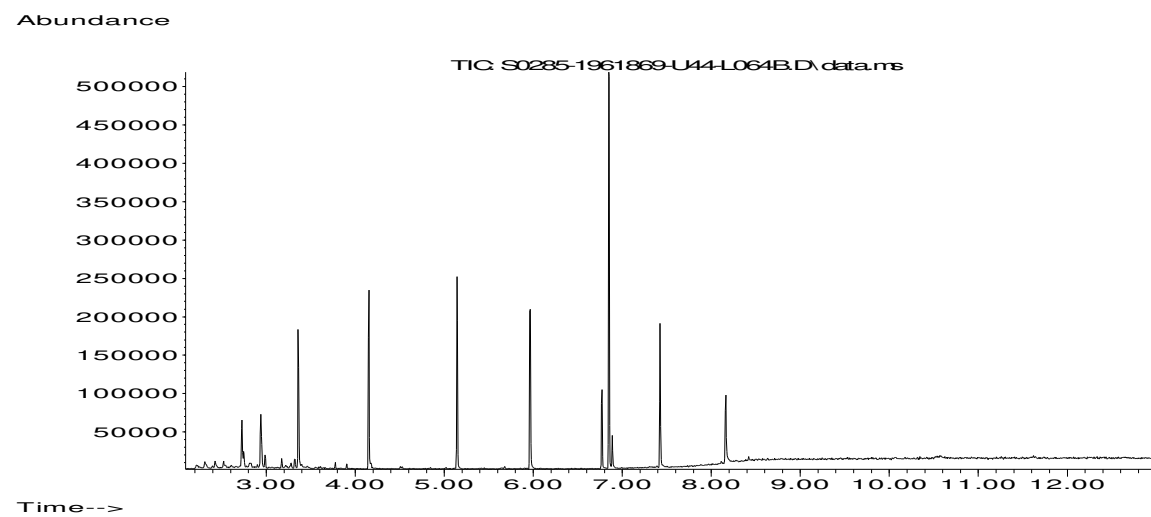
Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

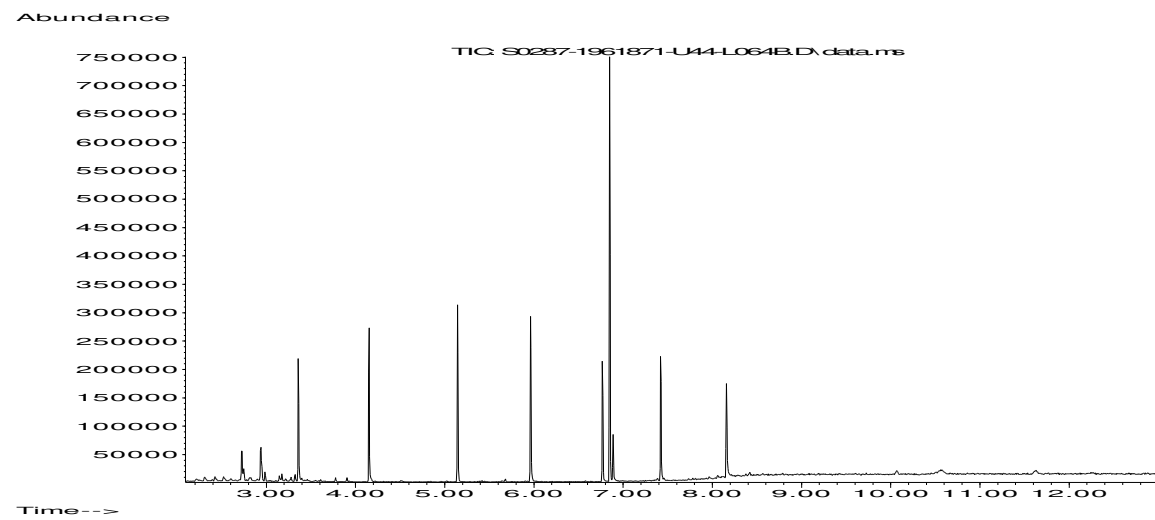
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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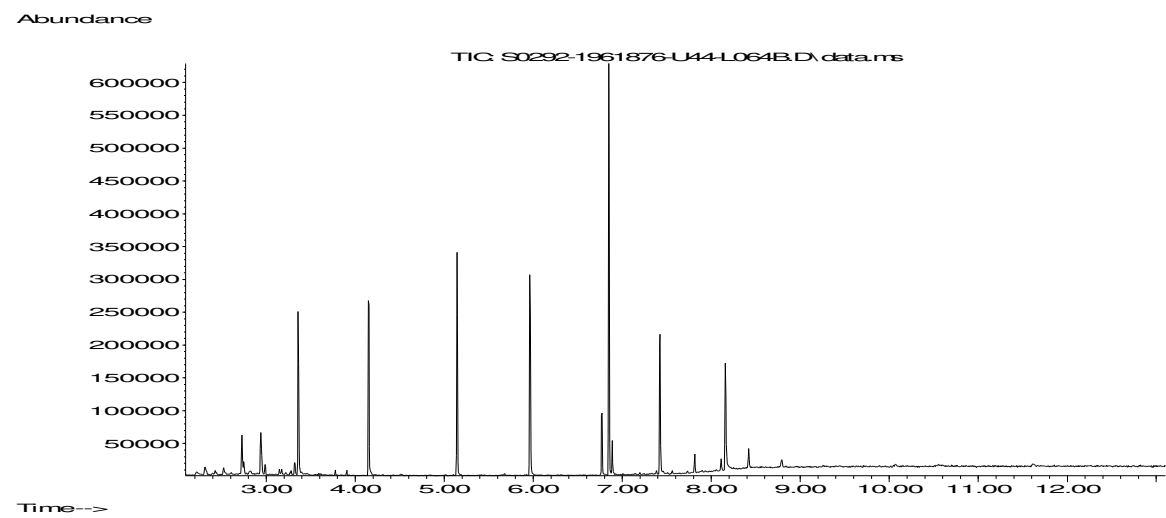
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

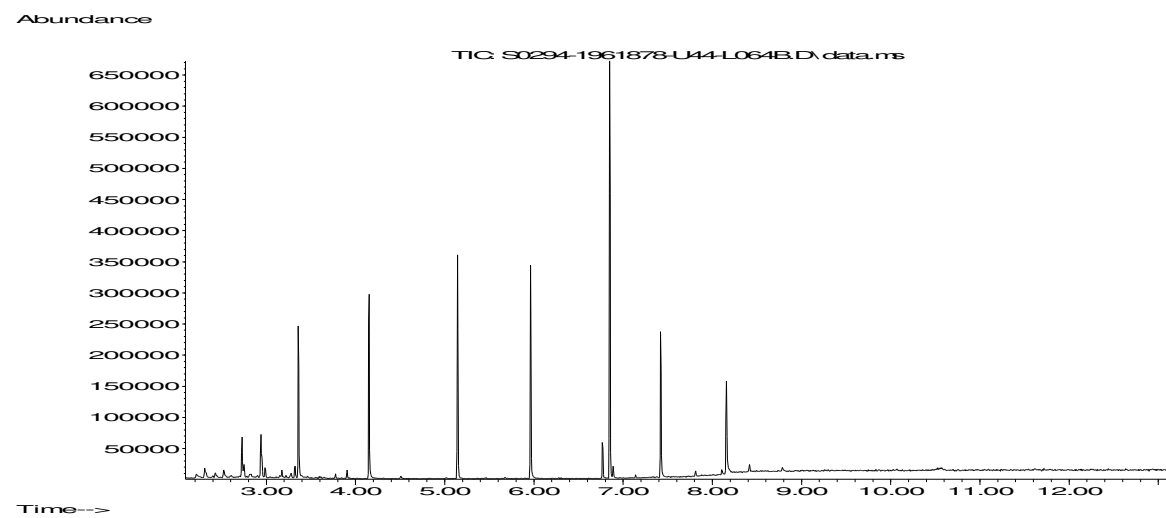
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

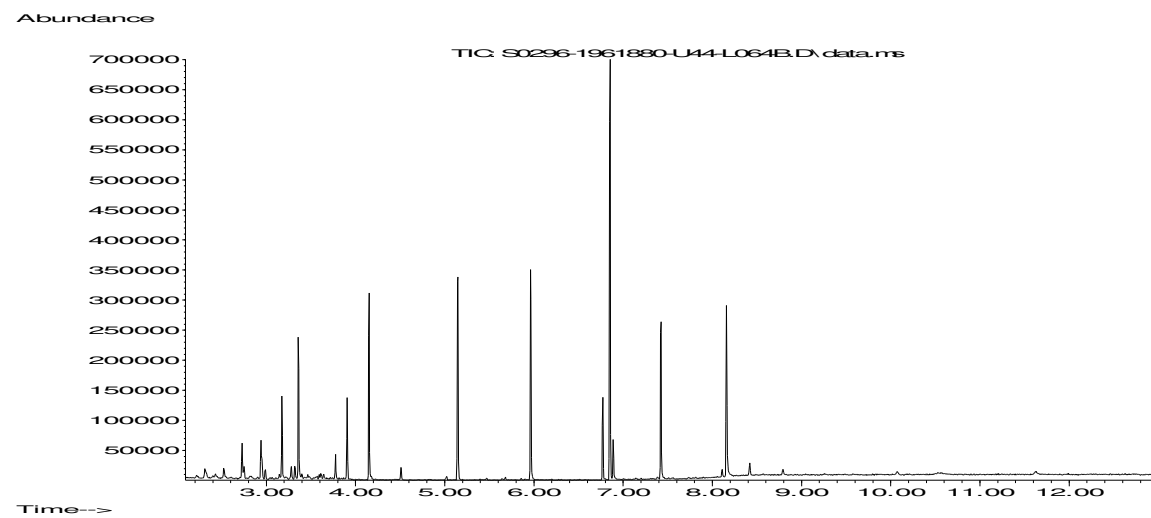












Sample Deviation Report



Analytical Report Number : 21-90870

Project / Site name: Dunsbury Park

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
SA101	None Supplied	S	1961882	c	Free cyanide in soil	L080-PL	c
TP5.01	None Supplied	S	1961867	c	Free cyanide in soil	L080-PL	c
TP5.01	None Supplied	S	1961867	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP5.01	None Supplied	S	1961867	c	TPH in (Soil)	L076-PL	c
TP5.03	None Supplied	S	1961868	c	Free cyanide in soil	L080-PL	c
TP5.05	None Supplied	S	1961869	c	Free cyanide in soil	L080-PL	c
TP5.05	None Supplied	S	1961869	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP5.05	None Supplied	S	1961869	c	TPH in (Soil)	L076-PL	c
TP5.06	None Supplied	S	1961870	c	Free cyanide in soil	L080-PL	c
WS5.01	None Supplied	S	1961872	c	Free cyanide in soil	L080-PL	c
WS5.02	None Supplied	S	1961873	c	Free cyanide in soil	L080-PL	c
WS5.04	None Supplied	S	1961874	bc	Free cyanide in soil	L080-PL	c
WS5.04	None Supplied	S	1961874	bc	Monohydric phenols in soil	L080-PL	b
WS5.04	None Supplied	S	1961874	bc	Speciated EPA-16 PAHs in soil	L064-PL	b
WS5.05	None Supplied	S	1961875	c	Free cyanide in soil	L080-PL	c
WS5.06	None Supplied	S	1961877	c	Free cyanide in soil	L080-PL	c
WS5.08	None Supplied	S	1961878	c	Free cyanide in soil	L080-PL	c
WS5.08	None Supplied	S	1961878	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
WS5.08	None Supplied	S	1961878	c	TPH in (Soil)	L076-PL	c
WS5.09	None Supplied	S	1961879	c	Free cyanide in soil	L080-PL	c
WS5.10	None Supplied	S	1961881	c	Free cyanide in soil	L080-PL	c

**Yacklin Panza**

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Analytical Report Number : 21-10737

Project / Site name:	Dunsbury Park	Samples received on:	16/09/2021
Your job number:	19453 GELO ALL UNITS	Samples instructed on/ Analysis started on:	17/09/2021
Your order number:	PO10000	Analysis completed by:	24/09/2021
Report Issue Number:	1	Report issued on:	24/09/2021
Samples Analysed:	8 water samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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



Analytical Report Number: 21-10737
Project / Site name: Dunsbury Park

Your Order No: PO10000

Lab Sample Number	2015467	2015468	2015469	2015470	2015471
Sample Reference	BH1.01	BH5.01	BH5.02	BH5.03	BH5.05
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	4.29	1.88	2.64	0.56	1.92
Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.7	8.0	7.9	7.9	7.9
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	430	590	1500	510	850
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	22700	19000	133000	15200	74500
Chloride	mg/l	0.15	ISO 17025	20	52	350	38	140
Fluoride	µg/l	50	ISO 17025	370	500	480	490	660
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	170	85	57	190	36
Ammoniacal Nitrogen as NH3	µg/l	15	ISO 17025	210	100	69	230	44
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	220	110	73	240	47
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	3.09	2.96	4.35	3.09	3.09
Nitrate as N	mg/l	0.01	ISO 17025	0.48	0.17	0.17	0.19	0.66
Nitrate as NO3	mg/l	0.05	ISO 17025	2.12	0.77	0.77	0.83	2.94
Nitrite as N	µg/l	1	ISO 17025	< 1.0	13	6.0	2.8	< 1.0
Nitrite as NO2	µg/l	5	ISO 17025	< 5.0	44	20	9.3	< 5.0

Hardness - Total	mg CaCO3/l	1	ISO 17025	192	278	400	264	308
Bromate by IC	mg/l	0.002	ISO 17025	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.04	NONE	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
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Analytical Report Number: 21-10737
Project / Site name: Dunsbury Park

Your Order No: PO10000

Lab Sample Number	2015467	2015468	2015469	2015470	2015471
Sample Reference	BH1.01	BH5.01	BH5.02	BH5.03	BH5.05
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	4.29	1.88	2.64	0.56	1.92
Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	62	200	560	180	260
Calcium (dissolved)	mg/l	0.012	ISO 17025	43	55	100	49	84
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	2.0	4.1	2.6	2.5	2.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.029	0.025	0.021	0.024	0.020
Iron (dissolved)	µg/l	4	ISO 17025	29	25	21	24	20
Magnesium (dissolved)	mg/l	0.005	ISO 17025	20	34	34	35	24
Sodium (dissolved)	mg/l	0.01	ISO 17025	26	60	210	25	110

Aluminium (dissolved)	µg/l	1	ISO 17025	24	25	3.6	3.3	6.2
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.5	0.7	0.7	0.9	0.5
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.32	4.30	3.82	1.58	2.42
Barium (dissolved)	µg/l	0.06	ISO 17025	72	32	34	42	21
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.0	4.1	2.6	2.5	2.0
Cobalt (dissolved)	µg/l	0.2	ISO 17025	0.6	0.3	1.9	0.7	1.0
Copper (dissolved)	µg/l	0.5	ISO 17025	3.4	3.6	4.6	3.0	4.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	21	8.9	110	33	16
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.4	2.7	5.0	1.6	3.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	0.8	2.1	< 0.6	1.0
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	0.35	< 0.20	0.43	0.52	0.70
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6	5.0	3.2	1.9	3.0
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.4	3.0	4.5	17	8.1



Analytical Report Number: 21-10737

Project / Site name: Dunsbury Park

Your Order No: PO10000

Lab Sample Number	2015467	2015468	2015469	2015470	2015471
Sample Reference	BH1.01	BH5.01	BH5.02	BH5.03	BH5.05
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	4.29	1.88	2.64	0.56	1.92
Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sum of m, p & o-Xylene	µg/l	2	ISO 17025	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG Total C5 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number: 21-10737

Project / Site name: Dunsbury Park

Your Order No: PO10000

Lab Sample Number	2015472	2015473	2015474
Sample Reference	BH6.02	BH6.03	BH7.01
Sample Number	None Supplied	None Supplied	None Supplied
Depth (m)	2.63	2.71	3.86
Date Sampled	15/09/2021	15/09/2021	15/09/2021
Time Taken	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status

General Inorganics

pH	pH Units	N/A	ISO 17025	7.8	7.5	7.3
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	510	1900	710
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	37900	184000	48900
Chloride	mg/l	0.15	ISO 17025	33	400	43
Fluoride	µg/l	50	ISO 17025	380	410	170
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	110	28	79
Ammoniacal Nitrogen as NH3	µg/l	15	ISO 17025	130	34	96
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	140	36	100
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	1.06	4.29	2.69
Nitrate as N	mg/l	0.01	ISO 17025	0.27	0.31	1.83
Nitrate as NO3	mg/l	0.05	ISO 17025	1.19	1.39	8.10
Nitrite as N	µg/l	1	ISO 17025	5.9	< 1.0	280
Nitrite as NO2	µg/l	5	ISO 17025	19	< 5.0	920

Hardness - Total	mg CaCO3/l	1	ISO 17025	303	479	392
Bromate by IC	mg/l	0.002	ISO 17025	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.04	NONE	< 0.040	< 0.040	< 0.040

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16
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Analytical Report Number: 21-10737

Project / Site name: Dunsbury Park

Your Order No: PO10000

Lab Sample Number				2015472	2015473	2015474
Sample Reference				BH6.02	BH6.03	BH7.01
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				2.63	2.71	3.86
Date Sampled				15/09/2021	15/09/2021	15/09/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	110	660	94
Calcium (dissolved)	mg/l	0.012	ISO 17025	91	110	130
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	2.0	3.6	3.5
Iron (dissolved)	mg/l	0.004	ISO 17025	0.037	0.016	0.006
Iron (dissolved)	µg/l	4	ISO 17025	37	16	5.8
Magnesium (dissolved)	mg/l	0.005	ISO 17025	18	48	19
Sodium (dissolved)	mg/l	0.01	ISO 17025	98	270	25

Aluminium (dissolved)	µg/l	1	ISO 17025	3.0	2.6	3.6
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.4	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.14	2.44	0.71
Barium (dissolved)	µg/l	0.06	ISO 17025	17	23	15
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.0	3.6	3.5
Cobalt (dissolved)	µg/l	0.2	ISO 17025	0.3	3.8	0.6
Copper (dissolved)	µg/l	0.5	ISO 17025	3.1	4.8	4.1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	40	310	49
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.0	6.1	3.3
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	2.6	0.8
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	0.48	0.50	0.35
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.6	1.2	0.8
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.6	4.3	8.7



Analytical Report Number: 21-10737
Project / Site name: Dunsbury Park

Your Order No: PO10000

Lab Sample Number				2015472	2015473	2015474
Sample Reference				BH6.02	BH6.03	BH7.01
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				2.63	2.71	3.86
Date Sampled				15/09/2021	15/09/2021	15/09/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Sum of m, p & o-Xylene	µg/l	2	ISO 17025	< 2.0	< 2.0	< 2.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG Total C5 - C44	µg/l	10	NONE	< 10	< 10	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-10737

Project / Site name: Dunsbury Park

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE



Analytical Report Number : 21-10737
Project / Site name: Dunsbury Park

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

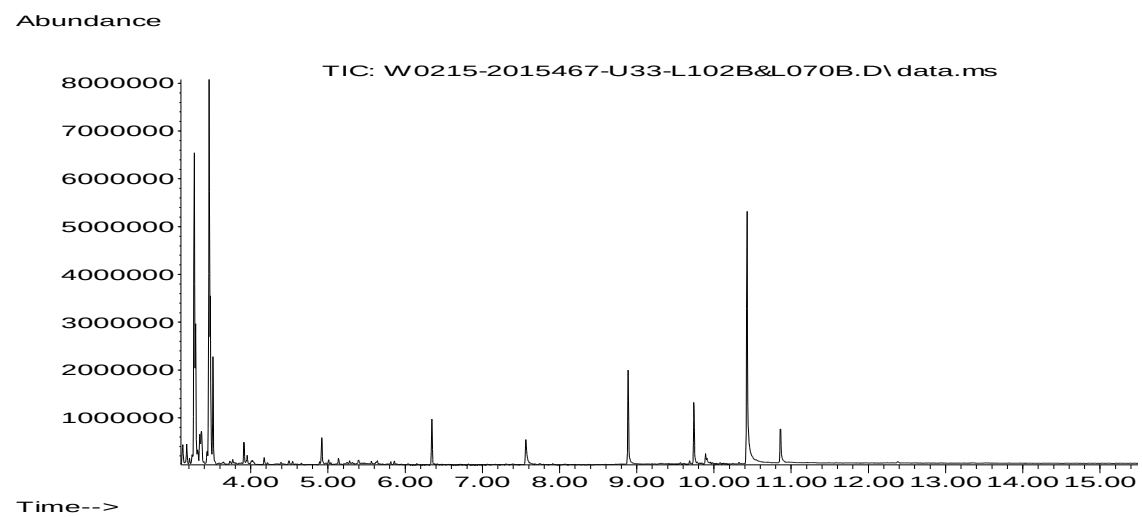
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH ₃ in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH ₄ in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	ISO 17025
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

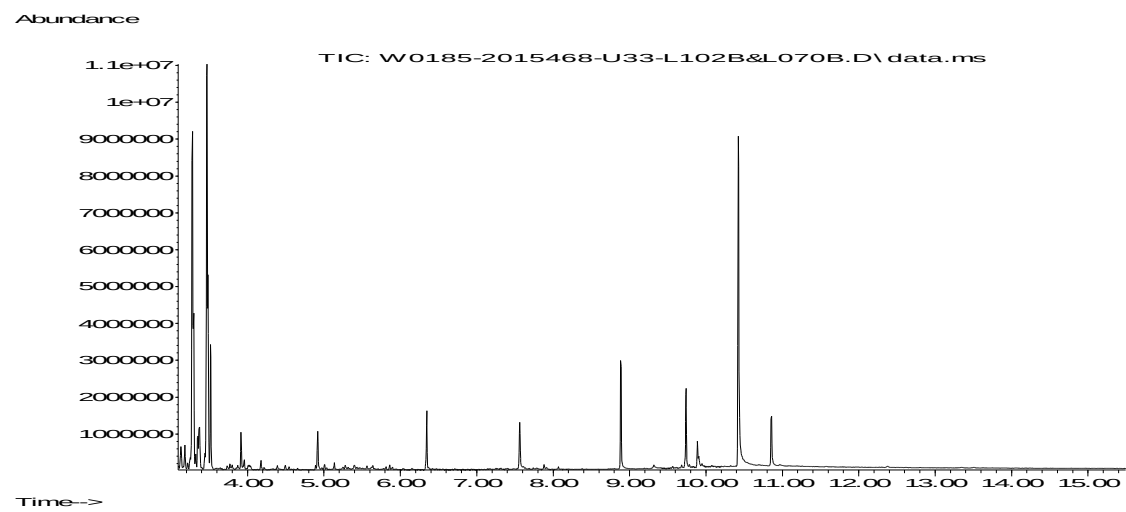
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

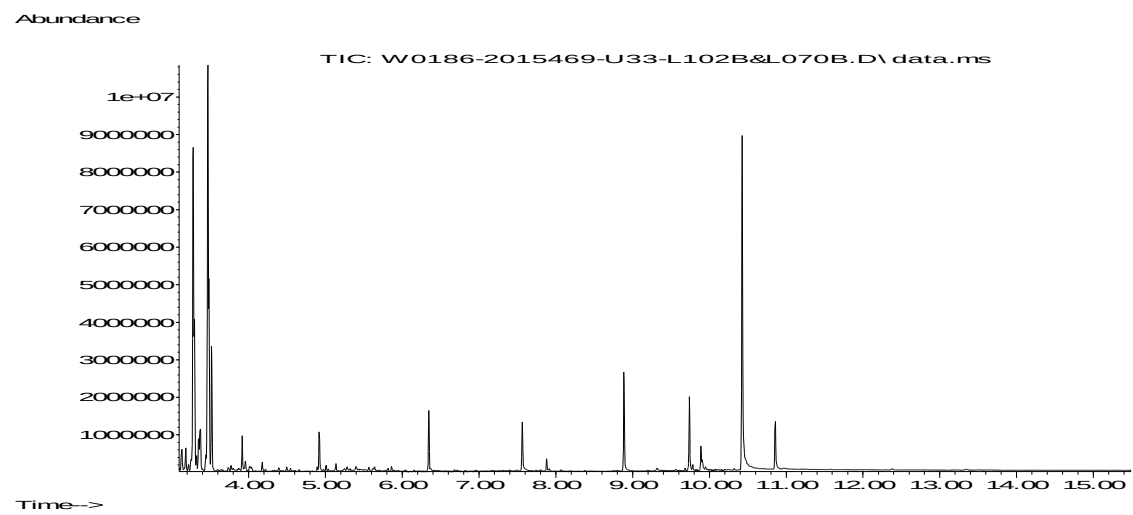
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

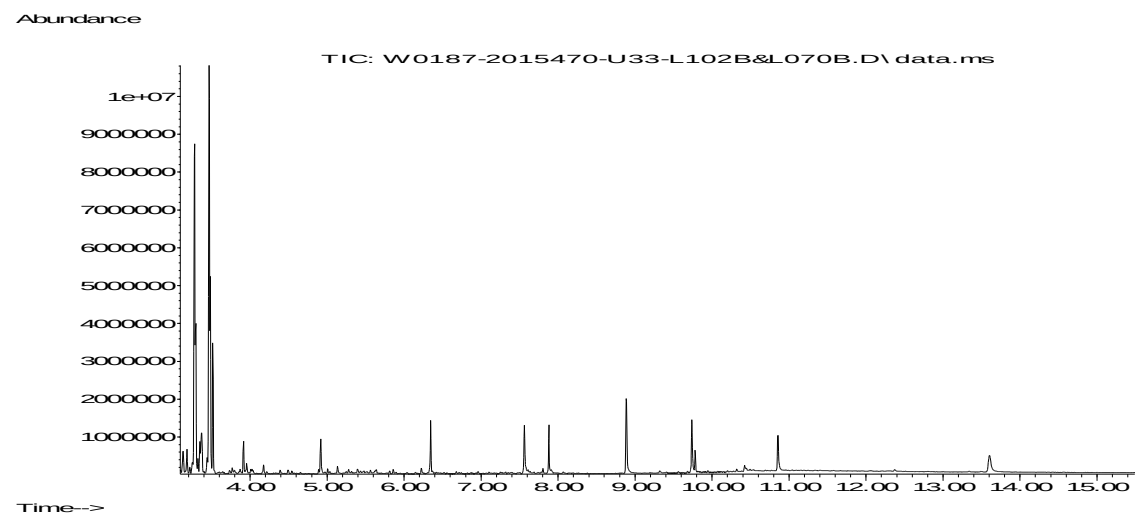
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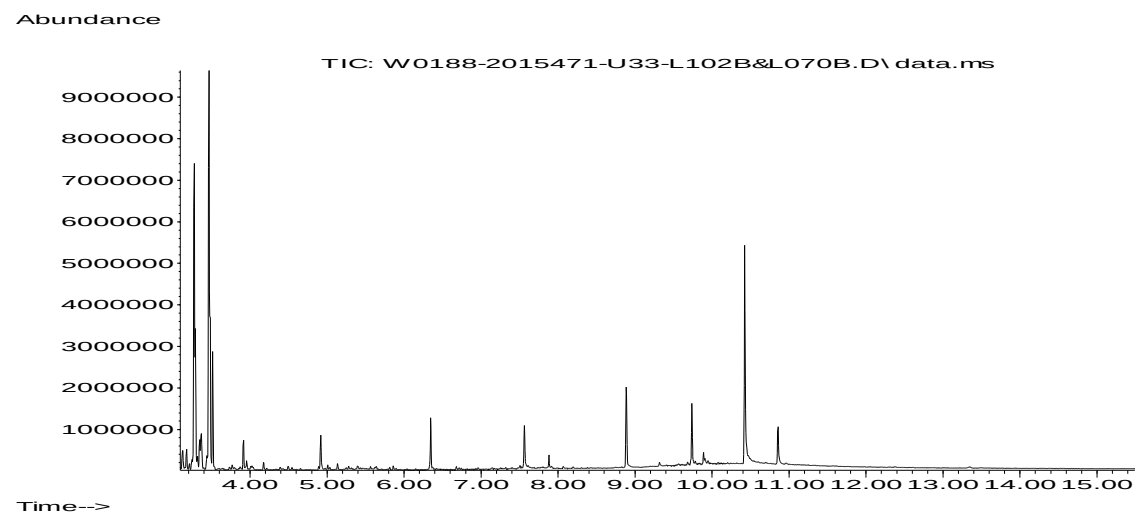
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.





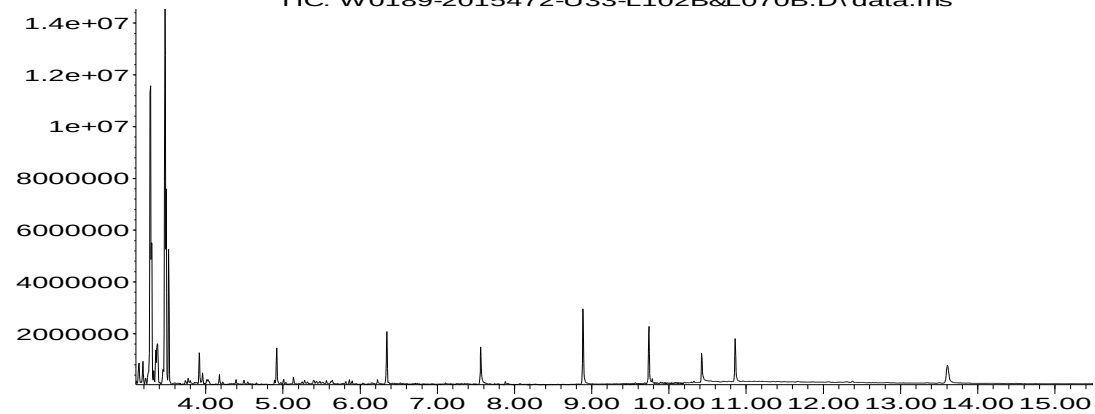




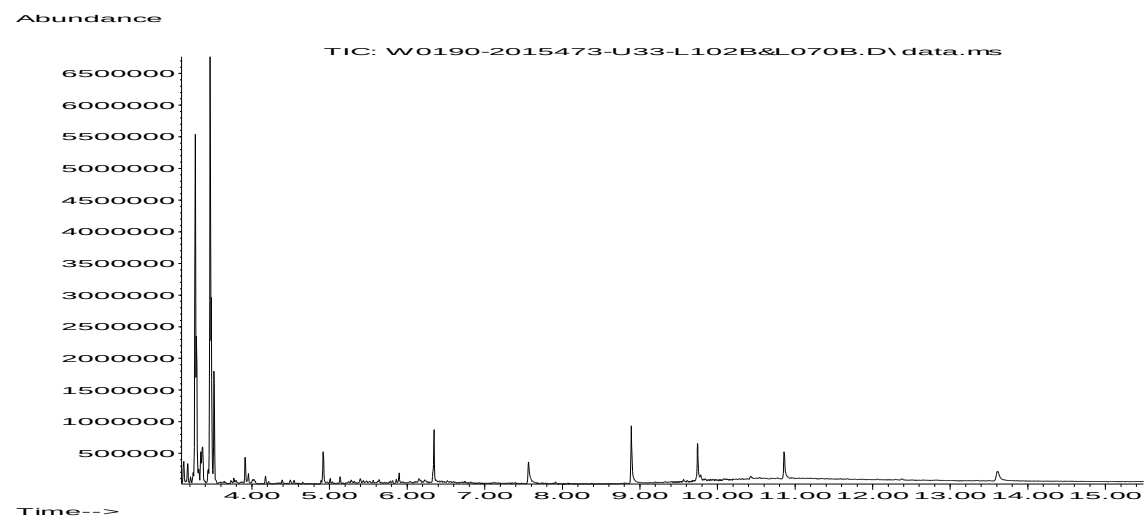


Abundance

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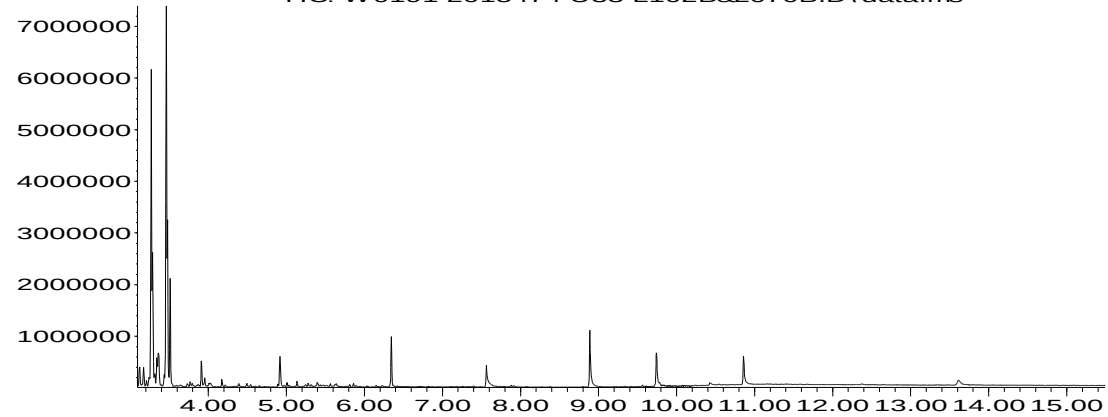


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Abundance

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Sample Deviation Report



Analytical Report Number : 21-10737
Project / Site name: Dunsbury Park

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH1.01	None Supplied	W	2015467	c	Ammonia as NH3 in water	L082-PL	c
BH1.01	None Supplied	W	2015467	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH1.01	None Supplied	W	2015467	c	Ammonium as NH4 in water	L082-PL	c
BH1.01	None Supplied	W	2015467	c	Electrical conductivity at 20oC of water	L031-PL	c
BH1.01	None Supplied	W	2015467	c	pH at 20oC in water (automated)	L099-PL	c
BH5.01	None Supplied	W	2015468	c	Ammonia as NH3 in water	L082-PL	c
BH5.01	None Supplied	W	2015468	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH5.01	None Supplied	W	2015468	c	Ammonium as NH4 in water	L082-PL	c
BH5.01	None Supplied	W	2015468	c	Electrical conductivity at 20oC of water	L031-PL	c
BH5.01	None Supplied	W	2015468	c	pH at 20oC in water (automated)	L099-PL	c
BH5.02	None Supplied	W	2015469	c	Ammonia as NH3 in water	L082-PL	c
BH5.02	None Supplied	W	2015469	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH5.02	None Supplied	W	2015469	c	Ammonium as NH4 in water	L082-PL	c
BH5.02	None Supplied	W	2015469	c	Electrical conductivity at 20oC of water	L031-PL	c
BH5.02	None Supplied	W	2015469	c	pH at 20oC in water (automated)	L099-PL	c
BH5.03	None Supplied	W	2015470	c	Ammonia as NH3 in water	L082-PL	c
BH5.03	None Supplied	W	2015470	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH5.03	None Supplied	W	2015470	c	Ammonium as NH4 in water	L082-PL	c
BH5.03	None Supplied	W	2015470	c	Electrical conductivity at 20oC of water	L031-PL	c
BH5.03	None Supplied	W	2015470	c	pH at 20oC in water (automated)	L099-PL	c
BH5.05	None Supplied	W	2015471	c	Ammonia as NH3 in water	L082-PL	c
BH5.05	None Supplied	W	2015471	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH5.05	None Supplied	W	2015471	c	Ammonium as NH4 in water	L082-PL	c
BH5.05	None Supplied	W	2015471	c	Electrical conductivity at 20oC of water	L031-PL	c
BH5.05	None Supplied	W	2015471	c	pH at 20oC in water (automated)	L099-PL	c
BH6.02	None Supplied	W	2015472	c	Ammonia as NH3 in water	L082-PL	c
BH6.02	None Supplied	W	2015472	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH6.02	None Supplied	W	2015472	c	Ammonium as NH4 in water	L082-PL	c
BH6.02	None Supplied	W	2015472	c	Electrical conductivity at 20oC of water	L031-PL	c
BH6.02	None Supplied	W	2015472	c	pH at 20oC in water (automated)	L099-PL	c
BH6.03	None Supplied	W	2015473	c	Ammonia as NH3 in water	L082-PL	c
BH6.03	None Supplied	W	2015473	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH6.03	None Supplied	W	2015473	c	Ammonium as NH4 in water	L082-PL	c
BH6.03	None Supplied	W	2015473	c	Electrical conductivity at 20oC of water	L031-PL	c
BH6.03	None Supplied	W	2015473	c	pH at 20oC in water (automated)	L099-PL	c
BH7.01	None Supplied	W	2015474	c	Ammonia as NH3 in water	L082-PL	c
BH7.01	None Supplied	W	2015474	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH7.01	None Supplied	W	2015474	c	Ammonium as NH4 in water	L082-PL	c
BH7.01	None Supplied	W	2015474	c	Electrical conductivity at 20oC of water	L031-PL	c
BH7.01	None Supplied	W	2015474	c	pH at 20oC in water (automated)	L099-PL	c

Assessment of Chemicals of Potential Concern to Human Health



All values in mg/kg unless otherwise stated							Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Location & Depth								TP5.01	TP5.03	TP5.06	WS5.02	WS5.04	WS5.05	WS5.09	SA101	BH5.01	BH5.02	BH5.05	BH5.05	
Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Result of Significance Test	0.1	0.3	0.4	0.9	0.4	0.2	0.3	0.3	0.05	0.05	0.2		
Arsenic	1	11	5.4	13	0	640	POTENTIALLY SUITABLE FOR USE	13	9.1	8.8	8.5	5.4	9.7	8.7	7.7	13	11	8.3		
Beryllium	0.06	11	0.21	0.64	0	390	POTENTIALLY SUITABLE FOR USE	0.24	0.51	0.64	0.56	0.53	0.45	0.41	0.54	0.44	0.21	0.63		
Boron	0.2	11	0.2	1.2	0	190000	POTENTIALLY SUITABLE FOR USE	0.4	0.3	0.3	0.3	0.4	0.9	0.4	1.2	0.2	0.2	0.2		
Cadmium	0.2	11	0.2	0.9	0	220	POTENTIALLY SUITABLE FOR USE	0.9	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.9	0.2		
Chromium (III)	1	11	8.4	31	0	8400	POTENTIALLY SUITABLE FOR USE	8.4	31	26	24	27	25	22	25	18	9.5	28		
Chromium (VI)	1.2	11	1.2	1.2	0	33	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2		
Copper	1	11	3.9	14	0	69000	POTENTIALLY SUITABLE FOR USE	4.9	7.1	9.2	8.7	8.3	6.8	14	12	9.1	3.9	12		
Lead	1	11	6.1	41	0	2330	POTENTIALLY SUITABLE FOR USE	41	8.2	11	11	6.1	12	12	7.5	35	22	14		
Mercury, inorganic	0.3	11	0.3	0.3	0	3600	POTENTIALLY SUITABLE FOR USE	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
Nickel	1	11	5.9	15	0	1700	POTENTIALLY SUITABLE FOR USE	5.9	9.7	15	12	11	9.3	8.8	10	11	6	12		
Selenium	1	11	1	1	0	13000	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1		
Vanadium	1	11	12	47	0	9000	POTENTIALLY SUITABLE FOR USE	13	47	38	38	40	37	33	37	28	12	42		
Zinc	1	11	35	100	0	670000	POTENTIALLY SUITABLE FOR USE	83	35	63	49	40	60	59	52	79	100	66		
Cyanide (free)	1	11	1	1	0	16000	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1		
Phenol (total)	1	11	1	1	0	760	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1		
Acenaphthene	0.05	11	0.05	0.05	0	84000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Acenaphthylene	0.05	11	0.05	0.05	0	83000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Anthracene	0.05	11	0.05	0.05	0	520000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Benz(a)anthracene	0.05	11	0.05	0.05	0	86	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Benzo(a)pyrene	0.05	11	0.05	0.05	0	14	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Benzo(b)fluoranthene	0.05	11	0.05	0.05	0	97	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Benzo(ghi)perylene	0.05	11	0.05	0.05	0	630	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Benzo(k)fluoranthene	0.05	11	0.05	0.05	0	140	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Chrysene	0.05	11	0.05	0.05	0	140	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Dibenz(a,h)anthracene	0.05	11	0.05	0.05	0	12	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Fluoranthene	0.05	11	0.05	0.05	0	23000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Fluorene	0.05	11	0.05	0.05	0	63000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Indeno(1,2,3-cd)pyrene	0.05	11	0.05	0.05	0	58	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Naphthalene	0.05	11	0.05	0.05	0	190	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Phenanthrene	0.05	11	0.05	0.05	0	22000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Pyrene	0.05	11	0.05	0.05	0	54000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Asbestos identified	Y/N							N	N	N	N	N	N	N	N	N	N	N		
FOC (dimensionless)	0.003345	(mean)						0.0012	0.0026	0.0025	0.0038	0.001	0.0071	0.0023	0.0017	0.0061	0.0033	0.0052		
SOM (calculated)	0.58%	(mean)						0.21%	0.45%	0.43%	0.66%	0.17%	1.22%	0.40%	0.29%	1.05%	0.57%	0.90%		
pH (su)	10.0	(mean)						8.8	8.9	10.5	9.3	10.9	10.1	10.6	11.5	8.9	9.6	10.6		
Risk parameter: Human health - commercial (1%SOM) Data set: Made Ground Client: Portsmouth City Council Site: Dunsbury Park Unit 500 Job no.: 19453-GELO Lab. report no(s).: 21-90870-1, 21-95123-1																				
Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC). MG denotes Made Ground NAT denotes natural ground																				

Assessment of Chemicals of Potential Concern to Plant Life



All values in mg/kg unless otherwise stated							Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	
							Location & Depth	TP5.01	TP5.03	TP5.06	WS5.02	WS5.04	WS5.05	WS5.09	SA101	BH5.01	BH5.02	BH5.05	
Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Result of Significance Test	0.1	0.3	0.4	0.9	0.4	0.2	0.3	0.3	0.05	0.05	0.2	
Arsenic	1	11	5.4	13	0	250	POTENTIALLY SUITABLE FOR USE	13	9.1	8.8	8.5	5.4	9.7	8.7	7.7	13	11	8.3	
Boron	0.2	11	0.2	1.2	0	3	POTENTIALLY SUITABLE FOR USE	0.4	0.3	0.3	0.3	0.4	0.9	0.4	1.2	0.2	0.2	0.2	
Chromium (III)	1	11	8.4	31	0	400	POTENTIALLY SUITABLE FOR USE	8.4	31	26	24	27	25	22	25	18	9.5	28	
Chromium (VI)	1.2	11	1.2	1.2	0	25	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Copper	1	11	3.9	14	0	200	POTENTIALLY SUITABLE FOR USE	4.9	7.1	9.2	8.7	8.3	6.8	14	12	9.1	3.9	12	
Nickel	1	11	5.9	15	0	110	POTENTIALLY SUITABLE FOR USE	5.9	9.7	15	12	11	9.3	8.8	10	11	6	12	
Zinc	1	11	35	100	0	300	POTENTIALLY SUITABLE FOR USE	83	35	63	49	40	60	59	52	79	100	66	
	Mean																		
pH (su)	10.0							8.8	8.9	10.5	9.3	10.9	10.1	10.6	11.5	8.9	9.6	10.6	
Risk parameter: Plant life pH >7 Data set: Made Ground Client: Portsmouth City Council Site: Dunsbury Park Unit 500 Job no.: 19453-GELO Lab. report no(s): 21-90870-1, 21-95123-1 Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC). MG denotes Made Ground NAT denotes natural ground																			

Assessment of Chemicals of Potential Concern to Human Health

All values in mg/kg unless otherwise stated							Soil Type	MG	MG	MG	MG	MG	MG	MG	NAT-BSM						
							Location & Depth	BH5.02	BH5.05	TP5.01	TP5.05	WS5.01	WS5.06	WS5.10	WS5.08						
Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Result of Significance Test	0.05	0.2	0.1	0.3	0.3	0.5	0.4	0.7						
Aliphatics EC5-EC6	0.001	8	0.001	0.001	0	300	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Aliphatics >EC6-EC8	0.001	8	0.001	0.001	0	140	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Aliphatics >EC8-EC10	0.001	8	0.001	0.001	0	78	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Aliphatics >EC10-EC12	1	8	1	1	0	48	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1						
Aliphatics >EC12-EC16	2	8	2	3.8	0	24	POTENTIALLY SUITABLE FOR USE	2	2	2	3.6	2	3.8	2	2						
Aliphatics >EC16-EC35	10	8	10	79	0	1000000	POTENTIALLY SUITABLE FOR USE	10	10	10	21	10	79	10	10						
Aliphatics >EC35-EC44	8.4	8	8.4	8.4	0	1000000	POTENTIALLY SUITABLE FOR USE	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4						
Aromatics EC5-EC7	0.001	8	0.001	0.001	0	1200	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Aromatics >EC7-EC8	0.001	8	0.001	0.001	0	870	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Aromatics >EC8-EC10	0.001	8	0.001	0.001	0	610	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Aromatics >EC10-EC12	1	8	1	1	0	360	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1						
Aromatics >EC12-EC16	2	8	2	2	0	36000	POTENTIALLY SUITABLE FOR USE	2	2	2	2	2	2	2	2						
Aromatics >EC16-EC21	10	8	10	10	0	28000	POTENTIALLY SUITABLE FOR USE	10	10	10	10	10	10	10	10						
Aromatics >EC21-EC35	10	8	10	10	0	28000	POTENTIALLY SUITABLE FOR USE	10	10	10	10	10	10	10	10						
Aromatics >EC35-EC44	8.4	8	8.4	8.4	0	28000	POTENTIALLY SUITABLE FOR USE	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4						
ADDITIVITY CHECK								HAZARD QUOTIENTS FOR EACH FRACTION													
Considered additive								Aliphatics EC5-EC6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aliphatics >EC6-EC8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aliphatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aliphatics >EC10-EC12	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021				
								Aliphatics >EC12-EC16	0.083	0.083	0.083	0.150	0.083	0.158	0.083	0.083					
Considered additive								Aliphatics >EC16-EC35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aliphatics >EC35-EC44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
								Aromatics EC5-EC7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
								Aromatics >EC7-EC8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
								Aromatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Considered additive								Aromatics >EC10-EC12	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003					
								Aromatics >EC12-EC16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aromatics >EC16-EC21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aromatics >EC21-EC35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
								Aromatics >EC35-EC44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Hazard Index for ali>C8-C16								0.104	0.104	0.104	0.171	0.104	0.179	0.104	0.104						
Hazard Index for aro>C8-C16								0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003						
Hazard Index for aro>C16-C35								0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001						
Risk parameter: Human health - commercial (1%SOM)								Hazard Index table - HI or HQ greater than 1 highlighted with yellow shading.													
Data set: Made Ground								Legend: Main table values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.													
Client: Portsmouth City Council								Main table alues in red are equal to, or greater than, the generic assessment criterion (GAC).													
Site: Dunsbury Park Unit 500								MG denotes Made Ground													
Job no.: 19453-GELO								NAT denotes natural ground													
Lab. report no(s): 21-95123-1, 21-90870-1																					

Assessment of Chemicals of Potential Concern to Plant Life



All values in mg/kg unless otherwise stated								Soil Type	NAT-LCW	NAT-LCW	NAT-LC	NAT-BSM	NAT-BSM						
Location & Depth									TP5.05	WS5.01	WS5.06	WS5.08	WS5.10						
Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Result of Significance Test		0.3	1.3	1.5	0.7	1						
Arsenic	1	5	6.4	10	0	250	POTENTIALLY SUITABLE FOR USE		7.6	10	9.7	7.7	6.4						
Boron	0.2	5	0.2	0.4	0	3	POTENTIALLY SUITABLE FOR USE		0.2	0.2	0.4	0.2	0.2						
Chromium (III)	1	5	24	35	0	400	POTENTIALLY SUITABLE FOR USE		28	35	28	24	25						
Chromium (VI)	1.2	5	1.2	1.2	0	25	POTENTIALLY SUITABLE FOR USE		1.2	1.2	1.2	1.2	1.2						
Copper	1	5	7.8	12	0	200	POTENTIALLY SUITABLE FOR USE		8.1	12	11	8.2	7.8						
Nickel	1	5	13	26	0	110	POTENTIALLY SUITABLE FOR USE		15	26	19	13	15						
Zinc	1	5	42	59	0	300	POTENTIALLY SUITABLE FOR USE		42	59	54	47	44						
	Mean																		
pH (su)	8.5								7.8	7.7	8.8	9.3	9.1						
Risk parameter: Plant life pH >7 Data set: Natural Client: Portsmouth City Council Site: Dunsbury Park Unit 500 Job no.: 19453-GELO Lab. report no(s): 21-90870-1 Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC). MG denotes Made Ground NAT denotes natural ground LCW denotes London Clay Formation Weathered LC denotes London Clay Formation BSM denotes Bogno Sand Member																			

Assessment of Chemicals of Potential Concern to Human Health

All values in mg/kg unless otherwise stated							Soil Type	NAT-LCW	NAT-LCW	NAT-LC	NAT-BSM	NAT-BSM							
							Location & Depth	TP5.05	WS5.01	WS5.06	WS5.08	WS5.10							
Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Result of Significance Test	0.3	1.3	1.5	0.7	1							
Arsenic	1	5	6.4	10	0	640	POTENTIALLY SUITABLE FOR USE	7.6	10	9.7	7.7	6.4							
Beryllium	0.06	5	0.67	0.85	0	390	POTENTIALLY SUITABLE FOR USE	0.8	0.85	0.76	0.71	0.67							
Boron	0.2	5	0.2	0.4	0	190000	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.4	0.2	0.2							
Cadmium	0.2	5	0.2	0.2	0	220	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.2	0.2	0.2							
Chromium (III)	1	5	24	35	0	8400	POTENTIALLY SUITABLE FOR USE	28	35	28	24	25							
Chromium (VI)	1.2	5	1.2	1.2	0	33	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2							
Copper	1	5	7.8	12	0	69000	POTENTIALLY SUITABLE FOR USE	8.1	12	11	8.2	7.8							
Lead	1	5	6.8	11	0	2330	POTENTIALLY SUITABLE FOR USE	7.8	11	8.7	6.8	7.6							
Mercury, inorganic	0.3	5	0.3	0.3	0	3600	POTENTIALLY SUITABLE FOR USE	0.3	0.3	0.3	0.3	0.3							
Nickel	1	5	13	26	0	1700	POTENTIALLY SUITABLE FOR USE	15	26	19	13	15							
Selenium	1	5	1	1	0	13000	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1							
Vanadium	1	5	35	45	0	9000	POTENTIALLY SUITABLE FOR USE	37	45	41	35	37							
Zinc	1	5	42	59	0	670000	POTENTIALLY SUITABLE FOR USE	42	59	54	47	44							
Cyanide (free)	1	5	1	1	0	16000	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1							
Phenol (total)	1	5	1	1	0	760	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1							
Acenaphthene	0.05	5	0.05	0.05	0	84000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Acenaphthylene	0.05	5	0.05	0.05	0	83000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Anthracene	0.05	5	0.05	0.05	0	520000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Benz(a)anthracene	0.05	5	0.05	0.05	0	86	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Benzo(a)pyrene	0.05	5	0.05	0.05	0	14	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Benzo(b)fluoranthene	0.05	5	0.05	0.05	0	97	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Benzo(ghi)perylene	0.05	5	0.05	0.05	0	630	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Benzo(k)fluoranthene	0.05	5	0.05	0.05	0	140	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Chrysene	0.05	5	0.05	0.05	0	140	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Dibenz(a,h)anthracene	0.05	5	0.05	0.05	0	12	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Fluoranthene	0.05	5	0.05	0.05	0	23000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Fluorene	0.05	5	0.05	0.05	0	63000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Indeno(1,2,3,cd)pyrene	0.05	5	0.05	0.05	0	58	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Naphthalene	0.05	5	0.05	0.05	0	190	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Phenanthrene	0.05	5	0.05	0.05	0	22000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Pyrene	0.05	5	0.05	0.05	0	54000	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05							
Asbestos identified	Y/N							N	N	N	N	N							
FOC (dimensionless)	0.00214	(mean)						0.0017	0.0013	0.0033	0.0034	0.001							
SOM (calculated)	0.37%	(mean)						0.29%	0.22%	0.57%	0.59%	0.17%							
pH (su)	8.5	(mean)						7.8	7.7	8.8	9.3	9.1							

Risk parameter: Human health - commercial (1%SOM)

Data set: Natural

Client: Portsmouth City Council

Site: Dunsbury Park Unit 500

Job no.: 19453-GELO

Lab. report no(s).: 21-90870-1

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.

Values in red are equal to, or greater than, the generic assessment criterion (GAC).

MG denotes Made Ground LCW denotes London Clay Formation Weathered

NAT denotes natural ground LC denotes London Clay Formation

BSM denotes Bogno Sand Member

Remedial Targets Methodology Data Table

Hydrock Scenario: Scenario D - DWS & EQS (inland) RTM Level: RTM Level 2 - Groundwater Beneath Source Assessment - groundwater samples Water body receptor(s): Groundwater and surface water Secondary receptor(s): 0 Data set: Groundwater Client: Portsmouth City Council Site: Dunsbury Park Job no: 19453-GELO Test Certificates(s): 21-10737,21-11194 Dataset ALL ZONES																
PNEC calculated (inland EQS) 123* Exceeds solubility value <1 Grey text and "<" sign if value <= LoD 999 Red text if value > DWS Red fill if value > Inland Waters EQS																
Surface Water Representative Hardness as mg/l CaCO ₃ 10																
CAS / AGS Number	Chemical of Potential Concern (µg/l)	WFD Designation	Hazardous Substance Status	Solubility Limit (µg/l)	No. of samples	Limit of Detection	DWS	Inland Waters EQS	BH5.01	BH5.02	BH5.03	BH5.05	WS5.02	WS5.04	WS5.05	WS5.08
7440-22-4	Silver (Ag) (dissolved)				8	0.05	n/a	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
7429-90-5	Aluminium (Al) (dissolved)				8	1	200	n/a	25	3.6	3.3	6.2	19	1.4	22	260
7440-38-2	Arsenic (As) (dissolved)	SP	H		8	0.15	10	50	4.3	3.82	1.58	2.42	32.6	1.61	3.51	3.6
7440-42-8	Boron (B) (dissolved)		NP		8	10	1000	2000	200	560	180	260	110	160	120	99
7440-39-3	Barium (Ba) (dissolved)				8	0.06	1300	n/a	32	34	42	21	55	120	50	60
7440-43-9	Cadmium (Cd) (dissolved)	PH	NP		8	0.02	5	0.08	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.02	<0.02
7440-48-4	Cobalt (Co) (dissolved)		NP		8	0.2	n/a	3	0.3	1.9	0.7	1	4.6	0.7	0.3	1
18540-29-9	Chromium (VI) (Cr) (dissolved)	SP	H		8	5	n/a	3.4	<5	<5	<5	<5	<5	<5	<5	<5
16065-83-1	Chromium (III) (Cr) (dissolved)	SP			8	1	n/a	4.7	4.1	2.6	2.5	2	2.3	2.1	1.6	2.2
7440-47-3	Chromium (Cr) (total) (dissolved)				8	0.2	50	n/a	4.1	2.6	2.5	2	2.3	2.1	1.6	2.2
7440-50-8	Copper (Cu) (dissolved)	SP	NP		8	0.5	2000	1	3.6	4.6	3	4.4	1.8	5.5	2.8	1.4
7439-89-6	Iron (Fe) (dissolved)	SP			8	4	200	1000	25	21	24	20	110	490	140	<4
7439-97-6	Mercury (Hg) (dissolved)	PH	H		8	0.05	1	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
P1286	Manganese (Mn) (dissolved)	SP			8	0.05	50	123	8.9	110	33	16	210	120	46	260
7440-23-5	Sodium (Na) (dissolved)				8	0.01	200000	n/a	60	210	25	110	71	45	43	31
7440-02-0	Nickel (Ni) (dissolved)	P	NP		8	0.5	20	4	2.7	5	1.6	3.5	77	2.7	1.6	2.1
7439-92-1	Lead (Pb) (dissolved)	P	H		8	0.2	10	1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
7440-36-0	Antimony (Sb) (dissolved)		NP		8	0.4	5	n/a	0.7	0.7	0.9	0.5	1.2	0.5	<0.4	<0.4
7782-49-2	Selenium (Se) (dissolved)		NP		8	0.6	10	n/a	0.8	2.1	<0.6	1	13	1.1	<0.6	<0.6
7440-31-5	Tin (Sn) (dissolved)				8	0.2	n/a	25	<0.2	0.43	0.52	0.7	0.45	0.33	0.79	0.74
7440-62-2	Vanadium (V) (dissolved)				8	0.2	n/a	20	5	3.2	1.9	3	6.1	0.5	0.6	1.5
7440-66-6	Zinc (Zn) (dissolved)	SP	NP		8	0.5	n/a	12.3	3	4.5	17	8.1	3.2	5.3	4.5	2.3
P1095	Cyanide (free) (hydrogen cyanide)	SP	NP		8	1	n/a	1	<1	<1	<1	<1	<1	<1	<1	<1
57-12-5	Cyanide (total)				8	1	50	n/a	<1	<1	<1	<1	4.8	<1	<1	<1
P1140	Ammonium (NH ₄ ⁺)		NP		8	15	500	n/a	110	73	240	47	7300	150	47	58
P1238	Ammoniacal Nitrogen (as N)		NP		8	15	n/a	300	85	57	190	36	5700	120	37	45
	Ammonia (unionised) (NH ₃ , as N)															
P1720	free ammonia	SP	NP		8	15	n/a	n/a	100	69	230	44	6900	140	45	54
15541-45-4	Bromate (BrO ₃ ⁻)				8	0.002	10	n/a	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16887-00-6	Chloride (Cl ⁻)				8	0.15	250000	250000	52	350	38	140	110	70	52	53
16984-48-8	Fluoride (F ⁻)				8	50	1500	1000	500	480	490	660	640	430	300	210
P1348	Nitrate (NO ₃ ⁻)				8	0.05	50000	n/a	0.77	0.77	0.83	2.94	0.48	0.06	<0.05	0.09
P1349	Nitrite (NO ₂ ⁻)				8	5	500	n/a	44	20	9.3	<5	<5	16	<5	<5
14808-79-8	Sulfate (SO ₄ ²⁻)				8	45	250000	400000	19000	133000	15200	74500	12500	29200	62100	79600
P1134	pH (min.) (su)				8	0	6.5	6	8	7.9	7.9	7.9	8.4	7.6	8	7.7
P1134	pH (max.) (su)				0		9.5	9								
P1287	Electrical conductivity (µS/cm)				8	10	2500	n/a	590	1500	510	850	1400	670	590	630
120-12-7	Anthracene	PH	H		56	8	0.01	n/a	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
50-32-8	Benzo(a)pyrene	PH	H		3.8	8	0.01	0.01	0.0017	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
206-44-0	Fluoranthene	P	H		230	8	0.01	n/a	0.0063	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
91-20-3	Naphthalene	P	NP		19000	8	0.01	n/a	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	PAHs = sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene															
GRP01		P	H		8	0.01	0.1	n/a	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
P1877	Phenol	SP	NP		84100000	8	1	7.7	<1	<1	<1	<1	9400	4.1	2.5	2
P1407	Ali >EC5-EC6				35900	8	1	15000	10	<1	<1	<1	<1	<1	<1	<1
P1408	Ali >EC6-EC9				5370	8	1	15000	10	<1	<1	<1	<1	<1	<1	<1
P1409	Ali >EC9-EC10				427	8	1	300	10	<1	<1	<1	<1	<1	<1	<1
P1410	Ali >EC10-EC12				33.9	8	10	300	10	<10	<10	<10	<10	<10	<10	<10
P1411	Ali >EC12-EC16				0.759	8	10	300	10	<10	<10	<10	<10	<10	<10	<10
P1938	Ali >EC16-EC35				0.00254	8	10	n/a	10	<10	<10	<10	<10	<10	<10	<10
P1415	Ali >EC35-EC44				0.00254	8	10	n/a	10	<10	<10	<10	<10	<10	<10	<10
P1441	Aro EC5-EC7				1780000	8	1	1	10	<1	<1	<1	<1	<1	<1	<1
P1355	Aro >EC7-EC8				590000	8	1	700	10	<1	<1	<1	32	<1	<1	<1
P1356	Aro >EC8-EC10				64600	8	1	300	10	<1	<1	<1	<1	<1	<1	<1
P1357	Aro >EC10-EC12				24500	8	10	90	10	<10	<10	<10	<10	<10	<10	<10
P1358	Aro >EC12-EC16				5750	8	10	90	10	<10	<10	<10	<10	<10	<10	<10
P1359	Aro >EC16-EC21				653	8	10	90	10	<10	<10	<10	<10	<10	<10	<10
P1360	Aro >EC21-EC35				6.61	8	10	90	10	<10	<10	<10	<10	<10	<10	<10
P1362	Aro >EC35-EC44				6.61	8	10	n/a	10	<10	<10	<10	<10	<10	<10	<10
71-43-2	Benzene	P	H		1780000	8	1	1	10	<1	<1	<1	<1	<1	<1	<1
108-88-3	Toluene	SP	H		590000	8	1	700	74	<1	<1	<1	31.9	<1	<1	<1
100-41-4	Ethylbenzene		H		180000	8	1	300	20	<1	<1	<1	<1	<1	<1	<1
95-47-6	o-Xylene		H		173000	8	1	500	30	<1	<1	<1	<1	<1	<1	<1

Remedial Targets Methodology Data Table

Water body receptor(s): Groundwater and surface water Secondary receptor(s): 0 Data set: Groundwater Client: Portsmouth City Council Site: Dunsbury Park Job no: 19453-GELO Test Certificates(s): 21-10737,21-11194 Dataset ALL ZONES										PNEC calculated (inland EQS)		123* Exceeds solubility value <1 Grey text and "<" sign if value <= LoD 999 Red text if value > DWS Red fill if value > Inland Waters EQS							
										Surface Water Representative Hardness as mg/l CaCO ₃ 10									
										Strata / Zone	LCF(W)	LCF(W)	LCF(W)	LCF(W)	LCF	LCF(W)	LCF	LCF(W)	
										Date sampled:	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	20/09/2021	20/09/2021	20/09/2021	
CAS / AGS Number	Chemical of Potential Concern (µg/l)	WFD Designation	Hazardous Substance Status	Solubility Limit (µg/l)	No. of samples	Limit of Detection	DWS	Inland Waters EQS	BH5.01	BH5.02	BH5.03	BH5.05	WS5.02	WS5.04	WS5.05	WS5.08			
P1374	m,p-Xylene		H	200000	8	1	500	30	<1	<1	<1	<1	<1	<1	<1	<1			
1634-04-04	Methyl tertiary butyl ether (MTBE)		NP	48000000	8	1	15	n/a	<1	<1	<1	<1	<1	<1	<1	<1			
71-55-6	1,1,1-Trichloroethane		NP	1300000	0		n/a	100											
79-00-5	1,1,2-Trichloroethane		NP	4490000	0		n/a	400											
96-12-8	1,2-Dibromo-3-chloropropane			1230000	0		0.1	n/a											
106-93-4	1,2-Dibromoethane		H	4300000	0		0.4	n/a											
95-50-1	1,2-Dichlorobenzene		H	133000	0		1000	20											
107-06-2	1,2-Dichloroethane (EDC)	P	NP	8680000	0		3	10											
156-59-2	cis 1,2-Dichloroethene (cis 1,2 DCE)		NP	7550000	0		50	n/a											
156-60-5	trans 1,2-Dichloroethene (trans 1,2 DCE)		NP	5250000	0		50	n/a											
78-87-5	1,2-Dichloropropane		H	2050000	0		40	n/a											
10061-01-5	cis 1,3-Dichloropropene		H	2700000	0		0.1	n/a											
10061-02-6	trans 1,3-Dichloropropene		H	2800000	0		0.1	n/a											
106-46-7	1,4-Dichlorobenzene		H	103000	0		300	20											
75-27-4	Bromodichloromethane			3000000	0		60	n/a											
75-01-4	Chloroethene (vinyl chloride)		H	2760000	0		0.5	n/a											
124-48-1	Dibromochloromethane			1050000	0		100	n/a											
25321-22-6	Dichlorobenzenes (1,2-, 1,3- & 1,4)				0		n/a	20											
75-09-2	Dichloromethane	P	NP	20100000	0		20	20											
87-68-3	Hexachlorobutadiene (HCBD)	PH	H	4800	0		0.1	0.6											
100-42-5	Styrene		H	290000	0		20	50											
25322-20-7	Tetrachloroethane (PCA)	SP			0		n/a	140											
127-18-4	Tetrachloroethene (PCE)	OP	NP	225000	0		10	10											
GRP02	Tetrachloroethene (PCE) and trichloroethene (TCE)				0		10	n/a											
56-23-5	Tetrachloromethane (Carbon Tetrachloride)	OP	H	846000	0		3	12											
75-25-2	Tri bromomethane (bromoform)			3000000	0		100	n/a											
12002-48-1	Trichlorobenzenes	P	NP		0		n/a	0.4											
79-01-6	Trichloroethene	OP	H	1370000	0		10	10											
67-66-3	Trichloromethane (chloroform)	P	H	8950000	0		100	2.5											
GRP03	Trihalomethanes, sum of trichloromethane, tribromomethane, dibromochloromethane & bromodichloromethane				0		100	n/a											
88-06-2	2,4,6-Trichlorophenol		H	434000	0		200	8											
120-83-2	2,4-Dichlorophenol	SP	H	4500000	0		n/a	4.2											
95-57-8	2-Chlorophenol		H	22700000	0		n/a	50											
554-00-7	3,4-Dichloroaniline	SP			0		n/a	0.2											
108-43-0	3-Chlorophenol		H		0		n/a	50											
59-50-7	4-Chloro, 3-methylphenol		H		0		n/a	40											
106-48-9	4-Chlorophenol		H		0		n/a	50											
85-68-7	Benzyl butyl phthalate	SP			0		n/a	7.5											
117-81-7	Di(2-ethylhexyl)phthalate (DEHP)	PH	NP		0		8	1.3											
84-74-2	Dibutyl phthalate		NP		0		n/a	8											
84-66-2	Diethyl phthalate (DEP)				0		n/a	200											
131-11-3	Dimethyl phthalate (DMP)				0		n/a	800											
117-84-0	Diethyl phthalates				0		n/a	20											
118-74-1	Hexachlorobenzene	PH	H	9.6	0		0.1	0.05											
104-40-5	Nonylphenol (4-Nonylphenol)	PH			0		n/a	0.3											
140-66-9	Octylphenol ((4-(1,1', 3,3'-tetramethylbutyl)-phenol))	P			0		n/a	0.1											
608-93-5	Pentachlorobenzene	PH	H	500	0		n/a	0.007											
123-91-1	1,4-dioxane				0		50	n/a											
79-06-1	Acrylamide		H		0		0.1	n/a											
92-52-4	Biphenyl (cyclochlorocyclohexane)				0		n/a	25											
32534-81-9	Brominated diphenylethers (Sum congeners 28,47,99,100,153,154)	PH	H		0		n/a	0.14											
85535-84-8	Chloroalkanes C10-C13	PH	H		0		n/a	0.4											
25567-68-4	Chloronitrotoluenes		H		0		n/a	10											
3252-43-5	Dibromoacetonitrile				0		70	n/a											
13425-80-4	Dichloroacetate				0		50	n/a											

Remedial Targets Methodology Data Table

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										Surface Water Representative Hardness as mg/l CaCO ₃ 10							
CAS / AGS Number	Chemical of Potential Concern (µg/l)	WFD Designation	Hazardous Substance Status	Solubility Limit (µg/l)	No. of samples	Limit of Detection	DWS	Inland Waters EQS	Strata / Zone Date sampled:	LCF(W) 15/09/2021 LCF(W) 15/09/2021 LCF(W) 15/09/2021 LCF(W) 15/09/2021 LCF 15/09/2021 LCF(W) 20/09/2021 LCF 20/09/2021 LCF(W) 20/09/2021							
										BH5.01	BH5.02	BH5.03	BH5.05	WS5.02	WS5.04	WS5.05	WS5.08
3018-12-0	Dichloroacetonitrile				0		20	n/a									
GRP04	Dioxins and dioxin-like compounds	PH			0		n/a	n/a									
3194-55-6	Hexabromocyclododecanes (HBCDD)	PH	H		0		n/a	0.0016									
2163-68-0	Hydroxyatrazine				0		200	n/a									
101043-37-2	Microcystin-LR				0		1	n/a									
62-75-9	N-nitrosodimethylamine				0		0.1	n/a									
1763-23-1	Perfluorooctane sulfonic acid (PFOS) & derivatives	PH	H		0		0.3	0.00065									
1336-36-3	Polychlorinated Biphenyls (PCB)		H		0		n/a	n/a									
2893-78-9	Sodium dichloroisoxyanurate				0		50000	n/a									
126-73-8	Tributyl phosphate		H		0		n/a	50									
3380-34-5	Triclosan	SP			0		n/a	0.1									
7726-95-6	Bromine (Br)				0		n/a	2									
7782-50-5	Chlorine (total free available)	SP	NP		0		200	2									
14866-68-3	Chlorate				0		700	n/a									
14998-27-7	Chlorite				0		700	n/a									
60-00-4	EDTA (edetic acid)				0		600	400									
106-89-8	Epichlorohydrin		H		0		0.1	n/a									
569-64-2	Malachite green		H		0		n/a	0.5									
10599-90-3	Monochloramine				0		3000	n/a									
79-11-9	Monochloroacetate (Chloroacetic Acid)				0		20	n/a									
139-13-9	NTA (nitrilotriacetic acid)				0		200	1000									
76-03-9	Trichloroethanoic acid (trichloroacetate)				0		200	n/a									
7440-61-1	U (dissolved)				0		30	n/a									
36643-28-4	Tributyl tin compounds	PH	H		0		n/a	0.0002									
7783-06-4	Hydrogen Sulphide				0		n/a	0.25									
14797-73-0	Perchlorate				0		70	n/a									
GRP06	Total anions				0		n/a	250000									
93-76-5	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)		H		0		0.1	n/a									
94-75-7	2,4-D (2,4-Dichlorophenoxyacetic acid)	SP			0		0.1	0.3									
94-82-6	2,4-DB (4-(2,4-dichlorophenoxy) butyric acid)				0		0.1	n/a									
71751-41-2	Abamectin				0		0.1	0.01									
74070-46-5	Acinofen	P			0		0.1	0.12									
15972-60-8	Alachlor	P	H		0		0.1	0.3									
116-06-3	Aldicarb		NP		0		0.1	n/a									
309-00-2	Aldrin		H		0		0.03	n/a									
GRP07	Aldrin & dieldrin		H		0		0.03	n/a									
1912-24-9	Atrazine	P	H	70000	0		0.1	0.6									
35575-96-3	Azamethiphos				0		0.1	n/a									
2642-71-9	Azinphos ethyl		H		0		0.1	n/a									
86-50-0	Azinphos-methyl		H	95000	0		0.1	0.01									
25057-89-0	Bentazone		NP		0		0.1	500									
42576-02-3	Bifenox	P	H		0		0.1	0.012									
1689-84-5	Bromoxynil		H		0		0.1	100									
10605-21-7	Carbendazim	SP	H		0		0.1	0.15									
1563-66-2	Carbofuran		NP		0		0.1	n/a									
57-74-9	Chlordane		H		0		0.1	n/a									
470-90-6	Chlorofenvinphos	P	H		0		0.1	0.1									
101-21-3	Chloroprotham		H		0		0.1	10									
2921-88-2	Chloropyrifos	P	H		0		0.1	0.03									
1897-45-6	Chlorothalonil	SP	H		0		0.1	0.035									
15545-48-9	Chlorotoluron		H		0		0.1	2									
GRP08	Cyclodiene pesticides, sum of Aldrin, Dieldrin, Endrin, Isodrin	OP	H		0		0.03	0.01									
56-72-4	Coumaphos		H		0		0.1	0.01									
21725-46-2	Cyanazine		H		0		0.1	n/a									
28159-98-0	Cybutryne	P			0		0.1	0.0025									
68359-37-5	Cyfluthrin				0		0.1	0.001									
52315-07-8	Cypermethrin	P	H		0		0.1	0.00008									
GRP09	DDT total (dichlorodiphenylthrichloroethane)	OP	H	5.73	0		0.1	0.025									
8065-48-3	Demeton		H		0		0.1	0.5									

Remedial Targets Methodology Data Table

Water body receptor(s): Groundwater and surface water Secondary receptor(s): 0 Data set: Groundwater Client: Portsmouth City Council Site: Dunsbury Park Job no: 19453-GELO Test Certificate(s): 21-10737,21-11194 Dataset ALL ZONES								123* Exceeds solubility value <1 Grey text and "<" sign if value <= LoD 999 Red text if value > DWS Red fill if value > Inland Waters EQS		Surface Water Representative Hardness as mg/l CaCO ₃ 10							
CAS / AGS Number	Chemical of Potential Concern (µg/l)	WFD Designation	Hazardous Substance Status	Solubility Limit (µg/l)	No. of samples	Limit of Detection	DWS	Inland Waters EQS		BH5.01	BH5.02	BH5.03	BH5.05	WS5.02	WS5.04	WS5.05	WS5.08
333-41-5	Diazinon (sheep dip)	SP	H		0		0.1	0.01									
120-36-5	Dichloroprop		H		0		0.1	n/a									
62-73-7	Dichlorvos	P	H	16000000	0		0.1	0.0006									
115-32-2	Dicofol	PH	H		0		0.1	0.0013									
60-57-1	Dieldrin		H	200	0		0.03	n/a									
35367-38-5	Diffubenzuron		H		0		0.1	0.001									
60-51-5	Dimethoate	SP	H		0		0.1	0.48									
330-54-1	Diuron	P	H		0		0.1	0.2									
117704-25-3	Doramectin				0		n/a	0.001									
115-29-7	Endosulfan	PH	H	280	0		0.1	0.005									
72-20-8	Endrin		H		0		0.1	n/a									
299-84-3	Fenchlorphos		H		0		0.1	0.03									
122-14-5	Fenitrothion		H	25300	0		0.1	0.01									
93-72-1	Fenoprop ((2,4,5-trichlorophenoxy)propionic acid)		H		0		0.1	n/a									
55-38-9	Fenthion		H		0		0.1	n/a									
370-50-3	Flucifuron				0		0.1	1									
50-00-0	Formaldehyde (methanal)		NP		0		0.1	5									
38641-94-0	Glyphosate	SP			0		0.1	196									
76-44-8	Heptachlor		H		0		0.03	0.000002									
GRP10	Heptachlor & Heptachlor epoxide	PH	H		0		0.03	0.000002									
1024-57-3	Heptachlor epoxide				0		0.03	0.000002									
608-73-1	Hexachlorocyclohexane (includes lindane)	PH	H		0		0.1	0.02									
1689-83-4	Ioxynil		H		0		0.1	10									
465-73-6	Isodrin		H		0		0.1	n/a									
34123-69-6	Isoproturon	P	NP		0		0.1	0.3									
70288-86-7	Ivermectin				0		n/a	0.0001									
330-55-2	Linuron	SP	H		0		0.1	0.5									
121-75-5	Malathion		H	141000	0		0.1	0.01									
8018-01-07	Mancozeb		NP		0		0.1	2									
12427-38-2	Maneb		NP		0		0.1	3									
94-74-6	MCPA (4-(2-methyl-4-chlorophenoxy acetic acid))				0		0.1	12									
93-65-2	Mecoprop	SP	NP		0		0.1	18									
2032-65-7	Methiocarb	SP	NP		0		0.1	0.01									
72-43-5	Methoxychlor				0		0.1	n/a									
51218-45-2	Metolachlor				0		0.1	n/a									
7786-34-7	Mevinphos		H		0		0.1	0.02									
2212-67-1	Molinate				0		0.1	n/a									
1113-02-6	Omethoate		H		0		0.1	0.01									
50-29-3	para-para-DDT	OP	H		0		0.1	0.01									
56-38-2	Parathion		H		0		0.1	n/a									
298-00-0	Parathion-methyl		H		0		0.1	n/a									
GRP11	PCSDs (cyfluthrin, sulcofuron, flucifuron and permethrin)				0		n/a	0.05									
40487-42-1	Pendimethalin	SP	NP		0		0.1	0.3									
87-86-5	Pentachlorophenol	P	H	14000	0		0.1	0.4									
52645-53-1	Permethrin	SP	H		0		0.1	0.001									
GRP12	Pesticides (individual) (other than aldrin, dieldrin, heptachlor & heptachlor epoxide)				0		0.1	n/a									
GRP13	Pesticides (total)				0		0.5	n/a									
23103-98-2	Prirnicarb		NP		0		0.1	1									
29232-93-7	Prirnicarb - methyl		H		0		0.1	0.015									
67747-09-5	Prochloraz		H		0		0.1	4									
31218-83-4	Propetamphos		H		0		0.1	0.03									
23950-58-5	Propyzamide		H		0		0.1	100									
95737-68-1	Pyriproxyfen				0		0.1	n/a									
124495-18-7	Quinoxifen	PH			0		0.1	0.15									
122-34-9	Simazine	P	H		0		0.1	1									
3567-25-7	Sulcofuron				0		0.1	25									
117-18-0	Tecnazene (total)				0		0.1	1									
886-50-0	Tertbutryn	P	NP		0		0.1	0.065									
5915-41-3	Tertbutylazine		H		0		0.1	n/a									
148-79-8	Thiabendazole		NP		0		0.1	5									
2303-17-5	Triallate		H		0		0.1	0.25									
24017-47-8	Triazaphos		H		0		0.1	0.005									

Remedial Targets Methodology Data Table



Water body receptor(s): Groundwater and surface water Secondary receptor(s): 0 Data set: Groundwater Client: Portsmouth City Council Site: Dunsbury Park Job no: 19453-GELO Test Certificates(s): 21-10737,21-11194 Dataset ALL ZONES										PNEC calculated (inland EQS)		123* <1 Exceeds solubility value 999 Grey text and "<" sign if value <= LoD Red text if value > DWS Red fill if value > Inland Waters EQS						
										Surface Water Representative Hardness as mg/l CaCO ₃								10
										Strata / Zone	LCF(W)	LCF(W)	LCF(W)	LCF(W)	LCF	LCF(W)	LCF	LCF(W)
										Date sampled:	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	20/09/2021	20/09/2021	20/09/2021
CAS / AGS Number	Chemical of Potential Concern (µg/l)	WFD Designation	Hazardous Substance Status	Solubility Limit (µg/l)	No. of samples	Limit of Detection	DWS	Inland Waters EQS	BH5.01	BH5.02	BH5.03	BH5.05	WS5.02	WS5.04	WS5.05	WS5.08		
1582-09-8	Trifluralin	PH	H	1000	0		0.1	0.03										
1262-21-1	Triphenyltin and derivatives		H		0		0.1	0.02										

Appendix G Waste Assessment

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e: Group Southampton cc engineer

Analytical Report Number : 21-90876

Project / Site name:	Dunsbury Park	Samples received on:	29/07/2021
Your job number:	19453-GELO UNIT 500	Samples instructed on/ Analysis started on:	04/08/2021
Your order number:	PO08918	Analysis completed by:	10/08/2021
Report Issue Number:	1	Report issued on:	10/08/2021
Samples Analysed:	4 10:1 WAC Samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

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

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Waste Acceptance Criteria Analytical Results							
Report No:	21-90876						
					Client: HYDROCK		
Location	Dunsbury Park						
Lab Reference (Sample Number)	1961904 / 1961905				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	20/07/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP5.01						
Depth (m)	0.10						
Solid Waste Analysis							
TOC (%)**	0.2				3%	5%	6%
Loss on Ignition (%) **	0.4				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.5				--	>6	--
Acid Neutralisation Capacity (mol / kg)	14				--	To be evaluated	To be evaluated
Eluate Analysis							
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test		
	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0021			0.0206	0.5	2	25
Barium *	0.0633			0.614	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0005			0.0046	0.5	10	70
Copper *	0.0054			0.053	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0041			0.0394	0.5	10	30
Nickel *	0.0037			0.036	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.010			0.10	4	50	200
Chloride *	1.9			19	800	15000	25000
Fluoride	0.23			2.2	10	150	500
Sulphate *	9.9			96	1000	20000	50000
TDS*	54			520	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	8.86			85.8	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.3						
Dry Matter (%)	96						
Moisture (%)	4.5						
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					** = MCFRTS accredited		

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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Waste Acceptance Criteria Analytical Results								
Report No:	21-90876							
					Client: HYDROCK			
Location	Dunsbury Park							
Lab Reference (Sample Number)	1961908 / 1961909				Landfill Waste Acceptance Criteria			
					Limits			
Sampling Date	26/07/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID	W55.06							
Depth (m)	1.50							
Solid Waste Analysis								
TOC (%)**	0.5				3%	5%	6%	
Loss on Ignition (%) **	2.0				--	--	10%	
BTEX (µg/kg) **	< 10				6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007				1	--	--	
Mineral Oil (mg/kg)	< 10				500	--	--	
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--	
pH (units)**	8.4				--	>6	--	
Acid Neutralisation Capacity (mol / kg)	6.0				--	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 *	< 0.0010			< 0.0100	0.5	2	25	
Barium *	0.0271			0.229	20	100	300	
Cadmium *	< 0.0001			< 0.0008	0.04	1	5	
Chromium *	0.0005			0.0041	0.5	10	70	
Copper *	0.0039			0.033	2	50	100	
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2	
Molybdenum *	0.0066			0.0561	0.5	10	30	
Nickel *	0.0033			0.028	0.4	10	40	
Lead *	< 0.0010			< 0.010	0.5	10	50	
Antimony *	< 0.0017			< 0.017	0.06	0.7	5	
Selenium *	0.012			0.10	0.1	0.5	7	
Zinc *	0.0096			0.081	4	50	200	
Chloride *	13			110	800	15000	25000	
Fluoride	0.073			0.62	10	150	500	
Sulphate *	93			780	1000	20000	50000	
TDS*	110			940	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-	
DOC	6.02			50.8	500	800	1000	
Leach Test Information								
Stone Content (%)	< 0.1							
Sample Mass (kg)	0.90							
Dry Matter (%)	86							
Moisture (%)	14							
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)			
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Waste Acceptance Criteria Analytical Results								
Report No:	21-90876							
					Client: HYDROCK			
Location	Dunsbury Park							
Lab Reference (Sample Number)	1961910 / 1961911				Landfill Waste Acceptance Criteria			
					Limits			
Sampling Date	26/07/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID	WS5.09							
Depth (m)	0.30							
Solid Waste Analysis								
TOC (%)**	0.3				3%	5%	6%	
Loss on Ignition (%) **	2.2				--	--	10%	
BTEX (µg/kg) **	< 10				6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007				1	--	--	
Mineral Oil (mg/kg)	< 10				500	--	--	
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--	
pH (units)**	11.8				--	>6	--	
Acid Neutralisation Capacity (mol / kg)	180				--	To be evaluated	To be evaluated	
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test			
	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	< 0.0010			< 0.0100	0.5	2	25	
Barium *	0.0663			0.591	20	100	300	
Cadmium *	< 0.0001			< 0.0008	0.04	1	5	
Chromium *	0.0025			0.022	0.5	10	70	
Copper *	0.050			0.45	2	50	100	
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2	
Molybdenum *	0.0030			0.0268	0.5	10	30	
Nickel *	0.012			0.11	0.4	10	40	
Lead *	< 0.0010			< 0.010	0.5	10	50	
Antimony *	< 0.0017			< 0.017	0.06	0.7	5	
Selenium *	< 0.0040			< 0.040	0.1	0.5	7	
Zinc *	0.014			0.13	4	50	200	
Chloride *	4.3			38	800	15000	25000	
Fluoride	0.077			0.69	10	150	500	
Sulphate *	7.0			62	1000	20000	50000	
TDS*	690			6200	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-	
DOC	15.4			137	500	800	1000	
Leach Test Information								
Stone Content (%)	< 0.1							
Sample Mass (kg)	1.1							
Dry Matter (%)	91							
Moisture (%)	9.1							
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					** = UKAS accredited (liquid eluate analysis only)			
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Analytical Report Number : 21-90876

Project / Site name: Dunsbury Park

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1961904	TP5.01	None Supplied	0.1	Brown clay and sand with gravel and vegetation.
1961906	WS5.02	None Supplied	0.5	Brown clay and sand with gravel.
1961908	WS5.06	None Supplied	1.5	Grey clay.
1961910	WS5.09	None Supplied	0.3	Light brown sand with gravel.

Analytical Report Number : 21-90876

Project / Site name: Dunsbury Park

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
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""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	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
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
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""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	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-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-90876
Project / Site name: Dunsbury Park

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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.

Sample Deviation Report



Analytical Report Number : 21-90876

Project / Site name: Dunsbury Park

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP5.01	None Supplied	S	1961904	c	BTEX in soil (Monoaromatics)	L073B-PL	c
TP5.01	None Supplied	S	1961904	c	Total BTEX in soil (Poland)	L073-PL	c

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:

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



9ACFV-VI4EO-H2SIM

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

Job name

19453 Dunsbury Park Plot 500-502

Description/Comments

Project

19453-GELO

Site

19453 Dunsbury Park Plot 500-502

Classified by

Name: **Andrew James**
 Date: **12 Oct 2021 16:43 GMT**
 Telephone: **01454 619533**
 Company: **Hydrock Consultants Ltd**

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
 Hazardous Waste Classification
 3 year Refresher overdue

Date
 08 Feb 2018

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP5.01	0.10	Non Hazardous		3
2	TP5.03	0.30	Non Hazardous		5
3	TP5.05	0.30	Non Hazardous		7
4	TP5.06	0.40	Non Hazardous		10
5	WS5.01	0.30	Non Hazardous		12
6	WS5.01[2]	1.30	Non Hazardous		13
7	WS5.02	0.90	Non Hazardous		15
8	WS5.04	0.40	Non Hazardous		17
9	WS5.05	0.20	Non Hazardous		19
10	WS5.06	0.50	Non Hazardous		21
11	WS5.06[2]	1.50	Non Hazardous		22
12	WS5.08	0.70	Non Hazardous		24
13	WS5.09	0.30	Non Hazardous		26
14	WS5.10	0.40	Non Hazardous		28
15	WS5.10[2]	1.00	Non Hazardous		29
16	SA101	0.30	Hazardous	HP 8	31
17	BH5.01	0.05	Non Hazardous		33
18	BH5.02	0.05	Non Hazardous		35
19	BH5.05	0.20	Non Hazardous		37

Related documents

#	Name	Description
1	Hydrock Standard plus Cresol (ammended Lead)	waste stream template used to create this Job

Report

Created by: Andrew James

Created date: 12 Oct 2021 16:43 GMT

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	39
Appendix B: Rationale for selection of metal species	40
Appendix C: Version	41

Classification of sample: TP5.01

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

Sample details

Sample name:	LoW Code:
TP5.01	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.10 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	13 mg/kg	1.32	17.164	mg/kg	0.00172 %		
5	benzene	601-020-00-8	200-753-7	71-43-2	<0.001 mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
6	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	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
8	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	0.24 mg/kg	2.775	0.666	mg/kg	0.0000666 %		
12	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.4 mg/kg	13.43	5.372	mg/kg	0.000537 %		
13	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	0.9 mg/kg	1.285	1.157	mg/kg	0.00009 %		
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		8.4 mg/kg	1.462	12.277	mg/kg	0.00123 %		
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
16	chrysene	601-048-00-0	205-923-4	218-01-9	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
17	copper { dicopper oxide ; copper (I) oxide }				4.9	mg/kg	1.126	5.517	mg/kg	0.000552 %		
	029-002-00-X	215-270-7	1317-39-1									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
19	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
20	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
21	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
22	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
23	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
24	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	41	mg/kg		41	mg/kg	0.0041 %		
	082-001-00-6											
25	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
26	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
27	nickel { nickel dihydroxide }				5.9	mg/kg	1.579	9.319	mg/kg	0.000932 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
28	pH				8.8	pH		8.8	pH	8.8 pH		
			pH									
29	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
30	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
31	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
32	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
33	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
34	xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
35	zinc { zinc oxide }				83	mg/kg	1.245	103.311	mg/kg	0.0103 %		
	030-013-00-7	215-222-5	1314-13-2									
Total:										0.0212 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP5.03

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

Sample details

Sample name:	LoW Code:
TP5.03	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.30 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		9.1 mg/kg	1.32	12.015	mg/kg	0.0012 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.51 mg/kg	2.775	1.415	mg/kg	0.000142 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.3 mg/kg	13.43	4.029	mg/kg	0.000403 %		
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		31 mg/kg	1.462	45.308	mg/kg	0.00453 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		7.1 mg/kg	1.126	7.994	mg/kg	0.000799 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
17		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD	
		006-007-00-5												
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
	601-041-00-2	200-181-8	53-70-3											
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			205-912-4	206-44-0										
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
		201-695-5	86-73-7											
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			205-893-2	193-39-5										
22		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	8.2	mg/kg		8.2	mg/kg	0.00082 %			
		082-001-00-6												
23		mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD	
	080-010-00-X	231-299-8	7487-94-7											
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
	601-052-00-2	202-049-5	91-20-3											
25		nickel { nickel dihydroxide }				9.7	mg/kg	1.579	15.321	mg/kg	0.00153 %			
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]										
26		pH				8.9	pH		8.9	pH	8.9 pH			
			PH											
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			201-581-5	85-01-8										
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD	
		604-001-00-2	203-632-7	108-95-2										
29		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			204-927-3	129-00-0										
30		zinc { zinc oxide }				35	mg/kg	1.245	43.565	mg/kg	0.00436 %			
		030-013-00-7	215-222-5	1314-13-2										
Total:											0.0144 %			

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP5.05

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

Sample details

Sample name:	LoW Code:
TP5.05	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.30 m	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		7.6 mg/kg	1.32	10.034	mg/kg	0.001 %		
5	benzene	601-020-00-8	200-753-7		<0.001 mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
6	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.8 mg/kg	2.775	2.22	mg/kg	0.000222 %		
12	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		<0.2 mg/kg	13.43	<2.686	mg/kg	<0.000269 %		<LOD
13	cadmium { cadmium sulfide }	048-010-00-4	215-147-8		<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		28 mg/kg	1.462	40.924	mg/kg	0.00409 %		
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
16	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
17	copper { dicopper oxide ; copper (I) oxide }				8.1	mg/kg	1.126	9.12	mg/kg	0.000912 %		
	029-002-00-X	215-270-7	1317-39-1									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
19	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
20	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
21	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
22	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
23	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
24	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	7.8	mg/kg		7.8	mg/kg	0.00078 %		
	082-001-00-6											
25	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
26	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
27	nickel { nickel dihydroxide }				15	mg/kg	1.579	23.692	mg/kg	0.00237 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
28	pH				7.8	pH		7.8	pH	7.8 pH		
			pH									
29	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
30	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
31	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
32	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
33	TPH (C6 to C40) petroleum group				24.6	mg/kg		24.6	mg/kg	0.00246 %		
			TPH									
34	xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
35	zinc { zinc oxide }				42	mg/kg	1.245	52.278	mg/kg	0.00523 %		
	030-013-00-7	215-222-5	1314-13-2									
Total:										0.018 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

Force this Hazardous property to non hazardous because Based on the concentrations identified and observations made in the field, it is considered that the risk from this material being potentially flammable is negligible.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00246%)

Classification of sample: TP5.06

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

Sample details

Sample name:	LoW Code:
TP5.06	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.40 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	8.8 mg/kg	1.32	11.619	mg/kg	0.00116 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	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
7	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	0.64 mg/kg	2.775	1.776	mg/kg	0.000178 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.3 mg/kg	13.43	4.029	mg/kg	0.000403 %		
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		26 mg/kg	1.462	38	mg/kg	0.0038 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4	218-01-9	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	9.2 mg/kg	1.126	10.358	mg/kg	0.00104 %		

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
17	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
18	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
19	fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		205-912-4	206-44-0								
20	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-695-5	86-73-7								
21	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		205-893-2	193-39-5								
22	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	11 mg/kg		11 mg/kg	0.0011 %			
	082-001-00-6										
23	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
24	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
25	nickel { nickel dihydroxide }				15 mg/kg	1.579	23.692 mg/kg	0.00237 %			
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
26	pH				10.5 pH		10.5 pH	10.5 pH			
			PH								
27	phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-581-5	85-01-8								
28	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
29	pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		204-927-3	129-00-0								
30	zinc { zinc oxide }				63 mg/kg	1.245	78.417 mg/kg	0.00784 %			
	030-013-00-7	215-222-5	1314-13-2								
Total:									0.0185 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.01



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

Sample details

Sample name:	LoW Code:
WS5.01	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.30 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
2	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
3	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
4	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
5	xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
Total:								0.001 %		

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)
<LOD	Below limit of detection
ND	Not detected

Classification of sample: WS5.01[2]

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

Sample details

Sample name:	LoW Code:
WS5.01[2]	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.30 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		10 mg/kg	1.32	13.203	mg/kg	0.00132 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.85 mg/kg	2.775	2.359	mg/kg	0.000236 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		<0.2 mg/kg	13.43	<2.686	mg/kg	<0.000269 %		<LOD
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		35 mg/kg	1.462	51.154	mg/kg	0.00512 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		12 mg/kg	1.126	13.511	mg/kg	0.00135 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
17		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD	
		006-007-00-5												
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
601-041-00-2		200-181-8	53-70-3											
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			205-912-4	206-44-0										
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			201-695-5	86-73-7										
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			205-893-2	193-39-5										
22		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	11	mg/kg		11	mg/kg	0.0011 %			
		082-001-00-6												
23		mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD	
		080-010-00-X	231-299-8	7487-94-7										
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
		601-052-00-2	202-049-5	91-20-3										
25		nickel { nickel dihydroxide }				26	mg/kg	1.579	41.067	mg/kg	0.00411 %			
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]										
26		pH				7.7	pH		7.7	pH	7.7 pH			
				PH										
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			201-581-5	85-01-8										
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD	
		604-001-00-2	203-632-7	108-95-2										
29		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			204-927-3	129-00-0										
30		zinc { zinc oxide }				59	mg/kg	1.245	73.438	mg/kg	0.00734 %			
		030-013-00-7	215-222-5	1314-13-2										
Total:												0.0215 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.02

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

Sample details

Sample name:	LoW Code:
WS5.02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.90 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		8.5 mg/kg	1.32	11.223	mg/kg	0.00112 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.56 mg/kg	2.775	1.554	mg/kg	0.000155 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.3 mg/kg	13.43	4.029	mg/kg	0.000403 %		
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		24 mg/kg	1.462	35.077	mg/kg	0.00351 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		8.7 mg/kg	1.126	9.795	mg/kg	0.00098 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
17	 cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }					<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD	
	006-007-00-5													
18	 dibenz[a,h]anthracene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
	601-041-00-2	200-181-8	53-70-3											
19	 fluoranthene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			205-912-4	206-44-0										
20	 fluorene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
		201-695-5	86-73-7											
21	 indeno[123-cd]pyrene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			205-893-2	193-39-5										
22	 lead {  lead compounds with the exception of those specified elsewhere in this Annex }				1	11	mg/kg		11	mg/kg	0.0011 %			
		082-001-00-6												
23	 mercury { mercury dichloride }					<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD	
	080-010-00-X	231-299-8	7487-94-7											
24	 naphthalene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
	601-052-00-2	202-049-5	91-20-3											
25	 nickel { nickel dihydroxide }					12	mg/kg	1.579	18.954	mg/kg	0.0019 %			
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]										
26	 pH					9.3	pH		9.3	pH	9.3 pH			
			PH											
27	 phenanthrene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			201-581-5	85-01-8										
28	 phenol					<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD	
	604-001-00-2	203-632-7	108-95-2											
29	 pyrene					<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			204-927-3	129-00-0										
30	 zinc { zinc oxide }					49	mg/kg	1.245	60.991	mg/kg	0.0061 %			
		030-013-00-7	215-222-5	1314-13-2										
Total:												0.0159 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.04

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

Sample details

Sample name: **WS5.04** LoW Code: Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.40 m** Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		5.4 mg/kg	1.32	7.13 mg/kg	0.000713 %			
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.53 mg/kg	2.775	1.471 mg/kg	0.000147 %			
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.4 mg/kg	13.43	5.372 mg/kg	0.000537 %			
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %			<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		27 mg/kg	1.462	39.462 mg/kg	0.00395 %			
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %			<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		8.3 mg/kg	1.126	9.345 mg/kg	0.000934 %			

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number								
17		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
		006-007-00-5										
18		dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		601-041-00-2	200-181-8	53-70-3								
19		fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
			205-912-4	206-44-0								
20		fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
			201-695-5	86-73-7								
21		indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
			205-893-2	193-39-5								
22		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	6.1 mg/kg		6.1 mg/kg	0.00061 %			
		082-001-00-6										
23		mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
		080-010-00-X	231-299-8	7487-94-7								
24		naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		601-052-00-2	202-049-5	91-20-3								
25		nickel { nickel dihydroxide }				11 mg/kg	1.579	17.374 mg/kg	0.00174 %			
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
26		pH				10.9 pH		10.9 pH	10.9 pH			
				PH								
27		phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
			201-581-5	85-01-8								
28		phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
		604-001-00-2	203-632-7	108-95-2								
29		pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
			204-927-3	129-00-0								
30		zinc { zinc oxide }				40 mg/kg	1.245	49.789 mg/kg	0.00498 %			
		030-013-00-7	215-222-5	1314-13-2								
Total:									0.0143 %			

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.05

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

Sample details

Sample name:	LoW Code:
WS5.05	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.20 m	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		9.7 mg/kg	1.32	12.807	mg/kg	0.00128 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.45 mg/kg	2.775	1.249	mg/kg	0.000125 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.9 mg/kg	13.43	12.087	mg/kg	0.00121 %		
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		25 mg/kg	1.462	36.539	mg/kg	0.00365 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		6.8 mg/kg	1.126	7.656	mg/kg	0.000766 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
17		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD	
	006-007-00-5													
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
601-041-00-2			200-181-8	53-70-3										
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
				205-912-4										206-44-0
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
			201-695-5	86-73-7										
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
				205-893-2										193-39-5
22		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	12	mg/kg		12	mg/kg	0.0012 %			
	082-001-00-6													
23		mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD	
080-010-00-X			231-299-8	7487-94-7										
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
601-052-00-2			202-049-5	91-20-3										
25		nickel { nickel dihydroxide }				9.3	mg/kg	1.579	14.689	mg/kg	0.00147 %			
	028-008-00-X			235-008-5 [1] 234-348-1 [2]										12054-48-7 [1] 11113-74-9 [2]
26		pH				10.1	pH		10.1	pH	10.1 pH			
			PH											
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
				201-581-5										85-01-8
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD	
604-001-00-2			203-632-7	108-95-2										
29		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD	
				204-927-3										129-00-0
30		zinc { zinc oxide }				60	mg/kg	1.245	74.683	mg/kg	0.00747 %			
	030-013-00-7			215-222-5										1314-13-2
Total:											0.0178 %			

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.06

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

Sample details

Sample name:	LoW Code:
WS5.06	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
2	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
3	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
4	TPH (C6 to C40) petroleum group				82.8 mg/kg		82.8 mg/kg	0.00828 %		
			TPH							
5	xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
Total:								0.00828 %		

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)
<LOD	Below limit of detection
ND	Not detected

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

Force this Hazardous property to non hazardous because Based on the concentrations identified and observations made in the field, it is considered that the risk from this material being potentially flammable is negligible.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00828%)

Classification of sample: WS5.06[2]

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

Sample details

Sample name:	LoW Code:
WS5.06[2]	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.50 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1		acenaphthene	201-469-6	83-32-9	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
2		acenaphthylene	205-917-1	208-96-8	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
3		anthracene	204-371-1	120-12-7	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	9.7 mg/kg	1.32	12.807 mg/kg	0.00128 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
6		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
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene	205-883-8	191-24-2	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	0.76 mg/kg	2.775	2.109 mg/kg	0.000211 %		
11		boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2	0.4 mg/kg	13.43	5.372 mg/kg	0.000537 %			
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		<LOD
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9	28 mg/kg	1.462	40.924 mg/kg	0.00409 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
15		chrysene	601-048-00-0	205-923-4	218-01-9	<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	11 mg/kg	1.126	12.385 mg/kg	0.00124 %		

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
17	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
18	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
19	fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		205-912-4	206-44-0								
20	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-695-5	86-73-7								
21	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		205-893-2	193-39-5								
22	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	8.7 mg/kg		8.7 mg/kg	0.00087 %			
	082-001-00-6										
23	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
24	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
25	nickel { nickel dihydroxide }				19 mg/kg	1.579	30.01 mg/kg	0.003 %			
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
26	pH				8.8 pH		8.8 pH	8.8 pH			
			PH								
27	phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-581-5	85-01-8								
28	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
29	pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		204-927-3	129-00-0								
30	zinc { zinc oxide }				54 mg/kg	1.245	67.215 mg/kg	0.00672 %			
	030-013-00-7	215-222-5	1314-13-2								
Total:									0.0186 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.08

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

Sample details

Sample name:	LoW Code:
WS5.08	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.70 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number					
1	acenaphthene							
		201-469-6	83-32-9		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
2	acenaphthylene							
		205-917-1	208-96-8		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
3	anthracene							
		204-371-1	120-12-7		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
4	arsenic { arsenic trioxide }							
	033-003-00-0	215-481-4	1327-53-3		7.7 mg/kg	1.32	10.167 mg/kg	0.00102 %
5	benzene							
	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg	<0.001 mg/kg	<0.0000001 %	<LOD
6	benzo[a]anthracene							
	601-033-00-9	200-280-6	56-55-3		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
7	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
8	benzo[b]fluoranthene							
	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
9	benzo[ghi]perylene							
		205-883-8	191-24-2		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
10	benzo[k]fluoranthene							
	601-036-00-5	205-916-6	207-08-9		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD
11	beryllium { beryllium oxide }							
	004-003-00-8	215-133-1	1304-56-9		0.71 mg/kg	2.775	1.97 mg/kg	0.000197 %
12	boron { boron tribromide/trichloride/trifluoride (combined) }							
			10294-33-4, 10294-34-5, 7637-07-2		<0.2 mg/kg	13.43	<2.686 mg/kg	<0.000269 %
13	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 %
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }							
		215-160-9	1308-38-9		24 mg/kg	1.462	35.077 mg/kg	0.00351 %
15	chromium in chromium(VI) compounds { chromium(VI) oxide }							
	024-001-00-0	215-607-8	1333-82-0		<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %
16	chrysene							
	601-048-00-0	205-923-4	218-01-9		<0.05 mg/kg	<0.05 mg/kg	<0.000005 %	<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
17	copper { dicopper oxide; copper (I) oxide }				8.2	mg/kg	1.126	9.232	mg/kg	0.000923 %		
	029-002-00-X	215-270-7	1317-39-1									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
19	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
20	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
21	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
22	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
23	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
24	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	6.8	mg/kg		6.8	mg/kg	0.00068 %		
	082-001-00-6											
25	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
26	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
27	nickel { nickel dihydroxide }				13	mg/kg	1.579	20.533	mg/kg	0.00205 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
28	pH				9.3	pH		9.3	pH	9.3 pH		
			PH									
29	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
30	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
31	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
32	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
33	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
34	xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
35	zinc { zinc oxide }				47	mg/kg	1.245	58.502	mg/kg	0.00585 %		
	030-013-00-7	215-222-5	1314-13-2									
Total:										0.0162 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.09

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

Sample details

Sample name:	LoW Code:
WS5.09	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.30 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	8.7 mg/kg	1.32	11.487	mg/kg	0.00115 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	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
7	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	0.41 mg/kg	2.775	1.138	mg/kg	0.000114 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.4 mg/kg	13.43	5.372	mg/kg	0.000537 %		
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		22 mg/kg	1.462	32.154	mg/kg	0.00322 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4	218-01-9	<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	14 mg/kg	1.126	15.762	mg/kg	0.00158 %		

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
17	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
18	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
19	fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		205-912-4	206-44-0								
20	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-695-5	86-73-7								
21	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		205-893-2	193-39-5								
22	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	12 mg/kg		12 mg/kg	0.0012 %			
	082-001-00-6										
23	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
24	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
25	nickel { nickel dihydroxide }				8.8 mg/kg	1.579	13.9 mg/kg	0.00139 %			
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
26	pH				10.6 pH		10.6 pH	10.6 pH			
			PH								
27	phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-581-5	85-01-8								
28	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
29	pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		204-927-3	129-00-0								
30	zinc { zinc oxide }				59 mg/kg	1.245	73.438 mg/kg	0.00734 %			
	030-013-00-7	215-222-5	1314-13-2								
Total:									0.0172 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS5.10



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

Sample details

Sample name:	LoW Code:
WS5.10	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.40 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
2	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
3	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
4	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
5	xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
Total:								0.001 %		

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)
<LOD	Below limit of detection
ND	Not detected

Classification of sample: WS5.10[2]

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

Sample details

Sample name:	LoW Code:
WS5.10[2]	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.00 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

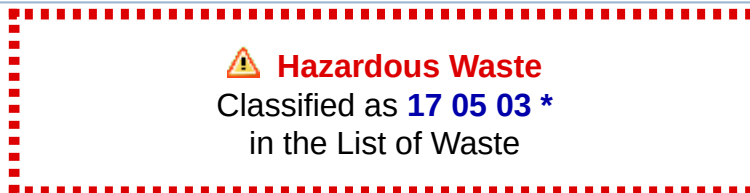
#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		6.4 mg/kg	1.32	8.45	mg/kg	0.000845 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.67 mg/kg	2.775	1.859	mg/kg	0.000186 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		<0.2 mg/kg	13.43	<2.686	mg/kg	<0.000269 %		<LOD
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		25 mg/kg	1.462	36.539	mg/kg	0.00365 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		7.8 mg/kg	1.126	8.782	mg/kg	0.000878 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
17		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
601-041-00-2		200-181-8	53-70-3										
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0										
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7										
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5										
22		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	7.6	mg/kg		7.6	mg/kg	0.00076 %		
		082-001-00-6											
23		mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel dihydroxide }				15	mg/kg	1.579	23.692	mg/kg	0.00237 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26		pH				9.1	pH		9.1	pH	9.1 pH		
				PH									
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8										
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0										
30		zinc { zinc oxide }				44	mg/kg	1.245	54.767	mg/kg	0.00548 %		
		030-013-00-7	215-222-5	1314-13-2									
Total:											0.0151 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: SA101



Sample details

Sample name:	LoW Code:
SA101	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
0.30 m	

Hazard properties

HP 8: Corrosive "waste which on application can cause skin corrosion"

pH; pH "Assumed to be irritant/corrosive because of pH value"

Because of determinand:

pH: (conc.: 11.5 pH)

Determinands

Moisture content: **0% No Moisture Correction applied (MC)**

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		7.7 mg/kg	1.32	10.167	mg/kg	0.00102 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.54 mg/kg	2.775	1.499	mg/kg	0.00015 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		1.2 mg/kg	13.43	16.116	mg/kg	0.00161 %		
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8		<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		25 mg/kg	1.462	36.539	mg/kg	0.00365 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
15	chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
16	copper { dicopper oxide; copper (I) oxide }				12	mg/kg	1.126	13.511	mg/kg	0.00135 %		
	029-002-00-X	215-270-7	1317-39-1									
17	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
18	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
19	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
20	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
21	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
22	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	7.5	mg/kg		7.5	mg/kg	0.00075 %		
	082-001-00-6											
23	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
24	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
25	nickel { nickel dihydroxide }				10	mg/kg	1.579	15.795	mg/kg	0.00158 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	pH				11.5	pH		11.5	pH	11.5 pH		
			pH									
27	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
28	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
29	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
30	zinc { zinc oxide }				52	mg/kg	1.245	64.725	mg/kg	0.00647 %		
	030-013-00-7	215-222-5	1314-13-2									
Total:										0.0172 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH5.01

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

Sample details

Sample name:	LoW Code:
BH5.01	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.05 m	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		13 mg/kg	1.32	17.164	mg/kg	0.00172 %		
5	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.44 mg/kg	2.775	1.221	mg/kg	0.000122 %		
11	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		<0.2 mg/kg	13.43	<2.686	mg/kg	<0.000269 %		<LOD
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	0.5 mg/kg	1.285	0.643	mg/kg	0.00005 %		
13	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		18 mg/kg	1.462	26.308	mg/kg	0.00263 %		
14	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		9.1 mg/kg	1.126	10.246	mg/kg	0.00102 %		

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number								
17		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD	
	006-007-00-5											
18		dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
	601-041-00-2 200-181-8 53-70-3											
19		fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
		205-912-4 206-44-0										
20		fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
	201-695-5 86-73-7											
21		indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
		205-893-2 193-39-5										
22		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	35 mg/kg		35 mg/kg	0.0035 %			
		082-001-00-6										
23		mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		<LOD	
	080-010-00-X 231-299-8 7487-94-7											
24		naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
	601-052-00-2 202-049-5 91-20-3											
25		nickel { nickel dihydroxide }				11 mg/kg	1.579	17.374 mg/kg	0.00174 %			
		028-008-00-X 235-008-5 [1] 234-348-1 [2] 12054-48-7 [1] 11113-74-9 [2]										
26		pH				8.9 pH		8.9 pH	8.9 pH			
	PH											
27		phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
		201-581-5 85-01-8										
28		phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD	
	604-001-00-2 203-632-7 108-95-2											
29		pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
		204-927-3 129-00-0										
30		zinc { zinc oxide }				79 mg/kg	1.245	98.332 mg/kg	0.00983 %			
		030-013-00-7 215-222-5 1314-13-2										
Total:									0.0215 %			

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH5.02

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

Sample details

Sample name:	LoW Code:
BH5.02	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.05 m	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9								
2	acenaphthylene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8								
3	anthracene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7								
4	arsenic { arsenic trioxide }				11 mg/kg	1.32	14.524	mg/kg	0.00145 %		
		033-003-00-0	215-481-4								
5	benzene				<0.001 mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7								
6	benzo[a]anthracene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-033-00-9	200-280-6								
7	benzo[a]pyrene; benzo[def]chrysene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-032-00-3	200-028-5								
8	benzo[b]fluoranthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-034-00-4	205-911-9								
9	benzo[ghi]perylene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2								
10	benzo[k]fluoranthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-036-00-5	205-916-6								
11	beryllium { beryllium oxide }				0.21 mg/kg	2.775	0.583	mg/kg	0.0000583 %		
		004-003-00-8	215-133-1								
12	boron { boron tribromide/trichloride/trifluoride (combined) }				<0.2 mg/kg	13.43	<2.686	mg/kg	<0.000269 %		<LOD
			10294-33-4, 10294-34-5, 7637-07-2								
13	cadmium { cadmium sulfide }			1	0.9 mg/kg	1.285	1.157	mg/kg	0.00009 %		
		048-010-00-4	215-147-8								
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				9.5 mg/kg	1.462	13.885	mg/kg	0.00139 %		
			215-160-9								
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8								
16	chrysene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-048-00-0	205-923-4								

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
17	copper { dicopper oxide ; copper (I) oxide }				3.9	mg/kg	1.126	4.391	mg/kg	0.000439 %		
	029-002-00-X	215-270-7	1317-39-1									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
19	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
20	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
21	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
22	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
23	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
24	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	22	mg/kg		22	mg/kg	0.0022 %		
	082-001-00-6											
25	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
26	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
27	nickel { nickel dihydroxide }				6	mg/kg	1.579	9.477	mg/kg	0.000948 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
28	pH				9.6	pH		9.6	pH	9.6 pH		
			pH									
29	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
30	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
31	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
32	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
33	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
34	xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
35	zinc { zinc oxide }				100	mg/kg	1.245	124.471	mg/kg	0.0124 %		
	030-013-00-7	215-222-5	1314-13-2									
Total:										0.0209 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH5.05

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

Sample details

Sample name: **BH5.05** LoW Code: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **0.20 m** Chapter: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**
Entry:

Hazard properties

None identified

Determinands

Moisture content: **0% No Moisture Correction applied (MC)**

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		8.3 mg/kg	1.32	10.959	mg/kg	0.0011 %		
5	benzene	601-020-00-8	200-753-7		<0.001 mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
6	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1		0.63 mg/kg	2.775	1.748	mg/kg	0.000175 %		
12	boron { boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.2 mg/kg	13.43	2.686	mg/kg	0.000269 %		
13	cadmium { cadmium sulfide }	048-010-00-4	215-147-8		<0.2 mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		28 mg/kg	1.462	40.924	mg/kg	0.00409 %		
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
16	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
17	copper { dicopper oxide ; copper (I) oxide }				12	mg/kg	1.126	13.511	mg/kg	0.00135 %		
	029-002-00-X	215-270-7	1317-39-1									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
19	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
20	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
21	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
22	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
23	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
24	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	14	mg/kg		14	mg/kg	0.0014 %		
	082-001-00-6											
25	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
26	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
27	nickel { nickel dihydroxide }				12	mg/kg	1.579	18.954	mg/kg	0.0019 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
28	pH				10.6	pH		10.6	pH	10.6 pH		
			pH									
29	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
30	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
31	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
32	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
33	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
34	xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
35	zinc { zinc oxide }				66	mg/kg	1.245	82.151	mg/kg	0.00822 %		
	030-013-00-7	215-222-5	1314-13-2									
Total:										0.0202 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

• **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

• **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

• **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

• **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

• **boron tribromide/trichloride/trifluoride (combined)** (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride

Data source: N/A

Data source date: 06 Aug 2015

Hazard Statements: EUH014, Acute Tox. 2 H330, Acute Tox. 2 H300, Skin Corr. 1A H314, Skin Corr. 1B H314

• **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

• **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

CLP index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

• **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Description/Comments:

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Hazard Statement(s): Carc. 2 H351

Reason for additional Hazards Statement(s):

03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

• **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

■ **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

■ **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

■ **lead compounds with the exception of those specified elsewhere in this Annex**

CLP index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers many simple lead compounds to be Carcinogenic category 2
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium
www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

■ **pH** (CAS Number: PH)

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

■ **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

■ **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

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

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
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

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on hazard statements

beryllium {beryllium oxide}

Worst case species based on hazard statements

boron {boron tribromide/trichloride/trifluoride (combined)}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

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

Worst case species based on hazard statements

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common species

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Worst case species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Worst case species based on hazard statements

mercury {mercury dichloride}

Worst case species based on hazard statements

nickel {nickel dihydroxide}

Worst case species based on hazard statements

zinc {zinc oxide}

Worst case species based on hazard statements

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.1, May 2018**

HazWasteOnline Classification Engine Version: 2021.246.4869.9247 (05 Sep 2021)

HazWasteOnline Database: 2021.246.4869.9247 (05 Sep 2021)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018

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 2019 - UK: 2019 No. 720 of 27th March 2019

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

POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

Appendix H Preliminary Geotechnical Risk Register

Geotechnical Hazard Identification – Desk Study Stage

Potential geotechnical hazards have been assessed in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622. The following pages set out the identified geotechnical risks and hazards which are associated with the proposed development and establish the approach which is to be taken to manage the risks including the geotechnical input and analysis.

Table H.1 is a preliminary assessment of possible geotechnical hazards at the site at Desk Study stage. This information is used to assist with ground investigation design.

Table H.1: Possible geotechnical hazards

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Uncontrolled Made Ground (variable strength and compressibility).	Artificial made ground and fill material is anticipated to be on site with variable strength and composition.	✓	-
Soft / loose compressible ground (low strength and high settlement potential).		✓	-
Shrink swell of the clay fraction of soils under the influence of vegetation.	London Clay Formation is expected to be encountered in the north and south areas of the site. Moreover, the presence of mature trees can pose a risk of shrink swell.	✓	-
Variable lateral and vertical changes in ground conditions.	The site is set at various levels and Made Ground and historical landfill may be variable in composition and thickness and this may pose implications to foundation design.	✓	-
High sulfates present in the soils.	Sulfates may be present in soils at the site.	✓	-
Adverse chemical ground conditions, (e.g. expansive slag).	The site has not been previously developed. Therefore, no adverse chemical ground conditions are expected.	-	✓
Obstructions.	The site has not been previously developed.	-	✓
Existing below ground structures to remain (on or off-site tunnels, foundations, basements, and adjacent sub-structures).	The site has not been previously developed. Therefore, existing below ground structures are not anticipated.	-	✓

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Shallow groundwater.	Shallow groundwater may be present within the Artificial Made Ground / Head Deposits. Groundwater was recorded to be present within the Bognor Sand Member between 2.40 – 4.00m bgl, and at 3.0m bgl within London Clay Formation in BGS borehole data.	✓	-
Changing groundwater conditions.	Phreatic levels can fluctuate seasonally.	✓	-
Risk from erosion.	Steep slopes were seen in the vicinity of the power lines in the east and also on the western boundary of Units 500 to 502. Other areas of steep slopes may be present across site.	✓	-
Risk from flooding.	The majority of the site is within Flood Zone 1 (with a low probability of flooding from rivers or the sea). Therefore, risk from flooding is considered low.	-	✓
Running sands and / or loose Made Ground, leading to difficulty with excavation and collapse of side walls.	Artificial Made Ground and fill material is anticipated to be on site with variable strength and composition.	✓	-
Mining.	No significant mining activities were identified within the site boundary or surrounding areas.	-	✓
Slope stability issues – general slopes.	The site level is variable and there are some steep slopes and large earth mounds on and around site. General slopes and retaining walls likely to be required.	✓	-
Slope stability issues – retaining walls.		✓	-
Earthworks – settlement (due to placement of fill on soft / loose ground).	The site level is variable and there are some steep slopes and large earth mounds on site. Earthworks likely to be required.	✓	-
Earthworks – poor bearing capacity of new fill.		✓	-
Earthworks – unsuitability of site won		✓	-

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
material to be reused as fill.			
Solution features in Chalk.	Chalk geology is present at depth beneath the site below the London Clay Formation and Lambeth Group.	-	✓
Cavities in the Superficial Deposits due to solution features.	Local geology is unlikely to suffer from dissolution	-	✓
Dissolution (associated with “wet rock head”).		-	✓
Brine extraction.	Unlikely. Brine extraction is not recorded at the site.	-	✓
Unforeseen ground conditions - risk associated with limited data.	Ground conditions are only defined at exploratory hole locations.	✓	-

Geotechnical Hazard Identification – Following Ground Investigation

The preliminary Geotechnical Risk Register following Ground Investigation is set out in Table H.3.

The probability and impact of a hazard have been judged on a qualitative scale as set out in Table H.2. The degree of risk (R) is determined by combining an assessment of the probability (P) of the hazard occurring with an assessment of the impact (I) of the hazard and associated mitigation it will require if it occurs ($R = P \times I$).

Table H.2: Qualitative assessment of hazards and risks

P = Probability		I = Impact		R = Risk Rating (P x I)	
1	Very unlikely (VU)	1	Very Low	1 – 4	None / negligible
2	Unlikely (U)	2	Low	5 – 9	Minor
3	Plausible (P)	3	Medium	10 – 14	Moderate
4	Likely (Lk)	4	High	15 – 19	Substantial
5	Very Likely (VLk)	5	Very High	20 – 25	Severe

Table H.3: Preliminary geotechnical risk register

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Uncontrolled Made Ground (variable strength and compressibility).	Made Ground (surface cover and engineered fill) was encountered across the site between ground level and to a maximum depth of 1.50m bgl.	Warehouse buildings.	Bearing capacity failure, settlement (total and differential).	2	4	8	Design foundations to found below Made Ground or on Made Ground which has been improved and tested.
			Floor slab failure.	3	4	12	Design floor slabs as suspended.
		Roads and Pavements.	Settlement (total and differential) of roads and pavements.	3	2	6	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate.
		Services.	Settlement (differential), causing damage to services.	3	2	6	Anticipated settlements are significant with regard to services. There is a requirement to improve the Made Ground prior to installation of services. It is also advisable to steepen falls in drainage to prevent back fall and use rocker boxes and flexible couplings.
		Public Open Space.	Settlement (differential), in gardens.	2	2	4	It is unlikely that settlements will be significant with regard to public open space.
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	3	3	9	Where soft spots encountered, over-excavation and replacement with suitable fill. Outline design of working platform to include geo-grid. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Soft / loose ground (low strength and high settlement potential).	The shallow natural soils comprise Bognor Sand Member, consisted of medium dense yellowish brown silty fine sands; and weathered London Clay Formation, consisted generally of soft to firm orangish brown sandy silty clays.	Warehouse buildings.	Foundation bearing capacity failure, settlement (total and differential).	1	4	4	Design foundations to found below any loose relative density sand and gravel or soft clay.
			Floor slab failure.	1	4	4	Design floor slab as suspended.
		Roads and Pavements.	Settlement (total and differential), of roads and pavements.	1	3	3	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate. If anticipated settlements are significant, and cannot be mitigated by design, over-excavate and replace soft soils.
		Services.	Settlement (differential), causing damage to services.	1	3	3	Ground levels are being raised in areas of plot 501 and settlements may be significant. Ground improvement may be required to reduce post construction settlements to tolerable levels.
		Public open	Settlement (differential),	1	3	3	

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
		spaces.	in public open spaces.				
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	1	3	3	Where soft spots encountered, over-excavate and replace with suitable fill. Design working platform to suit the ground conditions. Outline design of working platform to include geo-grid if necessary. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Shrinkage / swelling of the clay fraction of soils under the influence of vegetation.	The clays of the London Clay Formation (weathered and non-weathered) are medium heave potential. However, the site has been subject to earthwork and all vegetation has been removed.	Foundations.	Shrinkage or heave of soils and associated damage to foundations.	2	3	6	Design foundations in accordance with appropriate standards eg NHBC Chapter 4.2. Deepen foundations due to trees as appropriate.
		Floor slabs.	Floor slab failure.	2	4	8	Design floor slabs in accordance with NHBC standards. Design floor slab as suspended with a void, unless the warranty provider is satisfied the soil is not desiccated, or slabs are constructed when soils are not seasonally desiccated (i.e. during winter and spring).
Variable lateral and vertical changes in ground conditions.	The Made Ground soils (surface cover and engineered fill) are quite consistent across the site and do not present significant variations laterally and vertically, both in composition and strength. The shallow soils (Bognor Sand Member and London Clay Weathered) vary slightly laterally and	Warehouse buildings.	Foundation bearing capacity failure, settlement (total and differential).	2	4	8	Design foundations to found below Made Ground or on Made Ground which has been improved. Design foundations to found below any loose relative density sand and gravel or soft clay.
			Floor slab failure.	2	4	8	Design floor slab as suspended.
		Roads and Pavements.	Settlement (total and differential), of roads and pavements.	2	3	6	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate. If anticipated settlements are significant, and cannot be mitigated by design, over-excavate and replace unsuitable soils.
		Services.	Settlement (differential), causing damage to services.	2	3	6	Settlements are not anticipated to be significant with regard to services. No additional design requirements envisaged.
		Public open spaces.	Settlement (differential), in public open spaces.	2	3	6	It is unlikely that settlements will be significant with respect to public open spaces.
		Construction	Trafficking of the site in	2	3	6	Where soft spots encountered, over-excavate and replace with suitable

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
	vertically between medium dense sands to soft to firm sandy clays.	staff, vehicles and plant operators.	temporary conditions. Overturning of plant during construction.				fill. Design working platform to suit the ground conditions. Outline design of working platform to include geo-grid if necessary. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Sulfates present in the soils.	The ground investigation has proven that the potential for expansive sulfate bearing soils to be present has low likelihood at shallow depth but are present in deeper strata.	Attack of buried concrete.	Damage to concrete and reduction in strength.	2	4	8	Classify concrete in accordance with BRE SD1 and design concrete accordingly.
		Earthworks.	Sulfate heave following the use of hydraulic binders.	2	4	8	Supplementary sulfate testing in accordance with BRE guidelines to be undertaken during earthworks. Before the use of hydraulic binders is approved, comprehensive testing and design will need to be completed by a Specialist Contractor to satisfy both themselves and the Engineer of the suitability of the soils for treatment, and confirm that the requisite end-performance of the material is achievable. The use of modification / stabilisation to be restricted to suitable materials following laboratory trials. In all instances where improvement by the inclusion of binders is considered, a mix design is required and as part of this design, samples should be checked for swelling, even where very low sulfate values are recorded.
Obstructions.	No obstructions were encountered during intrusive investigation. Obstructions in the natural deposits are unlikely across most of the site.	Construction staff, vehicles and plant operators.	Risk of collapse of excavation as obstructions are pulled out.	1	3	3	Undertake Enablement Works and remove all obstructions.
		Roads and Pavements.	Hard spots in externals and roads / pavements.	1	2	3	
Shallow groundwater.	Shallow groundwater was encountered during ground investigation works	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation,	3	2	6	Contractor to appoint competent Temporary Works Designer to design temporary works, in accordance with BS 5975:2008+A1:2011. Temporary Works Designer to consider in their analysis the impact of, and requirements for, de-watering of excavations.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
	between 1.20m to 1.85m bgl with slow inflows of water. Post-field work monitoring has proven a shallow groundwater table sitting within the sandy fraction of the London Clay Formation (at approximately 0.86m to 4.0m bgl)		trafficking of site plant, inability to place and compact fill.				Any water that collects at the base of excavations to be removed as soon as practicable.
		Slopes and retaining.	Serviceability issues.	3	2	6	Contractor to appoint competent Temporary Works Designer to design temporary works, as required in accordance with BS 5975:2008+A1:2011. The shallow groundwater is to be taken into account during geotechnical design of the permanent works.
Changing groundwater conditions.	Monitoring during the ground investigations has proven that the groundwater table is highly variable (between 0.86m to 1.98m bgl in unit 500; 0.34m to 2.69m bgl in unit 501; and 1.58m bgl to 4.00m bgl in Unit 502).	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation, trafficking of site plant, inability to place and compact fill.	3	2	6	Contractor to appoint competent Temporary Works Designer to design temporary works as required, in accordance with BS 5975:2008+A1:2011. Temporary Works Designer to consider in their analysis the impact of a variable water table.
		Slopes and retaining.	Serviceability issues.	3	2	6	Contractor to appoint competent Temporary Works Designer to design temporary works, as required in accordance with BS 5975:2008+A1:2011. Design drainage for retaining walls to account for fluctuating groundwater levels. The shallow groundwater is to be taken into account during geotechnical design of the permanent works.
Subject to risk from erosion.	Slopes are proposed on the site.	The entire development.	Damage to buildings, open public spaces, roads and services.	2	4	8	Slopes to be designed at stable angle. Slopes to be designed with erosion matting to prevent scouring.
Running sands and / or loose Made Ground, leading to difficulty with excavation and	The ground investigation has proven the potential for running sands/ loose made ground is	Construction staff, vehicles and plant operators.	Ground failure, instability of plant and machinery.	1	4	4	Contractor to appoint competent Temporary Works Designer to design temporary works, in accordance with BS 5975:2008+A1:2011. Temporary Works Design to include recommendations for inspection of excavations. No person entry to unsupported excavations.
			Risk of collapse of excavation.	1	3	3	

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
collapse of side walls.	low.						
Slope stability issues – General Slopes.	The proposed development requires slopes to be formed as part of the cut to fill.	Warehouse buildings.	Serviceability issues.	3	4	12	Safe slope angles to be assessed during design. Engineered fill requirements to be defined at outline design stage. Drainage requirements to be assessed during design. Slopes to be constructed at a safe angle.
		Roads and Pavements.	Serviceability issues.	3	3	9	
		Public open spaces.	Serviceability issues.	3	2	6	
Slope stability issues – retaining walls.	The proposed development requires retaining walls to be constructed.	Warehouse buildings.	Serviceability issues.	3	4	12	Design of the retaining to be undertaken in accordance with EC7. Adequate drainage to be designed behind the structure, or for water seepage through the face of the wall. Lateral earth pressure parameters to be characterised during investigation and design. Engineered fill requirements to be defined at outline design stage.
		Pavement construction and long-term durability highways and external areas.	Serviceability issues.	3	3	9	
		Public open spaces.	Serviceability issues.	3	2	6	
		Construction staff, vehicles and plant operators.	Potential for future movements / collapse.	3	4	12	
Earthworks – Settlement (due to placement of fill on soft / loose ground / Deep Made Ground).	The ground investigation has proven the potential for soft / loose ground is low. Deepest Made ground (engineered fill) was encountered up to 1.50m bgl at location	Warehouse buildings.	Foundation bearing capacity failure, settlement (total and differential).	1	4	4	Design foundations to found below the soft / loose ground i.e. piled foundations.
			Floor slab failure.	1	4	4	Design floor slab as suspended.
		Roads and Pavements.	Settlement (total and differential), of roads and pavements.	1	3	3	Settlements are anticipated to be significant with regard to roads and pavements. Undertake ground improvement (pre-load and surcharge / rolling dynamic

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
	WS5.02, comprising very compacted fine sands.						compaction / dynamic compaction / over-excavation and replacement) to reduce settlements. Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate.
		Services.	Settlement (differential), causing damage to services.	1	3	3	Settlements are anticipated to be significant with regard to services. Detailed design works are required to assess the impact and design mitigation measures.
		Public open spaces.	Settlement (differential), in public open spaces.	1	3	3	Assess the use of geogrids as part of the design process. Undertake ground improvement (pre-load and surcharge / rolling dynamic compaction / dynamic compaction / over-excavation and replacement) to reduce settlements.
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	1	3	3	Where soft spots encountered, over-excavate and replace with suitable fill. Design working platform to suit the ground conditions. Outline design of working platform to include geo-grid if necessary. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Earthworks – poor bearing capacity and / or settlement of new fill.	There is a requirement for cut to fill to create the development platform for Plot 501. This will require reuse of soils excavated from the site.	Warehouse buildings.	Foundation bearing capacity failure, settlement (total and differential).	2	4	8	Design foundations to found below the alluvium / new fill i.e. piled foundations.
			Floor slab failure.	2	4	8	Design floor slab as suspended.
		Roads and Pavements.	Settlement (total and differential).	2	3	6	Minimum engineering performance to be defined in an Earthworks Specification.
		Services.	Settlement (differential), causing damage to services.	2	3	6	Earthworks to be designed in accordance with 1) Manual of Contract Documents for Highway Works (MCHW), Volume 1; 2) Specification for Highway Works (SHW) Series 600;
		Public open spaces.	Settlement (differential), in public open spaces,	2	3	6	3) 6031:2009, Code of practice for earthworks; and 4) BS 8000-1, workmanship on building sites.
		Construction staff, vehicles and plant	Trafficking of the site in temporary conditions. Overturning of plant	2	3	6	Site testing to be undertaken to confirm the works are in accordance with the design. A suitable watching brief and independent verification.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
		operators.	during construction.				
Earthworks – Unsuitability of site won material to be reused as fill.	There is a requirement for cut to fill to create the development platform for Plot 501. This will require reuse of soils excavated from the site.	Earthworks control, inability to place and compact fill.	Service limit state failure, excessive and intolerable total and differential settlement.	3	3	9	The design is to describe the processes required to produce suitable fill for reuse. Contractor to design site control measures, plant, equipment and arrangement to comply with processing requirements. Site testing to be undertaken to confirm the works are in accordance with the design. A suitable watching brief and independent verification. Adequate investigation required of soil types and characterisation of the soils to be undertaken during investigation. Some fill may be unsuitable for use.
		Project Budgets - Insufficient fill to complete earthworks.	Additional Costs, due to importation of fill or having to modify designs.	3	2	6	
Unforeseen ground conditions - risk associated with limited data.	Ground investigation has been undertaken. However, additional information will be obtained during construction. Ground conditions are only defined at exploratory hole locations.	All aspects of the development		3	4	12	Designers to be contacted if conditions encountered are different to those identified during investigation. Regular inspections of excavations and earthworks for evidence of stability. Adequate investigation required to characterise the site and understand the potential risks.

Whilst the probability and impact of the hazard occurring can be reduced to a minimum by geotechnical design, the impact cannot be reduced below very low. The risk register will need to be up-dated, as necessary, to reflect design, additional information, data and experience as it is gained through the construction process.

Impacts of the design with regard to health and Safety considerations will need to be included by the designer at design stage.

Appendix I Plausible Source-Pathway- Receptor Contaminant Linkages

Summary of Potential Contaminant Linkages

Table I.2 lists the plausible contaminant linkages which have been identified. These are considered as potentially unacceptable risks in line with guidelines published in LCRM (2019) and additional risk assessment is required.

Source – Pathway – Receptor Linkages have been assessed in general accordance with guidance in CIRIA Report C552 (Rudland et al 2001) but modified to add a 'no linkage' category and to remove low/moderate risk (See Table I.1).

It should be noted that whilst the risk assessment process undertaken in this report may identify potential risks to site demolition and redevelopment workers, consideration of occupational health and safety issues is beyond the scope of this report and need to be considered separately in the Construction Phase Health and Safety Plan.

Table I.1: Consequence versus probability assessment.

		Consequence			
Probability		Severe	Medium	Mild	Minor
	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			

Table I.2: Exposure model – preliminary risk assessment of source-pathway-receptor contaminant linkages

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Made Ground, associated with current earthworks/ construction works (metals, metalloids, PAH, hydrocarbons, asbestos) (S01).	Ingestion, inhalation or direct contact (P01)	Site users (R01)	Low likelihood	Medium	Low	There was no evidence of historical landfill in this area of the site. Made Ground soils (surface cover and engineered fill) do not present any exceedances above GAC. No asbestos was encountered / detected during ground investigation.
	Inhalation of fugitive dust (P01)	Neighbours (R01)	Low likelihood	Medium	Low	
	Leaching through unsaturated zone (P06)	Groundwater (R03)	Likely	Medium	Moderate	Groundwater analysis indicates elevated concentrations of Ammonium, ammoniacal nitrogen, phenol and aromatic band EC7-EC8 at location WS5.02. Migration is considered to be restricted due to underlying cohesive strata of London Clay Formation. Bognor Sand Member not considered to represent a sensitive groundwater resource. Nearest water abstraction 1.5km away.
	Surface run-off.	Aquatic ecosystems (R08)	Low likelihood	Medium	Low	
	Base flow from contaminated groundwater (P11)	Surface water (R04)	Low likelihood	Medium	Low	No exceedances were detected during the plant life risk assessment.
	Root uptake (P05)	Soft landscape planting (R05) Habitat Creation Area (R06)	Unlikely	Medium	Very Low	
	Direct contact (P02)	Water supply pipes (R02)	Likely	Medium	Moderate	There was no evidence of historical landfill in this area of the site. Made Ground soils (surface cover and engineered fill) do not present any exceedances above GAC. However, there was identified elevated concentrations of petroleum hydrocarbons and ammonium in groundwater at location WS5.02.

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / earthworks below the site (S02)	Migration, build up and asphyxiation (P03)	Site users (R01)	Likely	Medium to Severe	Moderate to High	Ground gas monitoring indicates that methane concentrations were not detected or below 0.4% in all locations with the exception of WS5.02 and WS5.04, where methane concentrations were recorded up to 4.2%. Highest concentrations of CO2 were detected at location WS5.05, with values between 0.4 and 1.2%. Based on the concentrations of methane, it is recommended gas protection measures in accordance with CS2 conditions be considered at this stage. However, further monitoring is recommended to assess the risk including low pressure conditions.
		Neighbours (R01)		Medium	Moderate	
	Migration, build up and explosion (P03)	Buildings on site (R02)	Likely	Medium to Severe	Moderate to High	
		Buildings on adjacent sites (R02)				
Made Ground, associated with historical mining activities (old clay pit, brick and tile works), possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydro-carbons (S03).	Ingestion, inhalation or direct contact (P01)	Site users (R01)	Low Likelihood	Medium	Low	Low likelihood to pose a risk due to the significant time elapsed since these activities took place.
	Inhalation of fugitive dust (P01)	Neighbours (R01)	Low likelihood	Medium	Low	
	Leaching through unsaturated zone (P06)	Groundwater (R03)	Low likelihood	Medium	Low	
	Surface run-off.	Aquatic ecosystems (R08)	Low likelihood	Medium	Low	
	Base flow from contaminated groundwater (P11)	Surface water (R04)	Low likelihood	Medium	Low	
Made Ground,	Ingestion,	Site users	Low	Medium	Low	Construction of the A3(M) likely involved excavation of

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
associated with earthworks for the construction of A3 (M) in the west boundary on the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S04).	inhalation or direct contact (P01)	(R01)	likelihood			natural soils and is considered unlikely to have a significant impact on the site.
	Inhalation of fugitive dust (P01)	Neighbours (R01)	Low likelihood	Medium	Low	
	Leaching through unsaturated zone (P06)	Groundwater (R03)	Low likelihood	Medium	Low	
	Surface run-off.	Aquatic ecosystems (R08) Surface water (R04)	Low Likelihood	Medium	Low	
Hydrocarbon vapours from potential VOC and petroleum hydrocarbon spillages/leaks from unspecified tank located at 110m N of the site. (S05).	Ingestion, inhalation or direct contact (P01)	Site users (R01)	No linkage		No risk	The tank was located at 110m N off-site and it was only recorded on historical mapping in 1970. It is not considered to pose a risk as there is no pathway between source. In terms of migration via leaching to the unsaturated zone, as it lies over London Clay Formation and this comprises generally cohesive soils, of unproductive strata, there is no link between source and receptor; therefore, risk level is considered negligible. Furthermore, the A3(M) is present at low elevation between the former tank and the site.
		Neighbours (R01)	No linkage		No risk	
	Direct contact	Water supply pipes (R02)	No linkage		No risk	
	Leaching through unsaturated zone.	Groundwater (R03)	No linkage		No risk	
Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / landfill / backfilled clay	Migration, build up and asphyxiation (P03)	Site users (R01)	Low likelihood	Medium	Low	Landfill is recorded to be at approximately 150m from the north boundary of the site. Therefore, likelihood of risk for ground gasses from this source are considered low.
		Neighbours (R01)	Low likelihood	Medium	Low	
	Migration, build up and	Buildings on site (R02)	Low likelihood	Medium	Low	

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
pits/brick works off-site. (S06).	explosion (P03)	Neighbours (R01)	Low likelihood	Medium	Low	