



Gravesham Community Investment Partnership LLP

Milton Place, Gravesend

Phase 2 Geo-Environmental Assessment

Revision A

MILTON PLACE, GRAVESEND

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Revision A

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Reference: AW/CS/P23-2862/02 Rev A

Date: January 2024

MILTON PLACE, GRAVESEND
Phase 2 Geo-Environmental Assessment – Revision A

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Phase 2 Geo-Environmental Assessment

Revision A

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Registration of Amendments

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By
Rev A February 2025	Updated with Client comments	TB	CB

1.0 INTRODUCTION

Brief

- 1.1 Create Consulting Engineers Ltd (CCE) was instructed by the Gravesham Community Investment Partnership LLP to undertake a Phase 2 Geo-Environmental Assessment of land off Milton Place (the 'Site') for residential end-use.

Project Context

- 1.2 The Client plans to submit a planning application to Gravesham Borough Council for development of the Site with 76No. units comprising 61No. units within a 4-storey apartment block and 15No. 2/3 storey residential houses with private gardens, associated car parking and areas of soft landscaping.
- 1.3 The proposed development layout is illustrated in Figure 1.1, below:



Figure 1.1: Proposed Development Layout

- 1.4 A Phase 1 Contamination Land Assessment was carried out by CCE in May 2023 (Ref: TB/VL/P23/2863/01) which highlighted a number of issues to be addressed.

Objectives

- 1.5 The objectives of the site investigation were as follows:

- Undertake a site investigation to quantify the potential source-receptor pollutant pathways as set out in the Phase 1 Contaminated Land Assessment report;
- Provide geotechnical parameters for the proposed development of the Site; and
- Assess the suitability for using soakaways for surface water disposal.

1.6 The geo-environmental investigation works were carried out in accordance with best practice and planning guidance such as that set out in the National Planning Policy Framework (2020), Environment Agency's Land Contamination Risk Management guidance (2021), BS5930:2015+A1:2020 - Code of practice for ground investigations, Eurocode 7: Geotechnical design and NHBC Standards 2011 Chapter 4.1: Land quality – managing ground conditions.

Scope of Work

1.7 The scope of works proposed for this assessment was as follows:

Geo-Environmental Site Investigation

- Drilling of 2No. cable percussive boreholes to 25.45m below ground level (or refusal) with hand-dug excavation pits to 1.0m for each borehole;
- Drilling of 5No. windowless sample boreholes to a maximum depth of 5.45m below ground level (or refusal) with hand-dug excavation pits to 1.0m for each borehole;
- During drilling of the boreholes, *in situ* (SPT) testing and disturbed sampling undertaken for laboratory analysis;
- Standpipes to be installed in the windowless sample boreholes to allow subsequent groundwater level and gas monitoring;
- Excavation 6No. machine excavated trial pits to help determine the potential for sustainable drainage (SUDS) across the Site;
- Excavation of 2No. machine excavated trial pits to help determine the former swimming pool wall location;
- Excavation of 2No. hand dug trial pits to obtain soil samples from areas inaccessible to the machine excavator;
- Undertaking of 3No. dynamic cone penetrometer (DCP) tests across the areas of the Site proposed for future access roads/gar parking to establish the strength profile of the soils;
- Soil samples collected and submitted to UKAS accredited testing laboratory for classification, strength, CBR and aggressiveness to concrete tests;
- Soil samples collected and submitted to an M-CERTS accredited testing laboratory for chemical testing for a standard suite or organic and inorganic parameters;
- Ground Gas and groundwater level monitoring to be undertaken on completion of the site works on 3No. occasions; and
- A summary interpretative report prepared on completion of the works and subsequent laboratory testing.

Constraints and Limitations

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- 1.10 Create Consulting Engineers Limited has endeavoured to assess all information provided to them during this appraisal. Should additional information become available which may affect the opinions expressed in this report, Create Consulting reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.
- 1.11 The report summarises information from a number of external sources and is unable to offer any guarantees or warranties for the completeness or accuracy of information relied upon. Information from third parties has not been verified by Create Consulting Engineers Limited unless otherwise stated in this report.
- 1.12 The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

2.0 SITE LOCATION AND DESCRIPTION

Site Location

- 2.1 The Site is located approximately 620m east of Gravesend mainline train station and 260m south of the River Thames. The Site can be centred at National Grid reference 565285.3, 174113.5 and the nearest postcode is DA12 2BT.
- 2.2 The approximate location of the Site is provided as Figure 2.1 below:



Figure 2.1: Site Location Plan (Geoindex, 2019)

Site Description

- 2.3 Access to the Site was gained off Ordnance Road to the south, via the strip of hardstanding utilised for car parking within the southern boundary.
- 2.4 The Site comprised several distinct areas: parking strip within the southern boundary; skate park within the eastern corner; open space within the central section of the Site, area of mounded earth between the skate park and playing field; recycling bins adjacent to the Site entrance; car park within the northwest section of the Site and fenced area of hardstanding (former car parking) within the southwest corner.

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- 2.5 The Site was generally level. However, the skate park was set approximately 1.0m below Site level. The mounded earth adjacent to the skate park was approximately 1.0m to 1.5m above Site level. The car park within the northwest section of the Site was approximately 0.5m below the level of Milton Road to the west.
- 2.6 A row of mature sycamore trees were located within the Site's northern boundary. A row of immature sycamore trees were located between the mounded earth and the central playing field. A mature poplar tree was located between the central playing field and the car park and mature trees and shrubs were located around the perimeter of the fenced off area of hardstanding in the southwest corner of the Site.
- 2.7 The Site was bound to the north by parkland, to the east and west by a residential areas, with a derelict building adjacent to the eastern corner of the Site. High street shops, restaurants and a petrol filling station were located to the southwest. Beyond Ordnance Road to the south were Chantry Community Academy, a nursery (Little Pebbles Childrens Centre) and Gravesend telephone exchange.

3.0 ENVIRONMENTAL SETTING

Geology

- 3.1 Reference has been made to the British Geological Survey (BGS) plans of the area (Sheet 271, Dartford, solid and drift edition, dated 1998), which indicates the Site is underlain by superficial deposits of 'Head'. The superficial deposits are indicated to be underlain by solid strata of the Lewis Nodular Chalk Formation.
- 3.2 Made ground is recorded 40m north of the Site. Superficial deposits of 'Alluvium' are recorded 40m north of the Site. No faults are indicated within influencing distance of the Site.

Hydrogeology

- 3.3 The Head deposits are classified by the Environment Agency (EA) as A '*Secondary Undifferentiated*', where possible assigned to Category A or B. This an aquifer of varying characteristics, previously designated as either major or minor aquifer.
- 3.4 The Lewis Nodular Chalk Formation is classed as a '*Principal Aquifer*' with high level of water storage and may support water supply/river base flow on a strategic scale.
- 3.5 The Site does not fall within a Source Protection Zone with regards to groundwater. A single active potable groundwater abstraction (785m south) was located within a 2km radius of the Site.

Hydrology and Flooding

- 3.6 The River Thames was located 250m north of the Site. A dock linked to the River Thames was located 190m northeast of the Site. A pond was located 55m north of the Site.
- 3.7 The EA Flood Maps indicate the Site is at '*moderate to high*' risk of flooding from groundwater, rivers or the sea.

Sensitivity

- 3.8 The sensitivity of each of the identified receptors is rated depending upon the environmental setting of the Site, the likelihood for pollutant linkages to be present and potential consequence of those potential pollutant linkages. The assessment approach adopted is based on guidance set out in the *Guidance for the Safe Development of Housing on Land Affected by Contamination R&D 66* document.
- 3.9 The site sensitivity with regards to groundwater within the superficial Head and bedrock Chalk is designated as **M1 (Moderately High)**, described as a '*Recognised major or minor aquifer*,

moderately vulnerable, with probable use (either direct or via baseflow to a sensitive watercourse). Within formal protection zone or catchment of authorised abstractions for potable or other high quality uses. Minor, short-term releases of contaminants may be tolerable'. This reflects the vulnerability of the underlying bedrock aquifer as well as the use of groundwater within influencing distance of the Site.

- 3.10 The Site sensitivity to surface water is designated as **L1 (Low)**, described as '*Within catchment of and over 250m from generally poor quality watercourse (GQA E or F) that is unlikely to improved by current or foreseeable surface water quality objectives or at distance (over 1000m) from a good quality watercourse with no interconnecting drains or baseflow from fissured strata.*'. This reflects the distance of the Site from the River Thames and potential to influence surface water catchment.

4.0 REVIEW OF EXISTING INFORMATION

Phase 1 Contaminated Land Assessment, CCE (Ref: TB/VL/P23/2863/01) dated May 2023.

- 4.1 A Phase 1 Contaminated Land Assessment was carried out by CCE to support a full planning application for the redevelopment of the Site to residential end-use.
- 4.2 The environmental sensitivity of the site has been assessed as moderately high with respect to groundwater and low with respect to surface water.
- 4.3 A number of potential pollutant linkages were identified associated with the proposed end-use. The key potential contamination sources identified in the Conceptual Site Model were:
- Potential poor quality Made Ground from former Site-use (swimming pools/structures including church/school/swimming pool structures);
 - Potential for ground gas to be present (infilled former swimming pool);
 - Potential for PCBs and hydrocarbons to be present from former substation;
 - Potential for off-site sources of contamination (works/garages/smithy/industrial estates);
 - Potential presence of Radon Gas; and
 - Potential presence of Unexploded Ordnance (UXO) beneath the Site.
- 4.4 The potential presence of contamination arising from the historical/current use of the Site is considered to be low and to pose a **moderate/low risk** to future end-users and buildings and services (water supply pipes).
- 4.5 The potential presence of contamination migrating onto Site from historical and current land-use in the surrounding area is considered to be unlikely and to pose a **low risk** to future end-users.
- 4.6 The risk to end-users from the potential presence of ground gas from underlying poor quality Made Ground present nearby infilled land is considered to be **moderate/low**.
- 4.7 Any exposure risk to construction workers associated with contamination has been assessed as **low** on the basis that the use of standard PPE would mitigate any exposure risk.
- 4.8 The risk posed to groundwater and surface water from potential on-site contamination is considered to be **very low** on the basis that there are no identified mobile contaminants on Site and given the historical Site-use.
- 4.9 In order to manage the uncertainty associated with these potential ground contamination sources, a site investigation was recommended to include any Made Ground and shallow soils and, depending on the findings, ground gas monitoring.

5.0 GROUND INVESTIGATION

5.1 Ground investigation works were undertaken at the Site between the 22nd and 25th May 2023, as outlined in the following paragraphs.

5.2 The borehole locations were selected to provide information on ground conditions in each area of the Site as well as to target specific areas of potential ground contamination, as follows:

- To establish the ground conditions beneath each of the former / current car parking areas in the northwest and southwest;
- To establish the nature and extent of Made Ground across the soft landscaped areas in the east;
- Establish the nature and extent of fill materials used to infill the former swimming pool;
- Establish the nature of the mounded material adjacent to the skate park; and
- Establish the ground conditions in the vicinity of the former electricity substation in the eastern corner of the Site.

Description of Fieldwork

5.3 The scope of initial works undertaken was as follows:

- Drilling of 2No. cable percussive boreholes (BH01 and BH02) to a depth of 25.45m bgl to determine ground and groundwater conditions, provide *in situ* soil strength information (SPTs) and enable the collection of soils samples for chemical and geotechnical testing, installation of groundwater and ground gas monitoring standpipe (BH02);
- Drilling of 6No. windowless sample boreholes (WS01, WS01A to WS05) to a maximum depth of 5.45m bgl to determine ground and groundwater conditions, provide *in situ* soil strength information (SPTs), enable the collection of soils samples for chemical and geotechnical testing and the installation of groundwater and ground gas monitoring standpipes (WS01A, WS02 and WS04);
- Excavation 6No. machine excavated trial pits (TP01 to TP06) to help determine the potential for sustainable drainage (SUDS) across the Site;
- Excavation 2No. machine excavated trial pits (TP07 and TP08) to locate the former swimming pool wall;
- Excavation of 2No. hand-dug pits to collect samples for laboratory chemical analysis (HP01 and HP02);
- Undertaking of 3No. dynamic cone penetrometer (DCP) tests across the areas of the Site (TP02, TP04 and TP05) proposed for access roads and car parking;
- Chemical laboratory testing of Made Ground and natural soils beneath the Site;

- Geotechnical laboratory testing of soil samples beneath the Site; and
- Ground gas monitoring on 3No. occasions (using an infrared gas analyser GA5000 and MiniRae 3000) to assess for the presence of ground gas.

- 5.4 An Exploratory Hole Location Plan is presented within Appendix A.
- 5.5 The soil arisings from each borehole and trial pit were logged by a suitably qualified Engineer, in line with the relevant British Standard (BS 5930 and Eurocode 7). The exploratory hole logs are included within Appendix B.
- 5.6 All works were undertaken in accordance with the CCE Health and Safety Policy and within the framework of a Health and Safety plan.

Environmental Laboratory Testing

- 5.7 Soil samples were collected from the Made Ground and underlying natural soils at various locations and depths across the site and submitted for chemical and aggressiveness to concrete testing (BRE SD1 Suite – Greenfield) at a UKAS/MCERTS accredited laboratory.
- 5.8 Samples for contamination analysis were collected in suitable amber glass 250ml jars and 60ml vials as well as 1ltr plastic tubs using clean nitrile gloves to avoid any cross-contamination between samples.
- 5.9 All samples were transported under chain of custody documentation and tested for a range of inorganic and organic compounds. Cool boxes were kept cool (<4°C) with ice packs during sample collection and subsequent transportation by courier to the testing laboratory.
- 5.10 The chemical testing comprised (total and leachate testing for a range of organic and inorganic parameters including asbestos, metals, petroleum hydrocarbons (TPH CWG) and speciated polyaromatic hydrocarbons (PAHs). In addition, two samples of made ground (outside the infilled swimming pool) were submitted for Waste Acceptance Criteria (WAC) testing.
- 5.11 The laboratory test certificates are included as Appendix D.

Geotechnical Laboratory Testing

- 5.12 Selected soil samples were subjected to testing within a UKAS accredited geotechnical laboratory. The results of this testing, along with laboratory certificates are included as Appendix E. Testing included:
- Moisture content;
 - Plasticity index;
 - Point load index;

- Saturation moisture content;
- Intact dry density; and
- California Bearing Ratio (CBR).

Ground Gas Monitoring

- 5.13 On completion of the fieldwork, a ground gas monitoring visit was undertaken on 3No. occasions to determine the presence of ground gas at the Site and to assess whether the deeper infilled ground of the former swimming pool had the potential to generate ground gas.
- 5.14 Measurements of methane, carbon dioxide, oxygen as well as gas flow were taken from each monitoring well using a GA5000 infra-red gas analyser with flow pod.
- 5.15 Following measurement of ground gas concentration and flow levels, standing groundwater levels and the total depth of selected monitoring wells were recorded using a dipmeter.
- 5.16 The ground gas monitoring and groundwater level measurements are presented in Appendix G and discussed in Section 7.

6.0 GROUND CONDITIONS

- 6.1 The encountered ground conditions are summarised below and provided in detail within the exploratory hole logs (Appendix B), photographs of exploratory holes (Appendix C) laboratory geotechnical test results (Appendix E) and geotechnical plots (Appendix F).

General

- 6.2 The ground investigation comprised a total of 18No. exploratory holes (BH01 and BH02, WS01, WS01A to WS05, TP01 to TP08 and HP01 to HP02), formed in accessible locations across the Site and targeting the proposed development. An exploratory hole location plan (drawing ref. P23-2863-10) is presented within Appendix A.
- 6.3 The ground investigation was designed to provide a general indication of ground conditions across the Site, collect samples for laboratory geotechnical and chemical testing, undertake soakage testing to assess the potential for sustainable drainage (TP01, TP04 and TP06) and permeable paving (TP02, TP03 and TP05) and install monitoring standpipes to enable ground gas and groundwater monitoring (BH02, WS01A, WS02 and WS04).
- 6.4 The following paragraphs provide a summary of ground conditions encountered during the ground investigation.

Hardstanding

- 6.5 Tarmacadam hardstanding was encountered during the formation of 2No. exploratory holes: BH02 and WS02 to depths of 0.10m and 0.05m below ground level (m bgl), respectively.

Topsoil

- 6.6 Within areas of soft landscaping, Topsoil was recorded to a maximum depth of 0.15m bgl, but generally to 0.10m bgl. The base of the Topsoil was marked with a layer of brown fine to medium sand.

Made Ground

- 6.7 Made Ground was recorded across the Site to depths of between 0.20m and 3.45m bgl, but generally to depths of less than 1.0m bgl. The Made Ground was generally described as '*brown slightly silty slightly sandy angular to subrounded fine to medium flint and chalk gravel with concrete and brick. Trace ash*'. Brick and glass were also encountered in the shallow Made Ground in the centre of the Site (TP01, TP02 and WS04).
- 6.8 A total of 4No. *in situ* SPT test were carried out within the Made Ground recording N-values in the range of N = 16 to N= 54, as detailed in the SPT depth plot, Appendix F.

- 6.9 Laboratory geotechnical tests undertaken on recovered Made Ground samples included 3No. CBRs, 3No. bulk density tests, 4No. moisture content tests, 1No. saturation moisture content (SMC) tests and 1No. dry density tests, as summarised in Table 6.1, below.

Laboratory test	No. of Tests	Result Range
Moisture Content	4	17% to 23%
Dry Density (Chalk material)	1	1.51Mg/m ³
Saturation Moisture Content (Chalk material)	1	29%
Bulk Density	3	1.81Mg/m ³ , 1.89Mg/m ³ and 2.04Mg/m ³
CBR	3	2.4%, 3.2% and 7.1%
Ph	8	6.1 to 11
SO ₄	8	15mg/l to 140mg/l

Table 6.1: Summary of Laboratory Geotechnical Testing – Made Ground

Former Swimming Pool

- 6.10 The former swimming pool was located within the central section of the Site, see Constraints Plan (P23-2863-11, Appendix A). Exploratory holes WS01, WS01A were used to determine the depth to base of the former pool, while exploratory holes TP07 and TP08 were positioned to determine whether the former pool walls remained in place.
- 6.11 Exploratory hole WS01 refused on reinforced concrete at 0.40m bgl, possibly the former swimming pool wall, see Plate P1, Appendix C.
- 6.12 Exploratory hole WS01A recorded backfill material to 2.90m bgl, where a flat concrete surface was encountered, interpreted as being the base of the former pool. WS01A recorded a refusal at 3.45m bgl, within the Made Ground.
- 6.13 TP07 did not locate the pool wall. Hence, TP08 was undertaken, encountering concrete at 0.50m, which stepped down, as detailed in Plate P2, Appendix C.
- 6.14 The Made Ground within the infilled swimming pool predominantly comprised demolition materials, presumably the former municipal building material formerly surveyed on the Site when the swimming pool was operational. The infilled material generally comprised fine to coarse gravel sized concrete and brick fragments with further cobbles and boulders of concrete in a brown silty sandy matrix. The deeper materials comprised brown red and back chalk, brick and concrete fragments with trace ash and dark grey clay horizons.

Head

- 6.15 Soils considered to represent Head were recorded to depths of between 0.35m and 2.40m bgl, within the central and southern sections of the Site. These deposits increased in depth towards the eastern half of the Site.
- 6.16 The Head deposits were generally described as '*soft brown silty clay, with occasional fine to medium flint subrounded gravel*'. A total of 3No. in-situ SPT strength tests were undertaken within the Head, recording N-values in the range of N=3 to N=11, confirming the very soft to soft nature of the material.
- 6.17 Laboratory geotechnical testing of Head samples included 3No. moisture content and 3No. plasticity tests, as summarised in Table 6.2, below.

Laboratory test	No. of Tests	Result Range
Moisture Content	3	16.4% to 18.1%
Modified Plasticity	3	17% to 24%
Ph	1	8.1
SO ₄	1	12mg/l

Table 6.2: Summary of Laboratory Geotechnical Testing – Head Deposits

Lewis Nodular Chalk Formation

- 6.18 The Made Ground / Head deposits were underlain by the Lewis Nodular Chalk Formation, across the Site, to the maximum extent of the boreholes (25.45m bgl). The Chalk was generally described as a '*structureless Chalk, recovered as cream, mottled white, silty subrounded to angular fine to coarse flint and Chalk gravel. With occasional cobbles of flint.*'. Light brown silt infill of fissures was noted to depths of between 2.0m and 3.90m bgl.
- 6.19 A total of 46No. SPT tests were undertaken within the Chalk, with corrected SPT N-values in the range of $N_{60} = 7$ to $N_{60} = 63$, but were generally greater than N=10 and were seen to increase in strength with depth, as detailed in the SPT depth plot, Appendix F.
- 6.20 Laboratory geotechnical test results of Site won Lewis Nodular Chalk Formation are summarised in Table 6.1, below, with laboratory test certificates presented in Appendix E.

Laboratory test	No. of Tests	Result Range
Moisture Content	8	27.1% to 35.6%
Dry Density (Chalk material)	8	1.42Mg/m ³ to 1.57Mg/m ³
Saturation Moisture Content	8	27% to 33%
Point Load Index $I_{d(50)}$	9	0.06MPa to 0.14MPa
Ph	9	8.1 to 9.8
SO ₄	9	10mg/l to 43mg/l

Table 6.3: Summary of Laboratory Geotechnical Testing – Chalk

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- 6.21 The laboratory geotechnical test results indicate the Chalk is of '**low density**', becoming medium dense at depths of greater than twenty metres below ground level.

Groundwater

- 6.22 During exploratory hole groundwater strikes were recorded within the Chalk from 7.0m bgl. Subsequent monitoring of installed standpipes, on 3No. occasions, recorded standing groundwater levels at a depth of approximately 9.0m bgl.

Visual and Olfactory Observations of Contamination

- 6.23 No visual or olfactory evidence of contamination was identified during exploratory hole formation across the Site.

7.0 CONTAMINATION ASSESSMENT

Soil Contamination

- 7.1 The soil characteristics have been assessed with reference to Land Quality Management (LQM)/Chartered Institute of Environmental Health (CIEH) 'Suitable 4 Use Levels' (S4ULs) for human health risk assessment 2015). In the case of lead a DEFRA Category 4 Screening Level has been adopted.
- 7.2 A Tier 1 (semi-quantitative) risk assessment has been undertaken comparing soil chemical testing results against current and appropriate published guidelines for residential end-use with home grown produce and as a conservative measure, using the minimum soil organic matter (SOM) result (minimum recorded value from across the Site was 0.6%) for quantifying the assessment criteria for organic components. In the case of heavy metals, the 1.0% SOM criteria has been utilised.
- 7.3 This assessment, along with the laboratory test certificates, are provided in Appendix D.

Tier 1 Human Health Assessment

- 7.4 All of the contaminants of concern underlying the Site were confirmed as being less than the assessment criteria (SSAC) in the samples collected and tested, with the exception of the following a concentration of Lead within the infilled swimming pool materials. No asbestos was detected within any of the samples collected and tested.
- 7.5 A more detailed assessment of the ground conditions in each area are provide below.

Soft Landscaped Area (East)

- 7.6 Made Ground encountered across the soft landscaped area in the east of the Site generally comprised reworked natural ground materials (Head and Chalk) along with anthropogenic materials such as brick and concrete fragments. However, fragments of glass and metals were encountered in the shallow Made Ground in the western part of this area (TP01, TP02 and WS04).
- 7.7 All of the contaminants of concern underlying this area of the Site were confirmed as being less than SSACs and asbestos was not detected within any of the samples collected and tested. Trace concentrations of Polyaromatic Hydrocarbons were identified in the Made Ground materials.
- 7.8 A hand pit (HP01) was formed in the mounded area to the west of the skate park and identified the material as reworked natural ground materials (gravelly sandy silt with chalk gravel) with

brick fragments. All of the contaminants of concern were confirmed as being less than SSACs and asbestos was not detected in the sample collected from this material.

- 7.9 A hand pit (HP02) was formed in the vicinity of the former electrical substation in the eastern corner of the Site. The Made Ground material present comprised reworked natural ground materials (gravelly sandy silt with chalk gravel) with brick and clinker fragments. The sample collected was submitted for Total Petroleum Hydrocarbons and Polychlorinated Biphenyls and neither were detected above laboratory detection limits.

Hard Landscaped Parking Areas (West)

- 7.10 Made Ground across the current / former car parking areas in the west of the Site generally brick/limestone gravel hard core over reworked Made Ground. Borehole BH02, located in the centre of the southwest area, encountered deeper Made Ground and cobbles of brick, limestone and concrete to a depth of 2m bgl. It is likely that this represents remnant foundations of the old church formerly present in this area.
- 7.11 All of the contaminants of concern were confirmed as being less than SSACs and asbestos was not detected in the sample collected from this material. No evidence of Total Petroleum Hydrocarbons were identified and only trace concentrations of Polyaromatic Hydrocarbons were detected.

Infilled Swimming Pool

- 7.12 The below ground swimming pool formerly occupying the central area of the Site was visibly still present through the back of the grass that now covers this area. A number of exploratory holes were formed across the area (WS01, WS101A, TP07 and TP08) and confirmed that the structure remains in-situ with a depth of at least 3m.
- 7.13 The Made Ground materials identified within the structure generally comprised demolition material (presumably the former municipal buildings present at the time of the swimming pool across this area) comprising concrete and brick fragments, cobbles and boulders in a brown sandy silty soil matrix. Traces of ash and clay lenses were also encountered.
- 7.14 All of the contaminants of concern identified within this infilled material were less than the assessment criteria (SSAC) in the sample collected and tested from this material, with the exception of Lead. Lead was present at a concentration of 550 mg/kg, which exceeds the residential end-use SSAC of 200 mg/kg. In addition, elevated concentrations of Petroleum Hydrocarbons (Aromatic & Aliphatic, C12-C35) were identified (300 mg/kg) although not at concentrations that exceeded the respective SSACs.

- 7.15 No asbestos was detected within the sample collected and tested from this material. However, the buildings formerly present on this Site were constructed in c. 1950s and would likely have incorporated asbestos-containing materials (ACMs). If these buildings are the origin of the demolition materials currently present in the swimming pool structure, it is considered likely that they will contain ACMs.

Controlled Water Health Assessment

- 7.16 A sample collected from the general Made Ground (BH01) encountered across the Site and the infill materials identified within the former swimming pool structure (WS01A) were submitted for soil leachate testing for a range of organic and inorganic determinants.
- 7.17 A GQRA has been undertaken comparing the soil leachate chemical testing results against current and appropriate published guidelines for Water Supply (Water Quality) Regulations, 2000 and this is provided in Appendix D.
- 7.18 Neither of the samples collected exceeded the respective SSACs available with the exception of Petroleum Hydrocarbons (Aliphatic C5-C8) which was present at a concentration of 820µg/l and exceeded the drinking water standard of 300µg/l. This represents petrol range hydrocarbons, and although not the same sample depth is different to the hydrocarbons identified in the soil total test which was heavier chain hydrocarbons (C12-C35).
- 7.19 Negligible/trace leachable concentrations of Polyaromatic Hydrocarbons were confirmed to be present in the sample tested.

Waste Acceptance Criteria

- 7.20 Waste acceptance criteria (WAC) testing was undertaken on 2No. samples of general Made Ground across the Site, collected from TP04 and WS04.
- 7.21 A slightly elevated percentage of total organic carbon (3.2%) was recorded on one of the samples, which exceeds the limit value of 3.0% and would classify this as Stable Non-Reactive Hazardous Waste (SNRHW). However, the other sample was confirmed to be 1.6%.
- 7.22 Prior to off-site disposal, further test results should be presented to the receiving landfill of all the materials including the swimming pool infill materials and confirming the waste classification. It is considered likely, however, that most materials would be classified as either Inert or SNRHW.

Ground Gas Monitoring

- 7.23 On the basis of the Conceptual Site Model prepared in the Phase 1 Assessment, a low to moderate potential ground gas risk was identified related potential poor quality Made Ground across the Site.
- 7.24 Historical records indicate the former swimming pool was backfilled by 1982. Exploratory hole WS01A located within the former swimming pool recorded Made Ground to a depth of 3.40m bgl, terminating due to a refusal, still within the Made Ground. No organic material was recorded within exploratory holes formed within the former swimming pool.
- 7.25 Outwith the former swimming pool, BH02 encountered foundations associated with the former Church, recording Made Ground to 2.0m bgl. Generally, Made Ground soils were recorded to depths of less than 1.0m bgl across the Site.
- 7.26 Ground gas monitoring visit was undertaken between 9th and 29th June 2023, to provide an assessment of the ground gas at the Site.
- 7.27 The ground gas monitoring recorded the following:
- Methane (CH₄) recorded at 0.0% by volume;
 - Carbon dioxide (CO₂) recorded at between 0.2% and 2.3% by volume;
 - Oxygen (O₂) recorded at 20.3% to 17.7% by volume; and
 - Gas flows recorded from 0.0l/hr to 0.3l/hr.
- 7.28 The results of the ground gas monitoring visits are provided in Appendix G.

Ground Gas Risk Assessment

- 7.29 The assessment of gas risk uses the gas concentrations present and the flow rate measured, which gives a gas screening value (GSV). Using this method and the worst-case measurements (Ref: BS 8485: 2015+A1:2019), the GSV for the areas identified across this Site have been established and a gas risk rating assigned in accordance with the 'traffic light' system outlined in the NHBC Guidance on Evaluation of Development Proposals on sites where Methane and Carbon Dioxide are present (March 2007).
- 7.30 The 'traffic light' system enables the assessment of derived GSVs against pre-determined gas screening values, as well as consideration to typical maximum concentrations, for methane and carbon dioxide. The screening values and typical maximum concentrations along with the gas protection measures required are outlined in Table 1 and 2 in Appendix G.

- 7.31 The worst case GSVs have been determined using the highest gas concentrations detected and the highest gas flow measured (0.3l/hr) on the site using the monitoring results and the worst case GSVs are:
- Methane (0.0%) x gas flow (0.3l/hr) gives a GSV of 0.00; and
 - Carbon Dioxide (2.3%) x gas flow (0.3l/hr) gives a GSV of 0.0069.
- 7.32 These GSVs, which represent the worst-case ground gas risk on the Site, indicate an NHBC 'green' classification (and Characteristic Situation 1, BS 8485:2019) with the GSVs an order of magnitude lower than the triggers for ground gas protection measures (Amber 1/Characteristic Situation 2), see Table 1 in Appendix G.
- 7.33 Current guidance for ground gas monitoring is to provide a minimum of 6No. measurements over a period of three months, with at least one of the visits undertaken during low (<1005mb) or falling atmospheric conditions to establish ground gas regime. However, with very low flows and negligible concentrations of ground gas recorded, it is considered that no further gas monitoring is required and that ground gas protections are not required for this development.

Updated Conceptual Site Model

- 7.34 Based on the intrusive investigation and subsequent contamination sampling and ground gas monitoring undertaken at the Site, the Conceptual Site Model from the Phase 1 Contaminated Land Assessment can be updated with proven pollutant linkages, as per Table 7.1, below with risk tables included in Appendix D.

Source	Pollutant	Pathway	Receptor	Likelihood of Occurrence	Consequence (severity)	Potential Risk	Comment	Further action
Historical and current site-use (School/ Church/Swimming Pools/Substation/ Recreation Ground) and earth mounds	Poor quality Made Ground (asbestos metals, hydrocarbons, volatiles etc.).	Possible direct contact with contaminated soils and accidental ingestion/inhalation of contaminated dust or volatile vapours. Plant uptake in residential garden areas.	Future residential end-users	Likely	Medium	Moderate	Elevated concentration of lead recorded within infill materials within swimming pool. Glass fragments identified in shallow Made Ground materials present on Site. No asbestos fibres identified, although given likely origin of demolition material in swimming pool, ACMs likely to be present. Further investigation and / or remediation will be required to mitigate exposure risk.	Yes
		Direct contact and ingestion of contamination in shallow soils during enabling works. Exposure likely to be short term.	Construction, demolition and ground workers	Unlikely	Mild	Very Low	Standard PPE during construction process would mitigate any potential exposure risk.	-
		Migration of any contaminants within infill materials via leaching/lateral migration down hydraulic gradient.	Controlled waters (groundwater and surface water)	Low likelihood	Mild	Very Low	Leachable concentration of petrol range hydrocarbons identified in swimming pool infill materials evidence. Controlled water receptors not considered sensitive in historical/current surrounding area land-use context. No action necessary.	-
		Direct contact. Permeation of mobile contaminants through water supply pipes	Buildings and services (water supply)	Low Likelihood	Medium	Moderate/ Low	Trace concentrations of hydrocarbons recorded in Made Ground during Site investigation works. Barrier pipe and/or clean corridors may be required to mitigate permeation risk to water supply pipes	Yes
	Polychlorinated Biphenyls (PCBs) from electrical substation	Possible direct contact with contaminated soils and accidental ingestion/inhalation of contaminated dust or volatile vapours. Plant uptake in residential garden areas.	Future residential end-users	Unlikely	Medium	Low	Testing of soils adjacent to sub-station did not record any PCBs.	-
	Ground gas (methane and carbon dioxide)	Possible lateral migration of ground gas contaminants onto Site and inhalation of harmful (asphyxiant) ground gases or accumulation of explosive gases.	Future residential end-users	Low Likelihood	Medium	Moderate/ Low	No elevated concentrations of ground gas recorded.	-
Nearby historical/ current industrial site uses (Sawmill, Tanks, Chemical Works, Garages, Smithy, Industrial Estates)	Asbestos, metals, hydrocarbons, VOCs	Possible lateral migration of volatile contaminants onto Site and inhalation of harmful (asphyxiant) volatile vapours or accumulation of explosive gases at ground floor level.	Future residential end-users	Unlikely	Medium	Low	Groundwater confirmed at depth (9 metres below ground level), negligible exposure risk potential by on-site migrating volatile contamination.	-
			Construction, demolition and ground workers	Unlikely	Mild	Very Low		-
Radon Gas	Radon	Possible harm from radon gas.	Future residential end-users	Unlikely	Medium	Low	Site not in a Radon affected area, no action required.	-
WW2 Bombs	UXO	Risk from unexploded ordnance	Future residential end-users	Unlikely	Severe	Low	No action necessary.	-
			Construction, demolition and ground workers	Unlikely	Severe	Low / Moderate	Detailed UXO risk assessment confirmed low/moderate UXO risk and UXO Risk Management Plan and Awareness briefings prepared for below ground works.	Yes

Table 7.1: Updated Conceptual Site Model

8.0 GEOTECHNICAL APPRAISAL

General

8.1 This section of the report should be read in conjunction with Section 6.0 (Ground Conditions), which indicates the Site is directly underlain by Made Ground soils, superficial deposits of Head and solid geology of the Lewis Nodular Chalk Formation. Groundwater levels were recorded at 9.0m bgl.

8.2 It is understood the proposed development is to include:

- 2No. 5-storey apartment blocks;
- 2No. 4-storey apartment blocks;
- 10No. 2/3-storey houses;
- private gardens;
- hardstanding for access and car parking; and
- areas of soft landscaping

Ground Model

8.3 Based on the material descriptions, *in situ* strength tests and geotechnical laboratory test results, the following ground model has been determined. Design parameters used for geotechnical analysis are presented in Table 8.1, below:

Material	Depth to base (m bgl)	γ (kN/m ³)	Design N-value	Φ (°)	I_p (%)	C_u (kN/m ²)
Made Ground	0.50	19	-	1	-	1
Head	1.0	17 [†]	N=7	20 [†]	20	20
Low-Density Chalk	>25.5	19.3	N=10 to N=40	-	-	-
Groundwater	9.0m bgl					

[†] - BS8002

Table 8.1: Geotechnical design parameters

Shallow Strip Foundations

8.4 Shallow strip foundations are feasible for the low-rise (2-3 storey) residential dwellings outwith the area of the former swimming pool (see Constraints Drawing P23/2863/11, Appendix A), where low density Chalk bedrock was encountered at depths of between 0.35m and 0.60m bgl.

8.5 Following the guidance of CIRIA guidance 'Engineering in Chalk', C574, a low-density chalk of Grade B and C, will have the following parameters:

Element	Low Density
E_s (secant modulus)	200MN/m ²
q_y (yield stress)	250kN/m ²
E_y (yield modulus)	15MN/m ²
q_u (ultimate bearing capacity)	1.5MN/m ²

Table 8.2: Low-density Chalk design parameters

- 8.6 Foundations should be a minimum of 1.20m bgl, with a minimum embedment of 350mm within the Chalk. With a conventional factor of safety of 3, an allowable bearing pressure of **83kN/m²** is calculated. Were the allowable bearing pressure insufficient and result in unacceptably large foundations or a piled foundation solution, a more precise estimate of settlements can be calculated following plate load bearing tests at formation level.
- 8.7 Formation level should be proof-rolled and soft spots should be excavated out and backfilled to a suitable earthworks specification.
- 8.8 Foundations constructed on this basis would limit settlements to approximately 25mm.

Piles

- 8.9 For buildings located within areas of deep Made Ground (former swimming pool and former church areas) and where the depth to Chalk head is greater than 1.50m (4-5 storey buildings) and for buildings where shallow foundations are not suitable, a piled foundation solution is recommended. Pile resistances have been calculated following the guidance of Engineering in Chalk (C574), ref. XVII, as outlined in the following paragraphs.
- 8.10 It is recommended piles are taken to a maximum of 8.0m bgl, 1.0m above the water table. Table 8.3 details resistances of 8.0m bored, continuous flight auger (CFA) and large displacement (closed end tubes and all pre-cast concrete, as per BS8004, 1986) piles.

	Bored piles	CFA piles	Large displacement piles (PL)
200mm diameter	157kN/m ²	132kN/m ²	201kN/m ²
300mm diameter	282kN/m ²	258kN/m ²	358kN/m ²

Table 8.3 Total Pile Resistances: 8.0m bgl

Pile Considerations

Bored piles

- little or no vibration;
- only noise of rig power pack;
- base difficult to clean;

- boring through thick superficial deposits will require extensive casing; and
- boring under water may require drilling mud, which can penetrate into dissolution features.

Continuous Flight Auger

- full base resistance can be assumed;
- little or no vibration;
- comparatively quiet;
- neither casing nor drilling mud required;
- impossible to judge solution feature penetrated during construction;

Driven cast-in-place

- high shaft resistance in chalk;
- full base resistance can be assumed;
- causes strong ground vibrations;
- noisy; and
- driven temporary casing restricts length.

Driven pre-formed

- higher base resistances possible by driving to hard layers;
- pile length can be increased by adding segmental sections;
- unaffected by superficial deposits or high water table;
- low shaft resistance;
- causes ground vibrations; and
- noisy.

Floor Slabs

- 8.11 Based on the ground conditions recorded, slabs should be suspended.

Pavements

- 8.12 A total of 3No. samples were subject to soaked CBR testing and a total of 3No. *in situ* Dynamic Cone Penetrometer (DCP) tests were undertaken during the Site investigation works.
- 8.13 The DCP tests were carried out according to the methodology set out in the Design Manual for Roads and Bridges (2008), where a CBR value for the soil profile is calculated by:

$$CBR (\%) = 10^{(2.48 - 1.057 \times \log_{10} P)}$$

Where:

P = The penetration rate in mm per blow (average)

8.14 The subgrade surface modulus is calculated by:

$$E = 17.6(CBR)^{0.64}$$

8.15 Where calculated CBR values are below 10%, the accuracy of this relationship is reduced. The interpreted DCP results are provided in Appendix I. A summary of the *in situ* DCP and laboratory CBR tests is provided in Table 8.4, below:

DCP Location	Laboratory Test Result		DCP Test Result	
	CBR (%)	Subgrade Surface Modulus (MPa)	CBR (%)	Subgrade Surface Modulus (MPa)
TP02 / DCP02	3.2	37	21.2	124
TP04 / DCP04	2.4	30	8.8	70
DCP05			18.6	114
WS04	7.1	61		

Table 8.4: *In situ* and Laboratory DCP Results

8.16 The high DCP results of DCP02 and DCP05 are attributed to grain sizes >20mm, which will result in an artificially high CBR value. Also, both of these tests recorded refusals before the full test was completed.

8.17 Using the laboratory test results and following the guidance of CD 255 Design for new pavement foundations, Revision 1 (April, 2020), the laboratory test results do not meet the minimum subgrade surface modulus requirement of 50MPa. Therefore, some form of ground improvement will be required prior to pavement construction.

8.18 Ground improvement may take the form of lime/cement stabilization or the use of a geogrid in proposed areas of pavement. Following ground improvement, it is recommended a series of in-situ CBRs are undertaken to inform pavement design.

Excavations and Earthworks

8.19 In general, shallow cohesive soils should remain freestanding over the short to medium term. Where granular soils are encountered, shoring should be used.

8.20 The constraints drawing (ref. P23-2863-11, Appendix A) details the proposed development in relation to former Site structures. Foundations associated with former Site structures: swimming pool (TP08, WS01 and WS01A) and church (BH02) were encountered during the

ground investigation. Further remnant below ground structures / foundations may also be present associated with other historical buildings on the Site, as identified in the constraints drawing. These will need to be grubbed out prior to development.

- 8.21 Were earthworks required, a site specific earthworks specification should be prepared and should include details of earthworks validation and testing.

Buried Concrete

- 8.22 Design/mix of buried concrete should be undertaken in accordance with the appropriate ACEC classification, of BRE Special Digest 1: 2005 (Concrete in Aggressive Ground). On this basis the Site is deemed to classify as “greenfield” and on the basis of the Site history, the geological setting, and observations during the formation of exploratory holes, the Site is not considered to be one that may contain pyrite (i.e. sulphide).
- 8.23 A total of 18No. samples from the Made Ground and natural deposits were subject to pH and SO₄ analysis. Results indicate soluble sulphate concentrations in soil samples of 10mg/l to 140mg/l, with the mean of the highest 20% (4No. results) calculated as 90mg/l. On the basis of these chemical test results, the Design Sulphate Class for the Site is considered to be “DS-1”.
- 8.24 Based on the Site geology, the groundwater conditions can be described as ‘static’. Recorded soil pH values were in the range of 6.1 to 11.0. On this basis, the “Aggressive Chemical Environment for Concrete (ACEC)” class for concrete in the ground is indicated to be AC-1s. Design/mix of buried concrete should be undertaken in accordance with these classifications.

9.0 SOAKAGE ASSESSMENT

- 9.1 A total of 6No. test pits were excavated to establish the potential for using soakaways for surface water drainage with 3No. shallow soakage tests (TP02, TP03 and TP05) and 3No. deeper soakage tests (TP01, TP04 and TP06).
- 9.2 The soakage test results are presented in full in Appendix H and the Trial Pit logs are provided in Appendix B. The results of the soakage testing are summarised in Table 9.1, below:

Loc.	Pass / Fail	Lithology	Test Range (m bgl)	Soil infiltration rate (ms ⁻¹)
TP02	Pass	Chalk	0.40m to 1.00m	3.64E-04 4.35E-04 2.82E-04
TP03	Pass	Chalk	0.40m to 1.00m	8.11E-06 8.29E-06 7.89E-06
TP05	Pass	Made Ground: gravelly silt. Gravel of brick and concrete. With cobbles of brick.	0.40m to 1.00m	3.80E-06 3.89E-06 3.14E-06

Table 9.1 Summary of permeable paving soakage test results

Loc.	Pass / Fail	Lithology	Test Range (depth, m)	Soil infiltration rate (ms ⁻¹)
TP01	Pass	Chalk	0.60m to 1.60m	3.94E-04 4.31E-04 4.59E-04
TP04	Pass	Chalk	1.00m to 2.00m	5.14E-04 4.48E-04 2.95E-04
TP06	Fail	Head: slightly silty Clay	1.00m to 2.00m	-

Table 9.2 Summary of sustainable drainage soakage test results

- 9.3 A general requirement for soakaway/infiltration testing is that the excavation should drain half the volume over a period of 24 hours. This was not achieved at TP06, where the test horizon comprised Head deposits. The test results indicate permeable paving and sustainable drainage are feasible where the drainage medium comprises Chalk. Outwith the areas of former buildings and swimming pool, the depth to Chalk increases to the east of the Site, with Head deposits at TP06 recorded to >1.90m.
- 9.4 Where SUDS are positioned within the Chalk, there is the potential to create solution features. Therefore, all SUDS should be located away from proposed structures.

10.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

- 10.1 A Phase 2 Geo-Environmental Assessment of land off Ordnance Road and Milton Place was undertaken to support the development for residential end-use.
- 10.2 The site investigation comprised 22No. exploratory holes to establish the ground conditions and determine the potential for ground, groundwater and ground gas contamination across the Site.
- 10.3 The ground conditions generally comprise hardstanding/Topsoil, underlain by Made Ground generally to 1.0m. However, deeper areas of Made Ground were recorded within the footprint of the former church structure (2.0m bgl) and former swimming pool (c. 3.45m bgl). The Made Ground generally comprised reworked natural deposits with brick and concrete fragments although metal and glass fragments were encountered in the central area of the Site. The structure of the former swimming pool was confirmed to remain in-situ and the infill materials comprised predominantly demolition waste, likely arising from the demolition of the buildings formerly present on the Site and associated with the former swimming pool.
- 10.4 The Made Ground was locally underlain by cohesive deposits of Head, which were seen to increase in thickness within the eastern section of the Site. The Made Ground and Head deposits were underlain by solid strata of the Lewis Nodular Chalk Formation. Standing groundwater was recorded at a depth of 9.0m bgl.
- 10.5 Chemical testing identified an elevated concentration of Lead within the infill materials in the former swimming pool structure in the centre of the Site (WS01A), which exceeded residential end-use criteria with home grown produce. No other human health exceedances were identified across the Site although the shallow Made Ground in the central areas (TP01, TP02 and WS04) included fragments of glass and metal.
- 10.6 No other concentrations of heavy metals, polyaromatic or petroleum hydrocarbons were recorded in shallow soils that exceeded the residential end-use criteria with home grown although elevated concentrations of Petroleum Hydrocarbons (C12-C35) were identified within the infill materials within the former swimming pool. No asbestos was detected within Site soils or Made Ground, although it is likely that ACMs are present within the infill material within the swimming pool given the likely origin of this material (c.1950s constructed municipal buildings).
- 10.7 No leachable concentrations of contaminants exceeded available SSACs except for Petroleum Hydrocarbons (C5-C8, Aliphatic) present within the infill materials within the former swimming pool structure. This marginally exceeds the drinking water standard, although is not

- considered to pose a risk given its current containment within a concrete below ground structure and low sensitivity of groundwater in this former industrial area.
- 10.8 The general Made Ground soils destined for off-site disposal are likely to be classified as either Inert or Stable Non-Reactive Hazardous Waste although chemical test results should be presented to the receiving landfill prior to disposal.
- 10.9 Ground gas monitoring confirmed no detectable presence of methane and very low concentrations of carbon dioxide (max 2.3% by volume) although with low/negligible gas flow rates of (0.3l/hr). On the basis of the calculated worst case gas screening values, and low/negligible gas flows, it is considered that there is a low ground gas risk and no ground gas protection measures are necessary for this development.
- 10.10 Shallow strip foundations should be taken down to 1.20m and a minimum of 350mm into the Chalk, which will give an allowable bearing pressure of **83kN/m²**. Where ground conditions result in deeper foundations or where a higher allowable bearing pressure is required, a pile foundation solution is recommended.
- 10.11 The piling process destroys and remoulds the Chalk as the pile is advanced, resulting in a shear surface along the length of the pile. Consequently, resistances from piles within Chalk are predominantly end bearing. Piles taken below the water table result in a higher factor of safety. Therefore, if sufficient resistances are achievable, it is recommended piles are taken down to a maximum of 8.0m, 1.0m above the water table.
- 10.12 Based on the ground conditions recorded, slabs should be suspended.
- 10.13 For any proposed new pavements, due to the low subgrade surface modulus results obtained, some form of ground improvement is required. This may take the form of cement/lime stabilization or the use of a geogrid. Following ground improvement, it is recommended a series of in-situ CBR tests are undertaken to guide pavement design.
- 10.14 Buried concrete should be classified as DS-1, with an ACEC classification of AC-1s.
- 10.15 Shallow excavations within cohesive soils may offer short to medium-term stability. Were earthworks required as part of the proposed development, an earthworks strategy, including validation testing should be prepared.
- 10.16 Soakage testing indicates permeable paving and sustainable drainage are feasible in areas of Chalk. However, the Head deposits are not a suitable drainage medium. In addition, with the potential to create solution features within the Chalk, any SUDS should be located a suitable distance from any proposed structures, in accordance with current guidance.

Recommendations

10.17 Based on the findings of the site investigation works undertaken, we would recommend the following:

- Given the presence of demolition materials, contaminants of concern (Lead and Petroleum Hydrocarbons) and the likely presence of asbestos-containing materials within the former swimming pool structure, further site investigation should be undertaken to determine the nature and extent of any deleterious materials and contamination present. This should include sufficient information to enable quantitative risk assessment to support the retention of this material on site (if appropriate) or to classify the material for off-site disposal, if required.
- If the material is to be retained, remediation works will be required to mitigate exposure risk to future site residents, particularly in private gardens and soft landscaped areas. Remediation works would also need to address areas of the site where further deleterious materials were encountered in shallow Made Ground (in the form of glass and metal fragments).
- A Remediation Method Statement will need to be prepared to detail the proposed remediation works and outline the validation process to render the Site suitable for residential end-use.
- Some form of ground improvement in areas of proposed hardstanding may be required, in the form lime/cement stabilisation or the use of a geogrid.
- On removal of any below ground structures, if significant earthworks are required, targeted laboratory geotechnical testing would be recommended and a detailed earthworks specification prepared.

11.0 REFERENCES

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APPENDICES

APPENDIX A

DRAWINGS



create
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Legend

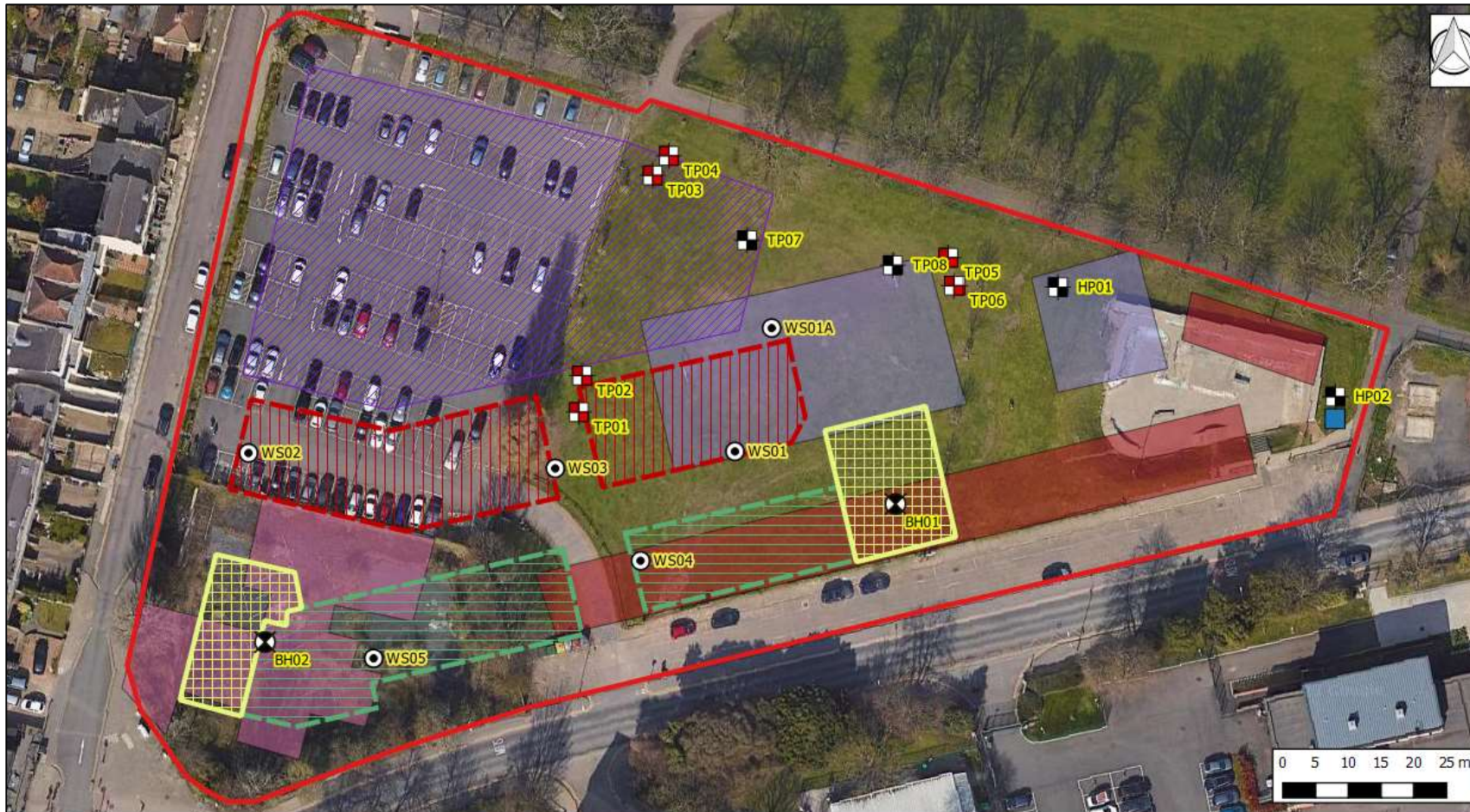
-  Site boundary
-  CP Borehole
-  WS Borehole
-  Trial Pit

Project: Milton Place, Gravesend

Drawing Title: Exploratory Hole Location Plan

Drawing No.: P23-2863-10

Date: 05/07/2023



create
CONSULTING ENGINEERS LTD

Legend

- Site boundary
- ✕ CP Borehole
- WS Borehole
- ◻ Trial Pit

Proposed Development

- 5-storey buildings
- 4-storey buildings
- 3-storey buildings

Historic Development

- Swimming pools
- Church and school
- Municipal buildings
- El. Sub Station

Project: Milton Place, Gravesend

Drawing Title: Exploratory Hole Location and Constraints Plan

Drawing No.: P23-2863-11

Date: 05/07/2023

APPENDIX B

EXPLORATORY HOLE LOGS

KEY SHEET

SAMPLING

D	Small disturbed sample
B	Bulk disturbed sample
ES	Environmental sample*
HVR	Hand Shear Vane Test (KPa)

TESTING

N=x	SPT blow count 'N' given as the sum of the blows required to drive the sampler across the test length (300mm)
(x,x/y,y,y,y)	Blows per increment during the standard penetration test (SPT). The initial two readings, 'x' relate to the seating drive (150mm of test) whilst the remaining blows, 'y', relate to the number of blows per 75mm increment of the test length (total of 300mm)
x (x,x for z)	Incomplete SPT test where seating drive blow count (x) totals 50 for length of seating drive (z) (penetration in mm)
x (x,x/y for z)	Incomplete SPT test where seating drive was completed but full test length could not be achieved (z) (penetration in mm).

All measurements are given in metres (m), unless otherwise specified

* Sample comprises: 1ltr plastic tub, 250ml amber glass vial and 60ml amber glass vial

Trial Pit Log

Trial Pit No.

TP01

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565262.00 N174102.90

Level: 8.30m AoD

Date

22/05/2023

Location: Gravesend

Dimensions (m): 1.60

Scale

1:20

Client: Hill Partnerships

Depth:
1.60

0.30

Logged
TB

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.05 - 0.10	ES		0.13 0.20 0.35	8.17 8.10 7.95	  	Grass over dark brown slightly gravelly silty fine to medium sand. Gravel is subangular to rounded fine to medium flint with fragments of glass and brick. MADE GROUND . Yellow brown slightly silty gravelly fine to medium sand. Gravel is subangular to rounded fine to medium flint. MADE GROUND . Brown mottled light brown friable slightly sandy slightly gravelly silty CLAY. Gravel is subrounded fine to coarse flint and subangular fine to medium chalk. HEAD .	
	1.00 - 1.50	D		0.70 0.90 1.60	7.60 7.40 6.70	   	Structureless CHALK recovered as cream mottled white gravelly SILT. Gravel is subrounded fine to coarse flint and subangular fine chalk. With occasional subrounded flint cobbles. UNDIFFERENTIATED CHALKbecoming white mottled orange ...becoming white silty GRAVEL. Gravel is subangular to subrounded fine to coarse chalk and subrounded fine to coarse flint. Grade Dc End of Trial Pit at 1.60m	1 2 3 4

Remarks

- TP01 terminated at 1.6m target depth.
- No groundwater encountered.



Stability : Stable

Stability : Stable

Trial Pit Log

Trial Pit No.

TP04

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565275.80 N174142.40

Level: 8.50m AoD

Date

22/05/2023

Location: Gravesend

Dimensions (m): 1.70

Scale

1:20

Client: Hill Partnerships

Depth:
2.00

0.30

Logged
AW

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.15 0.20			0.15 0.20	8.35 8.30		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to rounded fine to medium flint. TOPSOIL	
							Buff-brown fine sand. MADE GROUND.	
							Brown slightly gravelly silt. Gravel is subrounded fine chalk and brick. Trace clay. MADE GROUND.	
	0.50 0.50	B ES		0.60	7.90		Structureless CHALK recovered as cream mottled white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular fine chalk. With occasional subrounded flint cobbles. UNDIFFERENTIATED CHALK.	1
	1.80	B		2.00	6.50		End of Trial Pit at 2.00m	2
								3
								4

Remarks

- TP04 terminated at 2.0m target depth.
- No groundwater encountered.



Stability : Stable

Trial Pit Log

Trial Pit No.

TP05

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565318.30 N174126.80

Level: 7.25m AoD

Date

22/05/2023

Location: Gravesend

Dimensions (m): 1.70

Scale

1:20

Client: Hill Partnerships

Depth:
1.00

0.30

Logged
AW

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.10	7.15		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	
				0.20	7.05		Buff-brown fine sand. MADE GROUND.	
				0.20	7.05		Brown slightly gravelly silt. Gravel is angular to subrounded fine to coarse concrete and brick. With cobbles of brick. With boulders of concrete. Trace clay. MADE GROUND. ...with 5-10mm roots to 0.80m	
				1.00	6.25		End of Trial Pit at 1.00m	1
								2
								3
								4

Remarks

- TP05 terminated at 1.0m target depth.
- No groundwater encountered.



Stability : Stable

Trial Pit Log

Trial Pit No.

TP06

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565319.30 N174122.40

Level: 7.25m AoD

Date

22/05/2023

Location: Gravesend

Dimensions (m): 1.70

Depth:

0.30

1.90

Scale

1:20

Logged

AW

Client: Hill Partnerships

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.10			0.10	7.15		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	
	0.20			0.20	7.05		Buff-brown fine sand. MADE GROUND.	
	0.30	ES		0.40	6.85		Brown silty subangular to subrounded fine to coarse brick concrete and chalk gravel. With cobbles of brick. With boulders of concrete. MADE GROUND.	
	0.50	B		0.40	6.85		White silty subrounded fine to medium chalk gravel. MADE GROUND. ...with <5mm roots to 1.50m	
				0.70	6.55		Soft brown slightly silty CLAY. Trace rounded fine to medium flint gravel. HEAD.	1
				1.90	5.35		End of Trial Pit at 1.90m	2
								3
								4

Remarks

- TP06 terminated at 1.9m target depth.
- No groundwater encountered.



Stability : Stable

Trial Pit Log

Trial Pit No.

TP08

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565310.00 N174125.60

Level: 7.40m AoD

Date

25/05/2023

Location: Gravesend

Dimensions (m):

Depth:

1.50

Scale

1:20

Logged

AW

Client: Hill Partnerships

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.10	7.30		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	
				0.20	7.20		Buff-brown fine sand. MADE GROUND.	
				0.30	7.10		Very soft brown silty clay. MADE GROUND.	
				0.50	6.90		Brown slightly silty slightly sandy subangular to subrounded fine to coarse concrete and brick. Trace clay. With cobbles of concrete. With boulders of concrete. MADE GROUND.	
				0.50	6.90		Brown white slightly gravelly slightly silty sand. Gravel is angular to subrounded fine to coarse flint chalk brick and concrete. With cobbles of concrete and brick. With horizons of clay. MADE GROUND.	
				1.50	5.90		End of Trial Pit at 1.50m	

Remarks

- TP08 terminated at 1.5m target depth.
- No groundwater encountered.



Stability :

Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565287.00 N174102.00

Hole Type
WS

Location: Gravesend

Level: 7.50m aOD

Scale
1:40

Client: Hill Partnerships

Date: 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.10	7.40		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	
					0.40	7.10		Brown silty subangular to subrounded fine to coarse brick and concrete gravel. With cobbles of brick. MADE GROUND.	
								End of Borehole at 0.40m	
									1
									2
									3
									4
									5
									6
									7
									8
Borehole Diameter		Casing Diameter		Chiselling					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration			

Remarks

- WS01 terminated at 0.40m, due to refusal.
- No groundwater encountered.

Borehole Log

Borehole No.

WS01A

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565291.50 N174115.70

Hole Type
WS

Location: Gravesend

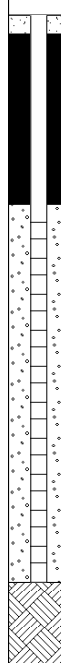
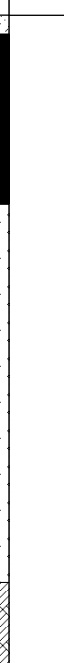
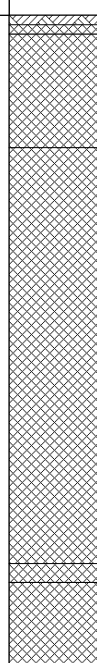
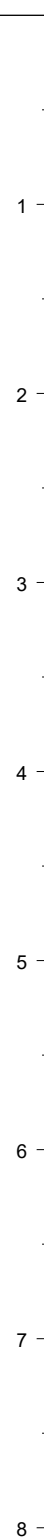
Level: 7.50m aOD

Scale
1:40

Client: Hill Partnerships

Date: 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05	7.45		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	
					0.10	7.40		Buff-brown fine sand. MADE GROUND.	
					0.70	6.80		Brown slightly silty slightly sandy subangular to subrounded fine to coarse concrete and brick. Trace clay. With cobbles fo concrete. With boulders of concrete. MADE GROUND.	
		1.00	SPT	N=29 (4,5/5,10,8,6)				Brown red black subangular to subrounded fine to coarse chalk brick and concrete. Trace ash. MADE GROUND.	
		1.50	ES		1.40	6.10		1.40m - ...with horizons of firm dark grey clay	
		2.00	SPT	N=22 (5,5/5,3,4,10)					
		3.00	SPT	N=54 (6,9/9,8,13,24)	2.90	4.60		Brown very weak concrete. MADE GROUND.	
					2.90	4.60		2.90m - ...flat concrete surface identified, possible base of swimming pool	
					3.00	4.50		Black silty subangular fine flint gravel. MADE GROUND.	
					3.45	4.05		End of Borehole at 3.45m	
Borehole Diameter		Casing Diameter		Chiselling					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration			

Remarks

- WS01A terminated at 3.45m, due to refusal.
- No groundwater encountered.

Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565211.60 N1744096.80

Hole Type
WS

Location: Gravesend

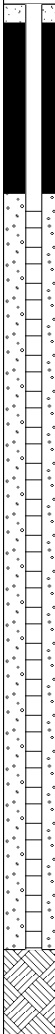
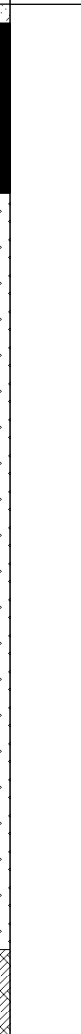
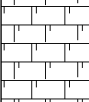
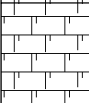
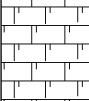
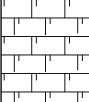
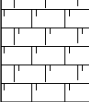
Level: 9.60m aOD

Scale
1:40

Client: Hill Partnerships

Date: 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.05	9.55		MACADAM.	1
					0.25	9.35		Brown black silty subangular fine to coarse brick concrete limestone gravel. With cobbles of brick.	
					0.60	9.00		MADE GROUND.	
		1.00 - 1.45	D SPT	N=15 (6,7/5,4,3,3)	1.30	8.30		Structureless CHALK recovered as brown white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular medium chalk. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.	2
		1.00						Structureless CHALK recovered as cream mottled white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular fine chalk. With occasional subrounded flint cobbles. UNDIFFERENTIATED CHALK.	
		2.00 - 2.45	D SPT	N=8 (2,2/2,2,2,2)					3
		2.00							
		3.00 - 3.45	D SPT	N=17 (3,3/4,4,4,5)					4
		3.00							
		4.00 - 4.45	D SPT	N=16 (3,2/4,4,3,5)					5
		4.00							
		5.00 - 5.45	D SPT	N=11 (2,2/2,3,3,3)	5.45	4.15			6
		5.00							
End of Borehole at 5.45m								7	
								8	
Borehole Diameter				Casing Diameter				Chiselling	
Depth Base		Diameter		Depth Base		Diameter		Depth Top	Duration

Remarks

- WS02 terminated at 5.45m, target depth.
- No groundwater encountered.

Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565258.50 N174094.30

Hole Type
WS

Location: Gravesend

Level: 8.50m aOD

Scale
1:40

Client: Hill Partnerships

Date: 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	8.40		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	1
		0.40	ES		0.50	8.00		Brown slightly sandy slightly gravelly silt. Gravel is subangular to subrounded fine to medium flint and brick. Trace clay. Trace ash. MADE GROUND.	
		0.80	D		1.30	7.20		Structureless CHALK recovered as brown white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular medium chalk. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.	
		1.00 - 1.45	D		1.50	7.00		Structureless CHALK recovered as brown white slightly silty slightly gravelly CLAY. Gravel is very weak subrounded fine to medium chalk. UNDIFFERENTIATED CHALK.	2
		1.00	SPT	N=10 (3,4/3,3,2,2)	2.00	6.50		Structureless CHALK recovered as brown white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular medium chalk. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.	
		2.00 - 2.45	D					Structureless CHALK recovered as white slightly silty slightly gravelly CLAY. Gravel is very weak subrounded fine to medium chalk. UNDIFFERENTIATED CHALK.	3
		2.00	SPT	N=8 (2,2/2,2,2,2)					
		3.00 - 3.45	D						4
		3.00	SPT	N=17 (3,3/4,4,4,5)					
		4.00 - 4.45	D						5
		4.00	SPT	N=25 (7,7/6,7,6,6)					
		5.00 - 5.45	D						6
		5.00	SPT	N=11 (3,2/2,2,3,4)					
		5.45			5.45	3.05		End of Borehole at 5.45m	7
									8

Borehole Diameter		Casing Diameter		Chiselling		Duration
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	

Remarks

- WS03 terminated at 5.45m, target depth.
- No groundwater encountered.

Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565271.40 N174080.20

Hole Type
WS

Location: Gravesend

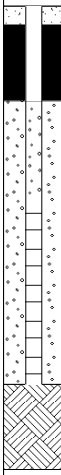
Level: 8.40m aOD

Scale
1:40

Client: Hill Partnerships

Date: 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.12	8.28		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	1	
		0.40	B		0.20	8.20		Buff-brown fine sand. MADE GROUND.		
		0.60	ES		0.50	7.90		Brown white gravelly silt. Gravel is very weak subrounded fine to medium chalk. MADE GROUND.		
		1.00	SPT	N=7 (1,1/2,2,1,2)				Soft brown slightly silty clay. Trace subangular fine brick. Trace glass. MADE GROUND.		
		1.50	D		1.30	7.10		Soft brown slightly silty CLAY. Trace rounded fine to medium flint gravel. HEAD.		
		2.00	SPT	N=63 (3,4/7,12,18,26)	2.00	6.40		Structureless CHALK recovered as brown white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular medium chalk. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.		
		2.30 - 2.45	D		2.30	6.10		Structureless CHALK recovered as white slightly silty slightly gravelly CLAY. Gravel is very weak subrounded fine to medium chalk. UNDIFFERENTIATED CHALK.		
					2.45	5.95		End of Borehole at 2.45m		
					</					

Remarks

- WS04 terminated at 2.45m due to refusal.
- No groundwater encountered.

Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project: Milton Place

Project No: P23-2863

Co-ords: E565226.90 N174066.00

Hole Type
WS

Location: Gravesend

Level: 9.70m aOD

Scale
1:40

Client: Hill Partnerships

Date: 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.30	ES	N=11 (1,2/1,2,3,5)	0.25	9.45		Brown silty subangular fine to coarse brick and concrete gravel. With cobbles of brick. MADE GROUND.	1	
					0.50	9.20		Brown white slightly sandy slightly silty subangular to subrounded chalk and concrete gravel. MADE GROUND.		
		0.80	D					Soft to firm brown silty CLAY. Trace subangular fine to medium flint gravel. HEAD.		
		1.00 - 1.40	D							
		1.00	SPT							
		1.60	D	N=54 (9,12/13,13,12,16)	1.40	8.30		Structureless CHALK recovered as brown white silty very weak subrounded medium chalk gravel. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.	2	
		2.00 - 2.30	D							
		2.00	SPT							
					2.30	7.40		Structureless CHALK recovered as white silty very weak subrounded medium chalk gravel. Silt infill of fissures. UNDIFFERENTIATED CHALK.		
					2.45	7.25		End of Borehole at 2.45m		
										3
										4
										5
								6		
								7		
								8		
Borehole Diameter				Casing Diameter				Chiselling		
Depth Base		Diameter		Depth Base		Diameter		Depth Top	Duration	

Remarks

- WS05 terminated at 2.45m due to refusal.
- No groundwater encountered.

Borehole Log

Borehole No.

BH01

Sheet 1 of 3

Project: Milton Place

Project No: P23-2863

Co-ords: E565310.40 N174088.80

Hole Type
BH

Location: Gravesend

Level: 7.20m aOD

Scale
1:50

Client: Hill Partnerships

Date: 22/05/2023 - 23/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	7.10		Grass over brown slightly gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint. TOPSOIL.	
		0.20			0.20	7.00		Buff-brown fine sand. MADE GROUND.	
		0.30	B					Brown slightly silty slightly sandy angular to subrounded fine to medium flint concrete and brick gravel. MADE GROUND.	1
		0.50	ES						
		0.80	B						
		1.00	ES		1.10	6.10			
		1.20	D		1.30	5.90			
		1.40	D						
		1.50 - 1.95	D						
		1.50	SPT	N=3 (1,0/0,1,1,1)					
		2.00 - 2.45	D						2
		2.50 - 3.00	B		2.40	4.80		Structureless CHALK recovered as brown white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular medium chalk. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.	3
		2.50	SPT	N=36 (6,7/9,8,9,10)					
		3.50	D						
		3.50	SPT	N=27 (3,5/6,7,7,7)					
		4.00	D		3.90	3.30		Structureless CHALK recovered as cream mottled white silty subrounded fine to coarse flint and subangular fine chalk GRAVEL. With occasional subangular flint cobbles. UNDIFFERENTIATED CHALK.	4
		4.00 - 4.45	B						
		4.50 - 4.95	D						5
		4.50	SPT	N=9 (1,2/2,3,2,2)					
		5.50	D						
		6.00 - 6.45	D						6
		6.00	SPT	N=11 (2,3/3,2,3,3)					
		7.00 - 7.45	D		7.00	0.20			7
		7.50	SPT	N=26 (4,6/7,6,6,7)					
		8.50	D						
		9.00 - 9.45	D						9
		9.00	SPT	N=19 (3,3/4,4,5,6)					
		10.00	D						10

Borehole Diameter

Casing Diameter

Chiselling

Depth Base

Diameter

Depth Base

Diameter

Depth Top

Depth Base

Duration

Remarks

- BH01 terminated at 25.45m, target depth.
- Groundwater strikes from 7.50m.

Borehole Log

Borehole No.

BH01

Sheet 2 of 3

Project: Milton Place

Project No: P23-2863

Co-ords: E565310.40 N174088.80

Hole Type
BH

Location: Gravesend

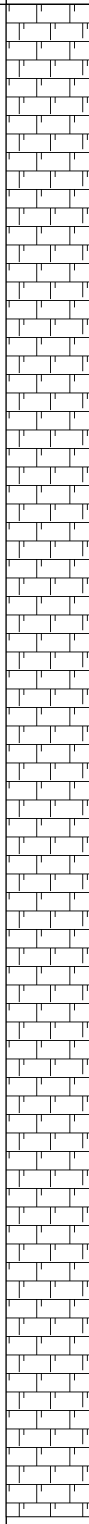
Level: 7.20m aOD

Scale
1:50

Client: Hill Partnerships

Date: 22/05/2023 - 23/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		10.50 - 10.95 10.50	D SPT	N=19 (3,4/4,5,5,5)				Structureless CHALK recovered as cream mottled white silty subrounded fine to coarse flint and subangular fine chalk GRAVEL. With occasional subangular flint cobbles. UNDIFFERENTIATED CHALK.	11	
		11.50	D							
		12.00 - 12.45 12.00	D SPT	N=18 (3,4/4,4,5,5)						12
		13.00	D							13
		13.50 - 13.95 13.50	D SPT	N=18 (2,4/4,5,5,4)						14
		14.50	D							
		15.00 - 15.95 15.00	D SPT	N=21 (3,5/5,5,5,6)						15
		16.00	D							16
		16.50 - 16.95 16.50	D SPT	N=21 (4,4/5,5,5,6)						17
		17.50	D							
		18.00 - 18.45 18.00	D SPT	N=28 (7,6/6,7,7,8)						18
		19.00	D							19
		19.50 - 19.95 19.50	D SPT	N=31 (6,7/6,7,9,9)						20
Borehole Diameter		Casing Diameter		Chiselling						
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration				

Remarks

- BH01 terminated at 25.45m, target depth.
- Groundwater strikes from 7.50m.

Borehole Log

Borehole No.

BH01

Sheet 3 of 3

Project: Milton Place

Project No: P23-2863

Co-ords: E565310.40 N174088.80

Hole Type
BH

Location: Gravesend

Level: 7.20m aOD

Scale
1:50

Client: Hill Partnerships

Date: 22/05/2023 - 23/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.50	D					Structureless CHALK recovered as cream mottled white silty subrounded fine to coarse flint and subangular fine chalk GRAVEL. With occasional subangular flint cobbles. UNDIFFERENTIATED CHALK.	
		21.00 - 21.45	D						21
		21.00	SPT	N=36 (6,7/8,9,9,10)					
		22.00	D						22
		22.50 - 22.95	D						
		22.50	SPT	N=37 (7,8/8,9,10,10)					23
		23.00	D						
		24.00	SPT	N=42 (6,6/8,8,13,13)					24
		24.50 - 24.95	D					End of Borehole at 25.45m	25
		25.00	D						
		25.00	SPT	N=39 (6,8/9,9,9,12)					26
		25.10 - 25.45	D		25.45	-18.25			27
									28
									29
									30

Borehole Diameter		Casing Diameter		Chiselling		Duration
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	

Remarks

- BH01 terminated at 25.45m, target depth.
- Groundwater strikes from 7.50m.



Borehole Log

Borehole No.

BH02

Sheet 1 of 3

Project: Milton Place

Project No: P23-2863

Co-ords: E565214.10 N174067.80

Hole Type
BH

Location: Gravesend

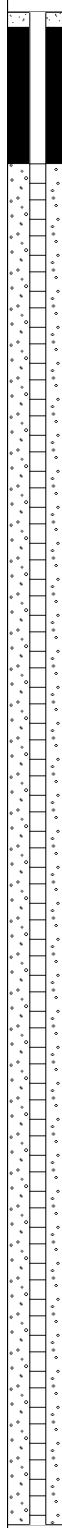
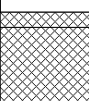
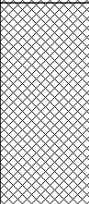
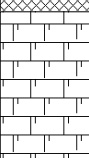
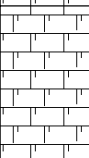
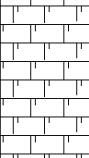
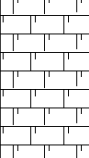
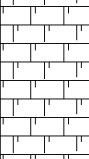
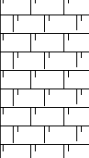
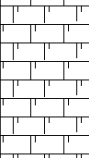
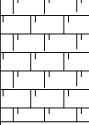
Level: 10.20m aOD

Scale
1:50

Client: Hill Partnerships

Date: 23/05/2023 - 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	10.10		MACADAM.	1
		0.40	B		0.60	9.60		Brown slightly silty slightly sandy angular to subrounded fine to coarse concrete and brick gravel. With cobbles of brick and concrete. MADE GROUND.	
		0.90	B					Brown grey subangular fine to coarse slightly sandy slightly clayey brick and concrete gravel. With cobbles of brick concrete and limestone. MADE GROUND.	2
		1.50 - 1.95 1.50	D SPT	N=16 (9,12/4,4,4,4)	2.00	8.20		Structureless CHALK recovered as brown white gravelly SILT. Gravel is very weak subrounded fine to coarse flint and subangular medium chalk. Trace subangular fine to coarse flint gravel. Brown silt infill of fissures. UNDIFFERENTIATED CHALK.	
		1.55 - 2.00	B		3.00	7.20		Structureless CHALK recovered as cream mottled white silty subrounded fine to coarse flint and subangular fine chalk GRAVEL. With occasional subangular flint cobbles. UNDIFFERENTIATED CHALK.	3
		2.50 - 2.95 2.50	D SPT	N=9 (2,2/2,3,2,2)					
		3.00 - 3.50	B						4
		3.50 - 3.95 3.50	D SPT	N=7 (1,2/1,2,2,2)					
		4.00	D						5
		4.50 - 4.95 4.50	D SPT	N=11 (1,2/3,3,2,3)					
		5.50	D						6
		6.00 - 6.45 6.00	D SPT	N=11 (2,3/3,2,3,3)					
		7.00	D						7
		7.50 - 7.95 7.50	D SPT	N=14 (2,3/3,3,4,4)					
		8.50	D						8
		9.00 - 9.45 9.00	D SPT	N=15 (3,3/3,4,4,4)					
		10.00	D		9.80	0.40			9
									10

Borehole Diameter

Casing Diameter

Chiselling

Depth Base

Diameter

Depth Base

Diameter

Depth Top

Depth Base

Duration

Remarks

- BH02 terminated at 25.45m, target depth.
- Groundwater strikes from 7.0m.



Borehole Log

Borehole No.

BH02

Sheet 2 of 3

Project: Milton Place

Project No: P23-2863

Co-ords: E565214.10 N174067.80

Hole Type
BH

Location: Gravesend

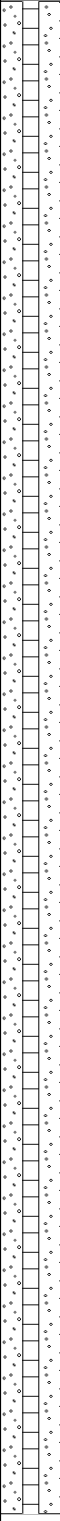
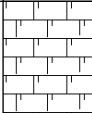
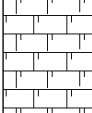
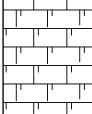
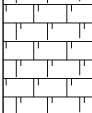
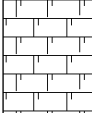
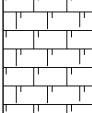
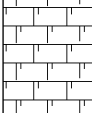
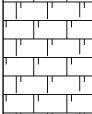
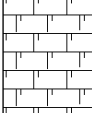
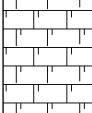
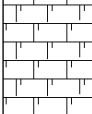
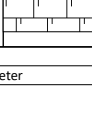
Level: 10.20m aOD

Scale
1:50

Client: Hill Partnerships

Date: 23/05/2023 - 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50 - 10.95 10.50	D SPT	N=20 (3,4/4,5,5,6)				Structureless CHALK recovered as cream mottled white silty subrounded fine to coarse flint and subangular fine chalk GRAVEL. With occasional subangular flint cobbles. UNDIFFERENTIATED CHALK.	11
		11.00	D						
		12.00 - 12.45 12.00	D SPT	N=17 (3,4/3,4,4,6)					12
		13.00	D						13
		13.50 - 13.95 13.50	D SPT	N=20 (3,4/5,5,5,5)					14
		14.50	D						
		15.00 - 15.95 15.00	D SPT	N=29 (4,9/10,6,6,7)					15
		16.00	D						16
		16.50 - 16.95 16.50	D SPT	N=22 (4,4/5,6,5,6)					17
		17.00	D						
		18.00 - 18.45 18.00	D SPT	N=20 (4,4/7,6,5,2)					18
		19.00	D						19
		19.50 - 19.95 19.50	D SPT	N=25 (4,6/7,6,6,6)					20
Borehole Diameter		Casing Diameter		Chiselling					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration			

Remarks

- BH02 terminated at 25.45m, target depth.
- Groundwater strikes from 7.0m.

Borehole Log

Borehole No.

BH02

Sheet 3 of 3

Project: Milton Place

Project No: P23-2863

Co-ords: E565214.10 N174067.80

Hole Type
BH

Location: Gravesend

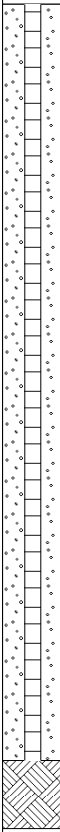
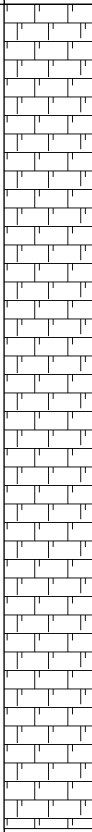
Level: 10.20m aOD

Scale
1:50

Client: Hill Partnerships

Date: 23/05/2023 - 24/05/2023

Logged
AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		20.50	D	N=26 (4,6/6,6,7,7)	25.45	-15.25		Structureless CHALK recovered as cream mottled white silty subrounded fine to coarse flint and subangular fine chalk GRAVEL. With occasional subangular flint cobbles. UNDIFFERENTIATED CHALK.	21	
		21.00 - 21.45 21.00	D SPT							
		22.00 22.10 - 22.45	D D							
		22.50	SPT	N=27 (4,5/6,7,7,7)						
		23.00	D							
		24.00 24.10 - 24.45	SPT D							N=26 (5,6/4,8,8,6)
		25.00 25.00 25.10 - 25.45	D SPT D	N=31 (8,6/7,7,8,9)						
		End of Borehole at 25.45m							26	
									27	
									28	
									29	
									30	
Borehole Diameter		Casing Diameter		Chiselling						
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration				

Remarks

- BH02 terminated at 25.45m, target depth.
- Groundwater strikes from 7.0m.

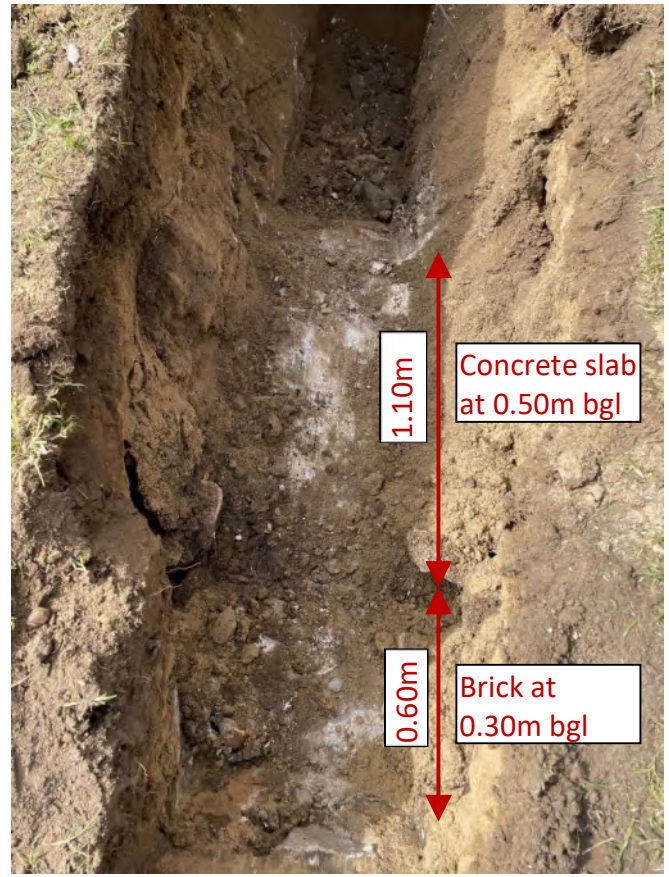
APPENDIX C

PHOTOGRAPHS

**Plate 1: WS01 – refusal on possible reinforced
concrete wall of former swimming pool**



Plate 2: TP08 – concrete at 0.50m steps down



APPENDIX D

CHEMICAL LABORATORY TEST CERTIFICATES COMPARISON OF RESULTS AGAINST SSAC



Certificate of Analysis

Certificate Number 23-12673

Issued: 15-Jun-23

Client Create Consulting Engineers LTD
15 Princess Street
Norwich
NR3 1AF

Our Reference 23-12673

Client Reference P23-2863

Order No PO5086

Contract Title Milton Place, Gravesend

Description 21 Soil samples, 4 Leachate samples.

Date Received 30-May-23

Date Started 30-May-23

Date Completed 15-Jun-23

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

A handwritten signature in black ink, appearing to read "K. Bridgewood".

Kirk Bridgewood
General Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178417	2178418	2178419	2178420	2178421	2178422
Sample ID	TP06	BH01	BH01	BH02	BH02	WS01A
Depth	0.30	0.50	1.00	10.00	21.00	0.30
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	23/05/2023	22/05/2023	22/05/2023	23/05/2023	23/05/2023	24/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	8.4	11				7.5
Barium	DETSC 2301#	1.5	mg/kg	68	65				310
Beryllium	DETSC 2301#	0.2	mg/kg	0.7	0.4				0.3
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.7	0.5				1.0
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2				0.5
Chromium	DETSC 2301#	0.15	mg/kg	14	15				14
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0				< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	16				76
Lead	DETSC 2301#	0.3	mg/kg	61	37				540
Mercury	DETSC 2325#	0.05	mg/kg	0.11	0.07				< 0.05
Nickel	DETSC 2301#	1	mg/kg	17	15				11
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5				< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	42	30				24
Zinc	DETSC 2301#	1	mg/kg	56	51				280
Inorganics									
pH	DETSC 2008#		pH	8.5	10.5	10.1	9.8	8.1	11.0
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	0.2				< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	0.1				< 0.1
Organic matter	DETSC 2002#	0.1	%	1.6	1.6				0.6
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	42	79	89	31	43	140
Sulphide	DETSC 2024*	10	mg/kg	43	31				35
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.07	0.14				0.82
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	0.10	< 0.01				< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01				< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01				< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5				< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2				14
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5				85
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4				48
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10				150
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01				< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01				< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01				< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9				< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5				4.4
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6				66
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4				64
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10				130
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10				280

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178417	2178418	2178419	2178420	2178421	2178422
Sample ID	TP06	BH01	BH01	BH02	BH02	WS01A
Depth	0.30	0.50	1.00	10.00	21.00	0.30
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	23/05/2023	22/05/2023	22/05/2023	23/05/2023	23/05/2023	24/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03				< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03				0.04
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03				< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03				< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.11	0.13				0.47
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03				0.16
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.30	0.17				0.68
Pyrene	DETSC 3303#	0.03	mg/kg	0.27	0.14				0.55
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.12	0.08				0.28
Chrysene	DETSC 3303	0.03	mg/kg	0.09	0.06				0.15
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	0.11				0.24
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03				0.06
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.12	0.09				0.19
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.04	0.04				0.17
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03				0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.05	0.05				0.50
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.3	0.87				3.6
PCBs									
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg						
PCB 52	DETSC 3401#	0.01	mg/kg						
PCB 101	DETSC 3401#	0.01	mg/kg						
PCB 118	DETSC 3401#	0.01	mg/kg						
PCB 153	DETSC 3401#	0.01	mg/kg						
PCB 138	DETSC 3401#	0.01	mg/kg						
PCB 180	DETSC 3401#	0.01	mg/kg						
PCB 7 Total	DETSC 3401#	0.01	mg/kg						
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.4				< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178423	2178424	2178425	2178426	2178427	2178428
Sample ID	WS01A	WS02	WS03	WS03	WS03	WS03
Depth	3.00-3.45	0.50	0.80	1.00-1.45	3.00-3.45	4.00-4.45
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg		8.2				
Barium	DETSC 2301#	1.5	mg/kg		77				
Beryllium	DETSC 2301#	0.2	mg/kg		0.4				
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg		0.9				
Cadmium	DETSC 2301#	0.1	mg/kg		0.4				
Chromium	DETSC 2301#	0.15	mg/kg		14				
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0				
Copper	DETSC 2301#	0.2	mg/kg		33				
Lead	DETSC 2301#	0.3	mg/kg		110				
Mercury	DETSC 2325#	0.05	mg/kg		0.57				
Nickel	DETSC 2301#	1	mg/kg		12				
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5				
Vanadium	DETSC 2301#	0.8	mg/kg		27				
Zinc	DETSC 2301#	1	mg/kg		71				
Inorganics									
pH	DETSC 2008#		pH	6.1	9.1	9.2	8.9	8.9	8.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg		0.1				
Cyanide, Free	DETSC 2130#	0.1	mg/kg		< 0.1				
Organic matter	DETSC 2002#	0.1	%		2.1				
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	51	52	19	24	13	15
Sulphide	DETSC 2024*	10	mg/kg		31				
Sulphate as SO4, Total	DETSC 2321#	0.01	%		0.10				
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		< 0.01				
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		< 0.01				
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01				
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		< 1.5				
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		< 1.2				
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		< 1.5				
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		< 3.4				
Aliphatic C5-C35	DETSC 3072*	10	mg/kg		< 10				
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		< 0.01				
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		< 0.01				
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01				
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9				
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		< 0.5				
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		< 0.6				
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		< 1.4				
Aromatic C5-C35	DETSC 3072*	10	mg/kg		< 10				
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg		< 10				

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178423	2178424	2178425	2178426	2178427	2178428
Sample ID	WS01A	WS02	WS03	WS03	WS03	WS03
Depth	3.00-3.45	0.50	0.80	1.00-1.45	3.00-3.45	4.00-4.45
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg		< 0.03				
Acenaphthylene	DETSC 3303#	0.03	mg/kg		< 0.03				
Acenaphthene	DETSC 3303#	0.03	mg/kg		< 0.03				
Fluorene	DETSC 3303	0.03	mg/kg		< 0.03				
Phenanthrene	DETSC 3303#	0.03	mg/kg		0.47				
Anthracene	DETSC 3303	0.03	mg/kg		0.12				
Fluoranthene	DETSC 3303#	0.03	mg/kg		0.97				
Pyrene	DETSC 3303#	0.03	mg/kg		0.89				
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		0.48				
Chrysene	DETSC 3303	0.03	mg/kg		0.32				
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		0.67				
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		0.17				
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		0.62				
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		0.20				
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		0.04				
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		0.29				
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg		5.2				
PCBs									
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg						
PCB 52	DETSC 3401#	0.01	mg/kg						
PCB 101	DETSC 3401#	0.01	mg/kg						
PCB 118	DETSC 3401#	0.01	mg/kg						
PCB 153	DETSC 3401#	0.01	mg/kg						
PCB 138	DETSC 3401#	0.01	mg/kg						
PCB 180	DETSC 3401#	0.01	mg/kg						
PCB 7 Total	DETSC 3401#	0.01	mg/kg						
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg		< 0.3				

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178429	2178430	2178432	2178433	2178434	2178435
Sample ID	WS03	WS03	WS04	WS05	WS05	HP01
Depth	5.00-5.45	2.00-2.45	1.50	0.30	1.60	0.20-0.30
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg				5.6		9.4
Barium	DETSC 2301#	1.5	mg/kg				47		81
Beryllium	DETSC 2301#	0.2	mg/kg				0.3		0.6
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg				< 0.2		0.7
Cadmium	DETSC 2301#	0.1	mg/kg				0.2		0.4
Chromium	DETSC 2301#	0.15	mg/kg				9.8		18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg				< 1.0		< 1.0
Copper	DETSC 2301#	0.2	mg/kg				13		31
Lead	DETSC 2301#	0.3	mg/kg				130		82
Mercury	DETSC 2325#	0.05	mg/kg				0.11		0.23
Nickel	DETSC 2301#	1	mg/kg				8.9		15
Selenium	DETSC 2301#	0.5	mg/kg				< 0.5		< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg				18		32
Zinc	DETSC 2301#	1	mg/kg				30		82
Inorganics									
pH	DETSC 2008#		pH	8.7	8.8	8.1	6.9	8.3	8.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg				< 0.1		0.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg				< 0.1		< 0.1
Organic matter	DETSC 2002#	0.1	%				0.7		2.2
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	15	15	12	15	< 10	31
Sulphide	DETSC 2024*	10	mg/kg				51		12
Sulphate as SO4, Total	DETSC 2321#	0.01	%				0.05		0.06
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg				0.13		< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg				< 0.01		< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg				< 0.01		< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg				< 1.5		< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg				< 1.2		< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg				< 1.5		< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg				< 3.4		< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg				< 10		< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg				< 0.01		< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg				< 0.01		< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg				< 0.01		< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg				< 0.9		< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg				< 0.5		< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg				< 0.6		< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg				< 1.4		< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg				< 10		< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg				< 10		< 10

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178429	2178430	2178432	2178433	2178434	2178435
Sample ID	WS03	WS03	WS04	WS05	WS05	HP01
Depth	5.00-5.45	2.00-2.45	1.50	0.30	1.60	0.20-0.30
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg				< 0.03		< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg				< 0.03		< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg				< 0.03		< 0.03
Fluorene	DETSC 3303	0.03	mg/kg				< 0.03		< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg				< 0.03		0.17
Anthracene	DETSC 3303	0.03	mg/kg				< 0.03		< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg				0.04		0.49
Pyrene	DETSC 3303#	0.03	mg/kg				0.04		0.44
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg				0.03		0.21
Chrysene	DETSC 3303	0.03	mg/kg				< 0.03		0.16
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg				0.04		0.27
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg				< 0.03		0.07
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg				< 0.03		0.22
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg				< 0.03		0.08
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg				< 0.03		< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg				< 0.03		0.09
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg				0.12		2.2
PCBs									
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg						
PCB 52	DETSC 3401#	0.01	mg/kg						
PCB 101	DETSC 3401#	0.01	mg/kg						
PCB 118	DETSC 3401#	0.01	mg/kg						
PCB 153	DETSC 3401#	0.01	mg/kg						
PCB 138	DETSC 3401#	0.01	mg/kg						
PCB 180	DETSC 3401#	0.01	mg/kg						
PCB 7 Total	DETSC 3401#	0.01	mg/kg						
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg				< 0.3		< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178436
Sample ID	HP02
Depth	0.30-0.40
Other ID	
Sample Type	SOIL
Sampling Date	24/05/2023
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic	DETSC 2301#	0.2	mg/kg	
Barium	DETSC 2301#	1.5	mg/kg	
Beryllium	DETSC 2301#	0.2	mg/kg	
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	
Cadmium	DETSC 2301#	0.1	mg/kg	
Chromium	DETSC 2301#	0.15	mg/kg	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	
Copper	DETSC 2301#	0.2	mg/kg	
Lead	DETSC 2301#	0.3	mg/kg	
Mercury	DETSC 2325#	0.05	mg/kg	
Nickel	DETSC 2301#	1	mg/kg	
Selenium	DETSC 2301#	0.5	mg/kg	
Vanadium	DETSC 2301#	0.8	mg/kg	
Zinc	DETSC 2301#	1	mg/kg	
Inorganics				
pH	DETSC 2008#		pH	
Cyanide, Total	DETSC 2130#	0.1	mg/kg	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	
Organic matter	DETSC 2002#	0.1	%	
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	
Sulphide	DETSC 2024*	10	mg/kg	
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10

Summary of Chemical Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178436
Sample ID	HP02
Depth	0.30-0.40
Other ID	
Sample Type	SOIL
Sampling Date	24/05/2023
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	
Acenaphthene	DETSC 3303#	0.03	mg/kg	
Fluorene	DETSC 3303	0.03	mg/kg	
Phenanthrene	DETSC 3303#	0.03	mg/kg	
Anthracene	DETSC 3303	0.03	mg/kg	
Fluoranthene	DETSC 3303#	0.03	mg/kg	
Pyrene	DETSC 3303#	0.03	mg/kg	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	
Chrysene	DETSC 3303	0.03	mg/kg	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	
PCBs				
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	

Summary of Chemical Analysis

Leachate Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178439	2178440
Sample ID	BH01	WS01A
Depth	1.00	1.50
Other ID		
Sample Type	LEACHATE	LEACHATE
Sampling Date	22/05/2023	24/05/2023
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Preparation					
BS EN 12457 10:1	DETS 1009*			Y	N
Metals					
Arsenic, Dissolved	DETS 2306	0.16	ug/l	1.1	3.2
Barium, Dissolved	DETS 2306	0.26	ug/l	7.5	6.7
Beryllium, Dissolved	DETS 2306*	0.1	ug/l	< 0.1	< 0.1
Boron, Dissolved	DETS 2306*	12	ug/l	< 12	< 12
Cadmium, Dissolved	DETS 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETS 2306	0.25	ug/l	5.3	2.2
Chromium, Hexavalent	DETS 2203	0.007	mg/l	< 0.007	< 0.007
Copper, Dissolved	DETS 2306	0.4	ug/l	4.7	1.3
Lead, Dissolved	DETS 2306	0.09	ug/l	0.81	0.64
Mercury, Dissolved	DETS 2306	0.01	ug/l	0.01	0.02
Nickel, Dissolved	DETS 2306	0.5	ug/l	0.8	< 0.5
Selenium, Dissolved	DETS 2306	0.25	ug/l	0.26	< 0.25
Vanadium, Dissolved	DETS 2306	0.6	ug/l	4.9	13
Zinc, Dissolved	DETS 2306	1.3	ug/l	3.3	< 1.3
Inorganics					
pH	DETS 2008		pH	10.9	8.6
Cyanide, Total	DETS 2130	40	ug/l	< 40	< 40
Cyanide, Free	DETS 2130	20	ug/l	< 20	< 20
Cyanide, Complex	DETS 2130*	40	ug/l	< 40	< 40
Sulphate as SO4	DETS 2055	0.1	mg/l	4.4	5.1
Sulphide	DETS 2208	10	ug/l	32	36
Total Organic Carbon	DETS 2085	1	mg/l	3.8	4.0
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETS 3322	0.1	ug/l	< 0.1	800
Aliphatic C6-C8	DETS 3322	0.1	ug/l	< 0.1	12
Aliphatic C8-C10	DETS 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C35-C40	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C40	DETS 3072*	10	ug/l	< 10	820
Aromatic C5-C7	DETS 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETS 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETS 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETS 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETS 3072*	1	ug/l	< 1.0	< 1.0

Summary of Chemical Analysis

Leachate Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	2178439	2178440
Sample ID	BH01	WS01A
Depth	1.00	1.50
Other ID		
Sample Type	LEACHATE	LEACHATE
Sampling Date	22/05/2023	24/05/2023
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Aromatic C35-C40	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C40	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro C5-C40	DETSC 3072*	10	ug/l	< 10	820
EPH (C10-C35)	DETSC 3311	10	ug/l	34	74
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.01	0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02	0.02
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20
Phenols					
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Sample Id TP04 0.50

Sample Numbers 2178416 2178437

Date Analysed 09/06/2023

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETS 2084# Total Organic Carbon	%	3.2	3	5	6
DETS 2003# Loss On Ignition	%	5.5	n/a	n/a	10
DETS 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETS 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETS 3311# TPH (C10 - C40)	mg/kg	12.0	500	n/a	n/a
DETS 3301 PAHs	mg/kg	3.8	100	n/a	n/a
DETS 2008# pH	pH Units	8.0	n/a	>6	n/a
DETS 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETS 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate			WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached* mg/kg	Limit values for LS10 Leachate		
	10:1	LS10	Inert Waste	SNRHW	Hazardous Waste
DETS 2306 Arsenic as As	0.75	< 0.01	0.5	2	25
DETS 2306 Barium as Ba	34	0.34	20	100	300
DETS 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETS 2306 Chromium as Cr	3	< 0.1	0.5	10	70
DETS 2306 Copper as Cu	3.4	0.034	2	50	100
DETS 2306 Mercury as Hg	0.025	< 0.002	0.01	0.2	2
DETS 2306 Molybdenum as Mo	18	0.18	0.5	10	30
DETS 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETS 2306 Lead as Pb	7.3	0.07	0.5	10	50
DETS 2306 Antimony as Sb	0.31	< 0.05	0.06	0.7	5
DETS 2306 Selenium as Se	1.4	< 0.03	0.1	0.5	7
DETS 2306 Zinc as Zn	15	0.15	4	50	200
DETS 2055 Chloride as Cl	1300	< 100	800	15,000	25,000
DETS 2055* Fluoride as F	240	2.4	10	150	500
DETS 2055 Sulphate as SO4	31000	310	1000	20,000	50,000
DETS 2009* Total Dissolved Solids	47000	470	4000	60,000	100,000
DETS 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETS 2085 Dissolved Organic Carbon	2200	< 50	500	800	1000

Additional Information	
DETS 2008 pH	9.1
DETS 2009 Conductivity uS/cm	66.7
* Temperature*	18.0
Mass of Sample Kg*	0.110
Mass of dry Sample Kg*	0.096
Stage 1	
Volume of Leachant L2*	0.947
Volume of Eluate VE1*	0.9

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Sample Id WS04 0.60

Sample Numbers 2178431 2178438

Date Analysed 08/06/2023

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETS 2084# Total Organic Carbon	%	1.6	3	5	6
DETS 2003# Loss On Ignition	%	4.7	n/a	n/a	10
DETS 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETS 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETS 3311# TPH (C10 - C40)	mg/kg	11.0	500	n/a	n/a
DETS 3301 PAHs	mg/kg	3.7	100	n/a	n/a
DETS 2008# pH	pH Units	8.3	n/a	>6	n/a
DETS 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETS 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate			WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached* mg/kg	Limit values for LS10 Leachate		
	10:1	LS10	Inert Waste	SNRHW	Hazardous Waste
DETS 2306 Arsenic as As	0.77	< 0.01	0.5	2	25
DETS 2306 Barium as Ba	7	< 0.1	20	100	300
DETS 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETS 2306 Chromium as Cr	< 0.25	< 0.1	0.5	10	70
DETS 2306 Copper as Cu	1.1	< 0.02	2	50	100
DETS 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETS 2306 Molybdenum as Mo	1.2	< 0.1	0.5	10	30
DETS 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETS 2306 Lead as Pb	0.46	< 0.05	0.5	10	50
DETS 2306 Antimony as Sb	0.58	< 0.05	0.06	0.7	5
DETS 2306 Selenium as Se	< 0.25	< 0.03	0.1	0.5	7
DETS 2306 Zinc as Zn	1.4	0.014	4	50	200
DETS 2055 Chloride as Cl	1100	< 100	800	15,000	25,000
DETS 2055* Fluoride as F	< 100	< 0.1	10	150	500
DETS 2055 Sulphate as SO4	2600	< 100	1000	20,000	50,000
DETS 2009* Total Dissolved Solids	45000	450	4000	60,000	100,000
DETS 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETS 2085 Dissolved Organic Carbon	3700	< 50	500	800	1000

Additional Information	
DETS 2008 pH	8.7
DETS 2009 Conductivity uS/cm	64.0
* Temperature*	18.0
Mass of Sample Kg*	0.110
Mass of dry Sample Kg*	0.096
Stage 1	
Volume of Leachant L2*	0.949
Volume of Eluate VE1*	0.9

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

Summary of Asbestos Analysis

Soil Samples

Our Ref 23-12673

Client Ref P23-2863

Contract Title Milton Place, Gravesend

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2178417	TP06 0.30	SOIL	NAD	none	Josh Best
2178418	BH01 0.50	SOIL	NAD	none	Josh Best
2178422	WS01A 0.30	SOIL	NAD	none	Josh Best
2178424	WS02 0.50	SOIL	NAD	none	Josh Best
2178433	WS05 0.30	SOIL	NAD	none	Josh Best
2178435	HP01 0.20-0.30	SOIL	NAD	none	Josh Best

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-12673
 Client Ref P23-2863
 Contract Milton Place, Gravesend

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2178416	TP04 0.50 SOIL	23/05/23	GJ 250ml, PT 1L		BTEX
2178417	TP06 0.30 SOIL	23/05/23	GJ 250ml, PT 1L		BTEX
2178418	BH01 0.50 SOIL	22/05/23	GJ 250ml, PT 1L	pH + Conductivity (7 days)	BTEX
2178419	BH01 1.00 SOIL	22/05/23	GJ 250ml, PT 1L	pH + Conductivity (7 days)	
2178420	BH02 10.00 SOIL	23/05/23	PG		
2178421	BH02 21.00 SOIL	23/05/23	PG		
2178422	WS01A 0.30 SOIL	24/05/23	GJ 250ml, PT 1L		BTEX
2178423	WS01A 3.00-3.45 SOIL	24/05/23	PG		
2178424	WS02 0.50 SOIL	24/05/23	GJ 60ml x2, PT 1L		
2178425	WS03 0.80 SOIL	24/05/23	PG		
2178426	WS03 1.00-1.45 SOIL	24/05/23	PG		
2178427	WS03 3.00-3.45 SOIL	24/05/23	PG		
2178428	WS03 4.00-4.45 SOIL	24/05/23	PG		
2178429	WS03 5.00-5.45 SOIL	24/05/23	PG		
2178430	WS03 2.00-2.45 SOIL	24/05/23	PG		
2178431	WS04 0.60 SOIL	24/05/23	GJ 60ml x2, PT 1L x2		
2178432	WS04 1.50 SOIL	24/05/23	PG		
2178433	WS05 0.30 SOIL	24/05/23	GJ 250ml, PT 1L		BTEX
2178434	WS05 1.60 SOIL	24/05/23	PG		
2178435	HP01 0.20-0.30 SOIL	24/05/23	GJ 250ml, PT 1L		BTEX
2178436	HP02 0.30-0.40 SOIL	24/05/23	GJ 250ml, PT 1L		BTEX
2178437	TP04 0.50 LEACHATE	23/05/23	GJ 250ml, PT 1L		
2178438	WS04 0.60 LEACHATE	24/05/23	GJ 60ml x2, PT 1L x2		
2178439	BH01 1.00 LEACHATE	22/05/23	GJ 250ml, PT 1L		
2178440	WS01A 1.50 LEACHATE	24/05/23	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub G-Bag

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

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

Milton Place, Gravesend

Comparison of Samples vs Site Specific Assessment Criteria

Scenario: Residential with plant uptake (2.5% SOM)

LoD	Metals (Based on 6% SOM)	SSAC	Sample ID	TP06	BH01	BH01	BH02	BH02	WS01A	WS01A	WS02
0.2mg/kg	Arsenic	37	Depth	0.30	0.50	1.00	10.00	21.00	0.30	3.00-3.45	0.50
1.5mg/kg	Barium	-		8.4	11				7.5		8.2
0.2mg/kg	Beryllium	1.7		68	65				310		77
0.2mg/kg	Boron, Water Soluble	290		0.7	0.4				0.3		0.40
0.1mg/kg	Cadmium	11		0.7	0.5				1		0.90
0.15mg/kg	Chromium	910		0.3	0.2				0.5		0.40
1mg/kg	Chromium, Hexavalent	6		14	15				14		14
0.2mg/kg	Copper	2400		1	1				1		1.0
0.3mg/kg	Lead	200		24	16				76		33
0.05mg/kg	Mercury	40		61	37				540		110
1mg/kg	Nickel	130		0.11	0.07				< 0.05		0.57
0.5mg/kg	Selenium	250		17	15				11		12
0.8mg/kg	Vanadium	410		< 0.5	< 0.5				< 0.5		< 0.5
1mg/kg	Zinc	3700		42	30				24		27
				56	51				280		71
	Inorganics										
	pH	-		8.5	10.5	10.1	9.8	8.1	11	6.1	9.1
0.1mg/kg	Cyanide, Total	-		0.1	0.2				0.1		0.10
0.1mg/kg	Cyanide, Free*	34		0.1	0.1				0.1		0.10
0.50%	Total Organic Carbon	-									
0.10%	Organic matter	-		1.6	1.6				0.6		2.1
10mg/l	Sulphate Aqueous Extract as SO4	-		42	79	89	31	43	140	51	52
10mg/kg	Sulphide	-		43	31				35		31
0.01%	Sulphate as SO4, Total	-		0.07	0.14				0.82		0.10
	Petroleum Hydrocarbons										
0.01mg/kg	Aliphatic C5-C6	78		0.10	0.01				0.01		0.01
0.01mg/kg	Aliphatic C6-C8	230		0.01	0.01				0.01		0.01
0.01mg/kg	Aliphatic C8-C10	65		0.01	0.01				0.01		0.01
1.5mg/kg	Aliphatic C10-C12	330		1.50	1.50				1.50		1.5
1.2mg/kg	Aliphatic C12-C16	2400		1.20	1.20				14.00		1.2
1.5mg/kg	Aliphatic C16-C21	92000		1.50	1.50				85.00		1.5
3.4mg/kg	Aliphatic C21-C35	92000		3.40	3.40				48.00		3.4
10mg/kg	Aliphatic C5-C35	-		10.00	10.00				150.00		10
0.01mg/kg	Aromatic C5-C7	140		0.01	0.01				0.01		0.01
0.01mg/kg	Aromatic C7-C8	290		0.01	0.01				0.01		0.01
0.01mg/kg	Aromatic C8-C10	83		0.01	0.01				0.01		0.01
0.9mg/kg	Aromatic C10-C12	180		0.90	0.90				0.90		0.90
0.5mg/kg	Aromatic C12-C16	330		0.5	0.50				4.40		0.50
0.6mg/kg	Aromatic C16-C21	540		0.6	0.60				66.00		0.60
1.4mg/kg	Aromatic C21-C35	1500		1.4	1.40				64.00		1.4
10mg/kg	Aromatic C5-C35	-		10	10.00				130.00		10
10mg/kg	TPH Ali/Aro Total	-		10	10.00				280.00		10
10mg/kg	EPH (C10-C35)	-									
10mg/kg	TPH (C10-C40)	-									
	PAHs										
0.03mg/kg	Naphthalene	5.6		0.03	0.03				0.03		0.03
0.03mg/kg	Acenaphthylene	420		0.03	0.03				0.04		0.03
0.03mg/kg	Acenaphthene	510		0.03	0.03				0.03		0.03
0.03mg/kg	Fluorene	400		0.03	0.03				0.03		0.03
0.03mg/kg	Phenanthrene	220		0.11	0.13				0.47		0.47
0.03mg/kg	Anthracene	5400		0.03	0.03				0.16		0.12
0.03mg/kg	Fluoranthene	560		0.3	0.17				0.68		0.97
0.03mg/kg	Pyrene	1200		0.27	0.14				0.55		0.89
0.03mg/kg	Benzo(a)anthracene	11		0.12	0.08				0.28		0.48
0.03mg/kg	Chrysene	22		0.09	0.06				0.15		0.32
0.03mg/kg	Benzo(b)fluoranthene	3.3		0.14	0.11				0.24		0.67
0.03mg/kg	Benzo(k)fluoranthene	93		0.03	0.03				0.06		0.17
0.03mg/kg	Benzo(a)pyrene	2.7		0.12	0.09				0.19		0.62
0.03mg/kg	Indeno(1,2,3-c,d)pyrene	36		0.04	0.04				0.17		0.20
0.03mg/kg	Dibenzo(a,h)anthracene	0.28		0.03	0.03				0.03		0.04
0.03mg/kg	Benzo(g,h,i)perylene	340		0.05	0.05				0.5		0.29
0.10mg/kg	PAH - USEPA 16, Total	9224		1.3	0.87				3.6		5.2
	Phenols										
0.3mg/kg	Phenol - Monohydric	316		0	0				0		0.30

Key

xx At or exceeding the SSAC (Site Specific Assessment Criteria)

xx Within 90th percentile of SSAC contaminant value

LoD Laboratory 'Limit of Detection'

* Based on ATKINS AtRisk Value, 2017

Scenario:	Residential with plant uptake (2.5% SOM)						
			Sample ID	WS05	WS05	HP01	HP02
LoD	Metals (Based on 6% SOM)	SSAC	Depth	0.30	1.60	0.20-0.30	0.30-0.40
0.2mg/kg	Arsenic	37		5.6		9.4	
1.5mg/kg	Barium	-		47		81	
0.2mg/kg	Beryllium	1.7		0.30		0.60	
0.2mg/kg	Boron, Water Soluble	290		< 0.2		0.70	
0.1mg/kg	Cadmium	11		0.20		0.40	
0.15mg/kg	Chromium	910		9.8		18	
1mg/kg	Chromium, Hexavalent	6		< 1.0		< 1.0	
0.2mg/kg	Copper	2400		13		31	
0.3mg/kg	Lead	200		130		82	
0.05mg/kg	Mercury	40		0.11		0.23	
1mg/kg	Nickel	130		8.9		15	
0.5mg/kg	Selenium	250		< 0.5		< 0.5	
0.8mg/kg	Vanadium	410		18		32	
1mg/kg	Zinc	3700		30		82	
	Inorganics						
	pH	-		6.9	8.3	8.6	
0.1mg/kg	Cyanide, Total	-		< 0.1		0.20	
0.1mg/kg	Cyanide, Free*	34		< 0.1		< 0.1	
0.50%	Total Organic Carbon	-		0.70		2.2	
0.10%	Organic matter	-		15	10	31	
10mg/l	Sulphate Aqueous Extract as SO4	-		51		12	
10mg/kg	Sulphide	-		0.05		0.06	
0.01%	Sulphate as SO4, Total	-					
	Petroleum Hydrocarbons						
0.01mg/kg	Aliphatic C5-C6	78		0.13		0.01	0.01
0.01mg/kg	Aliphatic C6-C8	230		0.01		0.01	0.01
0.01mg/kg	Aliphatic C8-C10	65		0.01		0.01	0.01
1.5mg/kg	Aliphatic C10-C12	330		1.5		1.5	1.5
1.2mg/kg	Aliphatic C12-C16	2400		1.2		1.2	1.2
1.5mg/kg	Aliphatic C16-C21	92000		1.5		1.5	1.5
3.4mg/kg	Aliphatic C21-C35	92000		3.4		3.4	3.4
10mg/kg	Aliphatic C5-C35	-		10		10	10
0.01mg/kg	Aromatic C5-C7	140		0.01		0.01	0.01
0.01mg/kg	Aromatic C7-C8	290		0.01		0.01	0.01
0.01mg/kg	Aromatic C8-C10	83		0.01		0.01	0.01
0.9mg/kg	Aromatic C10-C12	180		0.90		0.90	0.90
0.5mg/kg	Aromatic C12-C16	330		0.50		0.50	0.50
0.6mg/kg	Aromatic C16-C21	540		0.60		0.60	0.60
1.4mg/kg	Aromatic C21-C35	1500		1.4		1.4	1.4
10mg/kg	Aromatic C5-C35	-		10		10	10
10mg/kg	TPH Ali/Aro Total	-		10		10	
10mg/kg	EPH (C10-C35)	-					
10mg/kg	TPH (C10-C40)	-					
	PAHs						
0.03mg/kg	Naphthalene	5.6		0.03		0.03	
0.03mg/kg	Acenaphthylene	420		0.03		0.03	
0.03mg/kg	Acenaphthene	510		0.03		0.03	
0.03mg/kg	Fluorene	400		0.03		0.03	
0.03mg/kg	Phenanthrene	220		0.03		0.17	
0.03mg/kg	Anthracene	5400		0.03		0.03	
0.03mg/kg	Fluoranthene	560		0.04		0.49	
0.03mg/kg	Pyrene	1200		0.04		0.44	
0.03mg/kg	Benzo(a)anthracene	11		0.03		0.21	
0.03mg/kg	Chrysene	22		0.03		0.16	
0.03mg/kg	Benzo(b)fluoranthene	3.3		0.04		0.27	
0.03mg/kg	Benzo(k)fluoranthene	93		0.03		0.07	
0.03mg/kg	Benzo(a)pyrene	2.7		0.03		0.22	
0.03mg/kg	Indeno(1,2,3-c,d)pyrene	36		0.03		0.08	
0.03mg/kg	Dibenzo(a,h)anthracene	0.28		0.03		0.03	
0.03mg/kg	Benzo(g,h,i)perylene	340		0.03		0.09	
0.10mg/kg	PAH - USEPA 16, Total	9224		0.12		2.2	
	Phenols						
0.3mg/kg	Phenol - Monohydric	316		0.30		0.30	

Comparison of Samples vs Site Specific Assessment Criteria

Scenario: Residential with plant uptake (2.5% SOM)

LoD	Metals (Based on 6% SOM)	SSAC	Sample ID Depth	TP06	BH01	BH01	BH02	BH02	WS01A	WS01A	WS02
0.2mg/kg	Arsenic	37		0.30	0.50	1.00	10.00	21.00	0.30	3.00-3.45	0.50
1.5mg/kg	Barium	-		8.4	11				7.5		8.2
0.2mg/kg	Beryllium	1.7		68	65				310		77
0.2mg/kg	Boron, Water Soluble	290		0.7	0.4				0.3		0.40
0.1mg/kg	Cadmium	11		0.7	0.5				1		0.90
0.15mg/kg	Chromium	910		0.3	0.2				0.5		0.40
1mg/kg	Chromium, Hexavalent	6		14	15				14		14
0.2mg/kg	Copper	2400		<1	<1				<1		<1
0.3mg/kg	Lead	200		24	16				76		33
0.05mg/kg	Mercury	40		61	37				540		110
1mg/kg	Nickel	130		0.11	0.07				< 0.05		0.57
0.5mg/kg	Selenium	250		17	15				11		12
0.8mg/kg	Vanadium	410		< 0.5	< 0.5				< 0.5		< 0.5
1mg/kg	Zinc	3700		42	30				24		27
				56	51				280		71
	Inorganics										
	pH	-		8.5	10.5	10.1	9.8	8.1	11	6.1	9.1
0.1mg/kg	Cyanide, Total	-		0.1	0.2				<0.1		0.10
0.1mg/kg	Cyanide, Free*	34		<0.1	0.1				<0.1		<0.1
0.50%	Total Organic Carbon	-									
0.10%	Organic matter	-		1.6	1.6				0.6		2.1
10mg/l	Sulphate Aqueous Extract as SO4	-		42	79	89	31	43	140	51	52
10mg/kg	Sulphide	-		43	31				35		31
0.01%	Sulphate as SO4, Total	-		0.07	0.14				0.82		0.10
	Petroleum Hydrocarbons										
0.01mg/kg	Aliphatic C5-C6	78		0.10	<0.01				<0.01		<0.01
0.01mg/kg	Aliphatic C6-C8	230		<0.01	<0.01				<0.01		<0.01
0.01mg/kg	Aliphatic C8-C10	65		<0.01	<0.01				<0.01		<0.01
1.5mg/kg	Aliphatic C10-C12	330		<1.5	<1.5				<1.5		<1.5
1.2mg/kg	Aliphatic C12-C16	2400		<1.2	<1.2				14.00		<1.2
1.5mg/kg	Aliphatic C16-C21	92000		<1.5	<1.5				85.00		<1.5
3.4mg/kg	Aliphatic C21-C35	92000		<3.4	<3.4				48.00		<3.4
10mg/kg	Aliphatic C5-C35	-		<10	<10				150.00		<10
0.01mg/kg	Aromatic C5-C7	140		<0.01	<0.01				<0.01		<0.01
0.01mg/kg	Aromatic C7-C8	290		<0.01	<0.01				<0.01		<0.01
0.01mg/kg	Aromatic C8-C10	83		<0.01	<0.01				<0.01		<0.01
0.9mg/kg	Aromatic C10-C12	180		<0.9	<0.9				<0.9		<0.9
0.5mg/kg	Aromatic C12-C16	330		<0.5	<0.5				4.40		<0.5
0.6mg/kg	Aromatic C16-C21	540		<0.6	<0.6				66.00		<0.6
1.4mg/kg	Aromatic C21-C35	1500		<1.4	<1.4				64.00		<1.4
10mg/kg	Aromatic C5-C35	-		<10	<10				130.00		<10
10mg/kg	TPH Ali/Aro Total	-		<10	<10				280.00		<10
10mg/kg	EPH (C10-C35)	-									
10mg/kg	TPH (C10-C40)	-									
	PAHs										
0.03mg/kg	Naphthalene	5.6		<0.03	<0.03				<0.03		<0.03
0.03mg/kg	Acenaphthylene	420		<0.03	<0.03				0.04		<0.03
0.03mg/kg	Acenaphthene	510		<0.03	<0.03				<0.03		<0.03
0.03mg/kg	Fluorene	400		<0.03	<0.03				<0.03		<0.03
0.03mg/kg	Phenanthrene	220		0.11	0.13				0.47		0.47
0.03mg/kg	Anthracene	5400		<0.03	<0.03				0.16		0.12
0.03mg/kg	Fluoranthene	560		0.3	0.17				0.68		0.97
0.03mg/kg	Pyrene	1200		0.27	0.14				0.55		0.89
0.03mg/kg	Benzo(a)anthracene	11		0.12	0.08				0.28		0.48
0.03mg/kg	Chrysene	22		0.09	0.06				0.15		0.32
0.03mg/kg	Benzo(b)fluoranthene	3.3		0.14	0.11				0.24		0.67
0.03mg/kg	Benzo(k)fluoranthene	93		0.03	<0.03				0.06		0.17
0.03mg/kg	Benzo(a)pyrene	2.7		0.12	0.09				0.19		0.62
0.03mg/kg	Indeno(1,2,3-c,d)pyrene	36		0.04	0.04				0.17		0.20
0.03mg/kg	Dibenzo(a,h)anthracene	0.28		<0.03	0.03				0.03		0.04
0.03mg/kg	Benzo(g,h,i)perylene	340		0.05	0.05				0.5		0.29
0.10mg/kg	PAH - USEPA 16, Total	9224		1.3	0.87				3.6		5.2
	Phenols										
0.3mg/kg	Phenol - Monohydric	316		<0.3	0.4				<0.3		<0.3

Key

xx	At or exceeding the SSAC (Site Specific Assessment Criteria)
xx	Within 90th percentile of SSAC contaminant value
LoD	Laboratory 'Limit of Detection'
*	Based on ATKINS AtRisk Value, 2017

Comparison of Samples vs Site Specific Assessment Criteria

Scenario: Residential with plant uptake (2.5% SOM)

LoD	Metals (Based on 6% SOM)	SSAC	Sample ID Depth	WS05 0.30	WS05 1.60	HP01 0.20-0.30	HP02 0.30-0.40
0.2mg/kg	Arsenic	37		5.6		9.4	
1.5mg/kg	Barium	-		47		81	
0.2mg/kg	Beryllium	1.7		0.30		0.60	
0.2mg/kg	Boron, Water Soluble	290		< 0.2		0.70	
0.1mg/kg	Cadmium	11		0.20		0.40	
0.15mg/kg	Chromium	910		9.8		18	
1mg/kg	Chromium, Hexavalent	6		< 1.0		< 1.0	
0.2mg/kg	Copper	2400		13		31	
0.3mg/kg	Lead	200		130		82	
0.05mg/kg	Mercury	40		0.11		0.23	
1mg/kg	Nickel	130		8.9		15	
0.5mg/kg	Selenium	250		< 0.5		< 0.5	
0.8mg/kg	Vanadium	410		18		32	
1mg/kg	Zinc	3700		30		82	
	Inorganics						
	pH	-		6.9	8.3	8.6	
0.1mg/kg	Cyanide, Total	-		< 0.1		0.20	
0.1mg/kg	Cyanide, Free*	34		< 0.1		< 0.1	
0.50%	Total Organic Carbon	-					
0.10%	Organic matter	-		0.7		2.2	
10mg/l	Sulphate Aqueous Extract as SO4	-		15	10	31	
10mg/kg	Sulphide	-		51		12	
0.01%	Sulphate as SO4, Total	-		0.05		0.06	
	Petroleum Hydrocarbons						
0.01mg/kg	Aliphatic C5-C6	78		0.13		<0.01	<0.01
0.01mg/kg	Aliphatic C6-C8	230		<0.01		<0.01	<0.01
0.01mg/kg	Aliphatic C8-C10	65		<0.01		<0.01	<0.01
1.5mg/kg	Aliphatic C10-C12	330		<1.5		<1.5	<1.5
1.2mg/kg	Aliphatic C12-C16	2400		<1.2		<1.2	<1.2
1.5mg/kg	Aliphatic C16-C21	92000		<1.5		<1.5	<1.5
3.4mg/kg	Aliphatic C21-C35	92000		<3.4		<3.4	<3.4
10mg/kg	Aliphatic C5-C35	-		<10		<10	<10
0.01mg/kg	Aromatic C5-C7	140		<0.01		<0.01	<0.01
0.01mg/kg	Aromatic C7-C8	290		<0.01		<0.01	<0.01
0.01mg/kg	Aromatic C8-C10	83		<0.01		<0.01	<0.01
0.9mg/kg	Aromatic C10-C12	180		<0.9		<0.9	<0.9
0.5mg/kg	Aromatic C12-C16	330		<0.5		<0.5	<0.5
0.6mg/kg	Aromatic C16-C21	540		<0.6		<0.6	<0.6
1.4mg/kg	Aromatic C21-C35	1500		<1.4		<1.4	<1.4
10mg/kg	Aromatic C5-C35	-		<10		<10	<10
10mg/kg	TPH Ali/Aro Total	-		<10		<10	<10
10mg/kg	EPH (C10-C35)	-					
10mg/kg	TPH (C10-C40)	-					
	PAHs						
0.03mg/kg	Naphthalene	5.6		<0.03		<0.03	
0.03mg/kg	Acenaphthylene	420		<0.03		<0.03	
0.03mg/kg	Acenaphthene	510		<0.03		<0.03	
0.03mg/kg	Fluorene	400		<0.03		<0.03	
0.03mg/kg	Phenanthrene	220		<0.03		0.17	
0.03mg/kg	Anthracene	5400		<0.03		<0.03	
0.03mg/kg	Fluoranthene	560		0.04		0.49	
0.03mg/kg	Pyrene	1200		0.04		0.44	
0.03mg/kg	Benzo(a)anthracene	11		0.03		0.21	
0.03mg/kg	Chrysene	22		<0.03		0.16	
0.03mg/kg	Benzo(b)fluoranthene	3.3		0.04		0.27	
0.03mg/kg	Benzo(k)fluoranthene	93		<0.03		0.07	
0.03mg/kg	Benzo(a)pyrene	2.7		<0.03		0.22	
0.03mg/kg	Indeno(1,2,3-c,d)pyrene	36		<0.03		0.08	
0.03mg/kg	Dibenzo(a,h)anthracene	0.28		<0.03		<0.03	
0.03mg/kg	Benzo(g,h,i)perylene	340		<0.03		0.09	
0.10mg/kg	PAH - USEPA 16, Total	9224		0.12		2.2	
	Phenols						
0.3mg/kg	Phenol - Monohydric	316		0.30		0.30	
0.01mg/kg	Polychlorinated Biphenyls	-					<0.01

Key

xx	At or exceeding the SSAC (Site Specific Assessment Criteria)
xx	Within 90th percentile of SSAC contaminant value
LoD	Laboratory 'Limit of Detection'
*	Based on ATKINS AtRisk Value, 2017

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in “significant harm” as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. (Note: Water Resources Act contains no scope for considering significance of pollution). Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organisation forming part of such ecosystem (note: the definitions of ecological systems within the draft circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from Site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to human health (“significant harm” as defined in DETR, 2000). Pollution of sensitive water resources. (Note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem, (note: the definitions of ecological systems within draft circular on Contaminated Land, DETR, 2000).	Concentration of a contaminant from Site exceed the generic, or Site-specific assessment criteria. Leaching of contaminants from a Site to a major or minor aquifer. Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (“significant harm” as defined in the draft circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (for example foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.), easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during Site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

Table D1: Classification of Consequence

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the short-term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table D2: Classification of Probability

		Consequence			
		Severe	Medium	Mild	Minor
Risk	High Likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low Risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table D3: Combination of Consequence with Probability

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in “significant harm” as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. (Note: Water Resources Act contains no scope for considering significance of pollution). Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organisation forming part of such ecosystem (note: the definitions of ecological systems within the draft circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from Site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to human health (“significant harm” as defined in DETR, 2000). Pollution of sensitive water resources. (Note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem, (note: the definitions of ecological systems within draft circular on Contaminated Land, DETR, 2000).	Concentration of a contaminant from Site exceed the generic, or Site-specific assessment criteria. Leaching of contaminants from a Site to a major or minor aquifer. Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (“significant harm” as defined in the draft circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (for example foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.), easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during Site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

Table D1: Classification of Consequence

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the short-term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table D2: Classification of Probability

		Consequence			
		Severe	Medium	Mild	Minor
Risk	High Likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low Risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table D3: Combination of Consequence with Probability

APPENDIX E
GEOTECHNICAL LABORATORY
TEST CERTIFICATES

GEOLABS Limited
Bucknalls Lane
Garston
Watford
Hertfordshire
WD25 9XX

Tel: +44(0) 1923 892 190
Fax: +44(0) 1923 892 191
email: admin@geolabs.co.uk
web: www.geolabs.co.uk

Create Consulting Engineers
109-112 Temple Chambers
3-7 Temple Avenue
London
EC4Y 0HP

27 June 2023

Report No : GEO/38215/01

Page 1 of 1

For the attention of Mr A Warren

Our ref **GEO / 38215**
Your Ref **P23-2863**

Date samples received 26/05/2023
Date written instructions received 06/06/2023
Date testing commenced 07/06/2023
Date of sample disposal 25/07/2023

Project **MILTON PLACE, GRAVESEND**

Further to your instructions we have pleasure in enclosing the results of the tests you requested in the attached figures.

LABORATORY TEST REPORT

Item No	Test Quantity	Description
1	~	Liquid & Plastic Limits Summary
~	3	Water Content
~	3	Liquid & Plastic Limits
2	8	Saturation Water Content
3	9	Point Load Strength Index

Any opinions or interpretations expressed herein are outside the scope of UKAS accreditation. All results contained in this report are provisional unless signed by an approved signatory. The results contained in this report relate only to samples received in the laboratory and are tested 'as received' unless otherwise stated. This report should not be reproduced, except in full, without the written approval of the laboratory. The results reported are applicable only to the test items received by the laboratory.

All the necessary data required by the documented test procedures has been recorded and will be stored for a period of not less than 6 years. This data will be issued to yourselves at your request. All samples will be disposed of after the date shown above. Written confirmation will be required to retain the samples beyond this period and a storage charge may be applied.

We trust that the above meets your requirements and should you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully
on behalf of **GEOLABS Limited**



S Burke
Senior Technician

BS EN ISO 17892-12 : 2018

SUMMARY OF LIQUID AND PLASTIC LIMIT TESTS

[illegible]

Test Type:

- 1 - 1 point 80g / 30° fall cone method.
- 2 - 4 point 80g / 30° fall cone method.
- 3 - Non plastic determination.

Sample condition:

1 - As Received
2 - Air Dried
3 - Washed & Air Dried

Checked and Approved by:

S Burke

S Burke - Senior Technician
27/06/2023

Project Number:

GEO / 38215

Project Name:

**MILTON PLACE, GRAVESEND
P23-2863**

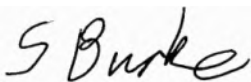


SATURATION WATER CONTENT OF CHALK

Location	Depth m	Sample Ref	Sample Type	Description	Water Content BS EN ISO 17892-1 : 2014 %	Bulk Density BS EN ISO 17892-2 : 2014 : 5.2 Mg/m ³	Dry Density BS EN ISO 17892-2 : 2014 : 5.2 Mg/m ³	Saturation Water Content %	Porosity %
BH1	8.50		D	White CHALK.	31.4	1.91	1.45	32	46
BH1	17.50		D	White CHALK.	29.7	1.94	1.50	30	44
BH1	22.00		D	White CHALK.	27.1	1.99	1.57	27	42
BH2	7.00		D	White CHALK.	35.6	1.93	1.42	33	47
BH2	16.00		D	White CHALK.	35.0	1.92	1.42	33	47
BH2	22.00		D	White CHALK.	29.3	1.93	1.49	30	45
TP01	1.00-1.50		D	White CHALK.	30.6	1.92	1.47	31	46
TP04	1.80		D	White CHALK.	29.9	1.93	1.49	30	45

Notes

Tested by SB
Checked and Approved by



S Burke - Senior Technician
27/06/2023

Project Number:

GEO / 38215

Project Name:

MILTON PLACE, GRAVESEND
P23-2863



DETERMINATION OF POINT LOAD STRENGTH ON ROCK

Sample details				Point Load test											
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Test type & Direction		Sample width W (mm)	Platen separation (mm)		Water Content (%)	Equiv. Diameter D _e (mm)	Failure Load P (kN)	I _s P/De ² (MPa)	Correction Factor F	Point Load Index I _{s(50)} (MPa)
								Start D	End D'						
BH1		8.50	White CHALK	15/06/23	I	U	45.1	30.3	28.1		40.2	0.19	0.12	0.91	0.11
BH1		13.00	White CHALK	15/06/23	I	U	30.0	23.6	21.5		28.7	0.07	0.08	0.78	0.06
BH1		17.50	White CHALK	15/06/23	I	U	80.0	47.6	43.2		66.3	0.64	0.14	1.14	0.16
BH1		22.00	White CHALK	15/06/23	I	U	42.5	23.4	21.0		33.7	0.10	0.09	0.84	0.08
BH2		7.00	White CHALK	15/06/23	I	U	32.0	32.1	30.3		35.1	0.08	0.07	0.85	0.06
BH2		16.00	White CHALK	15/06/23	I	U	43.3	30.1	27.8		39.1	0.15	0.10	0.90	0.09
BH2		22.00	White CHALK	15/06/23	I	U	47.6	26.4	24.1		38.2	0.10	0.07	0.89	0.06
TP01		1.00-1.50	White CHALK	15/06/23	I	U	45.0	39.8	37.5		46.4	0.30	0.14	0.97	0.14
TP01		1.80	White CHALK	15/06/23	I	U	53.1	36.2	34.3		48.2	0.45	0.19	0.98	0.19

(*) Sample failed on weakness

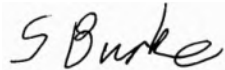
 Test type and direction: **D** - Diametral **A** - Axial **B** - Block **I** - Irregular lump **P** - Perpendicular to planes of weakness **U** - Random or unknown orientation **L** - Parallel to planes of weakness

Checked and Approved by  C Clergeaud (Snr. Geologist) Date: 22/06/2023		Project Number: GEO / 38215 Project Name: MILTON PLACE, GRAVESEND P23-2863												
		 												



Client	Create Consulting Engineers	TEST RESTRICTION
Project No.	38215	
Project Name	MILTON PLACE, GRAVESEND	

The following tests have been scheduled on the above project and **CANNOT** be performed for the reason stated. If alternative samples are available for the restricted tests, please supply details.

Laboratory ID	BH / TP No.	Sample Ref.	Depth (m)		Type	Test(s) Scheduled			Reason for Restriction	Description
488116	BH1		13.00		D				No suitable lumps	White structureless CHALK
						SMC				
Comments / remarks										Test restriction raised by 

Create Consulting Engineers Ltd
 FAO Tom Bennett
 15 Princes Street
 NORWICH
 NR3 1AF

Our Project No 104409
Our Report and sample No NNPL2023060142-
Your Sample Ref B1
Your Project or Order No 5070
Date Report Issued 03 July 2023
Date Tested 27 June 2023

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

Determination of the California Bearing Ratio to BS 1377 : Part 4 : 1990 (Withdrawn)

Scheme	Gravesend, Milton Place		
Location	TP02 @ 0.4m	Specimen: 1	
Date sampled	22 May 2023	Date received	31 May 2023
Sampled by	Client	Sample Mass	17.695kg
If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'			
Material	Soil	Sample type	Bulk Disturbed
Description	Greyish white mottled white CHALK, recovered as slightly sandy, gravelly SILT. Gravel is angular to sub-rounded, fine to coarse chalk and rare flint.		
Supplier	Not applicable	Source	Ex site

Test Specimen Preparation details

Location	Not applicable	Method of Division	Quartering
Orientation	Not applicable	Preparation Method	Sieving, Natural Moisture Content
Retained 37.5mm	12.8 %	Retained 20mm	129.2* %
BS Method	3.4, 2.5kg Rammer	Grading zone	X
Number of layers	3	Bulk Density	1.81 Mg/m ³
Blows per layer	62 Blows	Dry Density	1.44 Mg/m ³
Condition	Soaked	Init. Moisture Content	23.0 %
Amount of Swell (mm)	-0.068	Soaking Period	4 days

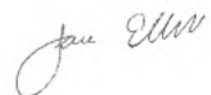
Test Results

		CBR Value	Surface Modulus \$	\$ The calculation of Surface Modulus is not covered by UKAS accreditation
		%	Mpa	
Top	5.1	50		
Bottom	3.2	37		
Moisture Content Method	Oven dried @ 105-110°C			
Moisture Content Top	%	25.0	Moisture Cont. Bottom	% 25.0

Remarks

*Test not applicable for materials with more than 25% retained on a 20mm BS test sieve, BS 1377 part 4:1990 cl 7.2.12. The insitu value is likely to be higher than the test result.

This report shall not be reproduced, except in full, without the prior approval of Norfolk Partnership Laboratory



Create Consulting Engineers Ltd
 FAO Tom Bennett
 15 Princes Street
 NORWICH
 NR3 1AF

Our Project No	104409
Our Report and sample No	NNPL2023060143-
Your Sample Ref	B1
Your Project or Order No	5070
Date Report Issued	03 July 2023
Date Tested	23 June 2023

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

Determination of the California Bearing Ratio to BS 1377 : Part 4 : 1990 (Withdrawn)

Scheme	Gravesend, Milton Place		
Location	TP04 @ 0.5m	Specimen: 1	
Date sampled	23 May 2023	Date received	31 May 2023
Sampled by	Client	Sample Mass	19.296kg
If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'			
Material	Soil	Sample type	Bulk Disturbed
Description	Firm dark brown, gravelly CLAY. Gravel is angular to sub-angular flint and occasional chalk.		
Supplier	Not applicable	Source	Ex site

Test Specimen Preparation details

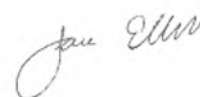
Location	Not applicable	Method of Division	Quartering
Orientation	Not applicable	Preparation Method	Sieving, Natural Moisture Content
Retained 37.5mm	2.7 %	Retained 20mm	5.0 %
BS Method	3.4, 2.5kg Rammer	Grading zone	4
Number of layers	3	Bulk Density	2.04 Mg/m ³
Blows per layer	62 Blows	Dry Density	1.72 Mg/m ³
Condition	Soaked	Init. Moisture Content	18.0 %
Amount of Swell	(mm) 0.007	Soaking Period	4 days

Test Results

		CBR Value	Surface Modulus \$	\$ The calculation of Surface Modulus is not covered by UKAS accreditation
		%	Mpa	
Top	2.4		31	
Bottom	3.4		39	
Moisture Content Method	Oven dried @ 105-110°C			
Moisture Content Top	%	19.0	Moisture Cont. Bottom	% 17.0

Remarks

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Create Consulting Engineers Ltd
 FAO Tom Bennett
 15 Princes Street
 NORWICH
 NR3 1AF

Our Project No 104409
Our Report and sample No NNPL2023060145-
Your Sample Ref B1
Your Project or Order No 5070
Date Report Issued 03 July 2023
Date Tested 27 June 2023

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

Determination of the California Bearing Ratio to BS 1377 : Part 4 : 1990 (Withdrawn)

Scheme	Gravesend, Milton Place		
Location	WS04 @ 0.4m	Specimen: 1	
Date sampled	24 May 2023	Date received	31 May 2023
Sampled by	Client	Sample Mass	10.085kg
If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'			
Material	Soil	Sample type	Bulk Disturbed
Description	Dark greyish brown, clayey, very gravelly, fine and medium SAND. Gravel is angular to sub-angular, fine to coarse chalk and flint.		
Supplier	Not applicable	Source	Ex site

Test Specimen Preparation details

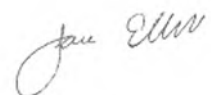
Location	Not applicable	Method of Division	Quartering
Orientation	Not applicable	Preparation Method	Sieving, Natural Moisture Content
Retained 37.5mm	8.0 %	Retained 20mm	16.1 %
BS Method	3.4, 2.5kg Rammer	Grading zone	5
Number of layers	3	Bulk Density	1.89 Mg/m ³
Blows per layer	62 Blows	Dry Density	1.55 Mg/m ³
Condition	Soaked	Init. Moisture Content	19.0 %
Amount of Swell (mm)	-0.004	Soaking Period	4 days

Test Results

		CBR Value	Surface Modulus \$	\$ The calculation of Surface Modulus is not covered by UKAS accreditation
		%	Mpa	
Top	7.1	62		
Bottom	7.6	64		
Mean Value	7	63		
Moisture Content Method	Oven dried @ 105-110°C			
Moisture Content Top	%	22.0	Moisture Cont. Bottom	% 22.0

Remarks

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Create Consulting Engineers Ltd

Tom Bennett

15 Princes Street
NORWICH
NR3 1AF

Our Project No. 104409

Our Report and sample No. NNPL2023060144-6

Our Specimen Ref.

Your Order No. 5070

Date Report Issued 03 Jul 2023

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

Determination of Saturation Water Content of Chalk to BS1377-2 : 2022

Scheme	Gravesend, Milton Place		
Location	TP06	Depth	0.5 m
Date sampled	23 May 2023	Date received	31 May 2023
Sampled by	Client	Date tested	
Sample type	Bulk Disturbed		
If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'			
Material	Soil		
Description	Intact, white chalk GRAVEL.		
Supplier	Not applicable	Source	Not applicable

	Test Specimen
Location	
Orientation	Not applicable
	Preparation Details
Method of Division	
Preparation Method	Oven dried @ 105 -110°C
Water Content (%)	26.91
Dry Density (Mg/m³)	1.51
Saturation Water Content (%)	29
Remarks	

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Test Code = 602

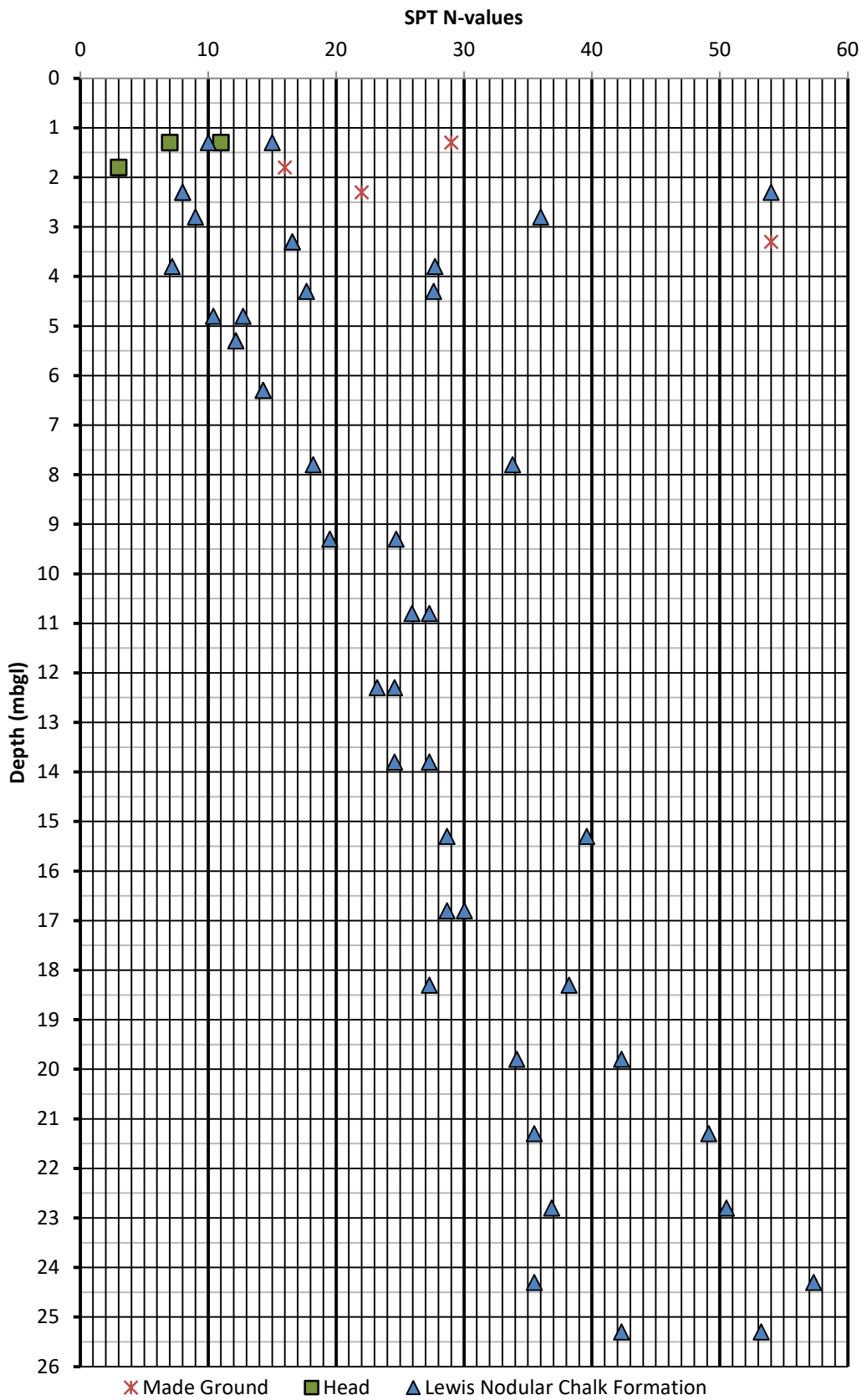
Jim Elliot (Lead Technical Support Tech.)



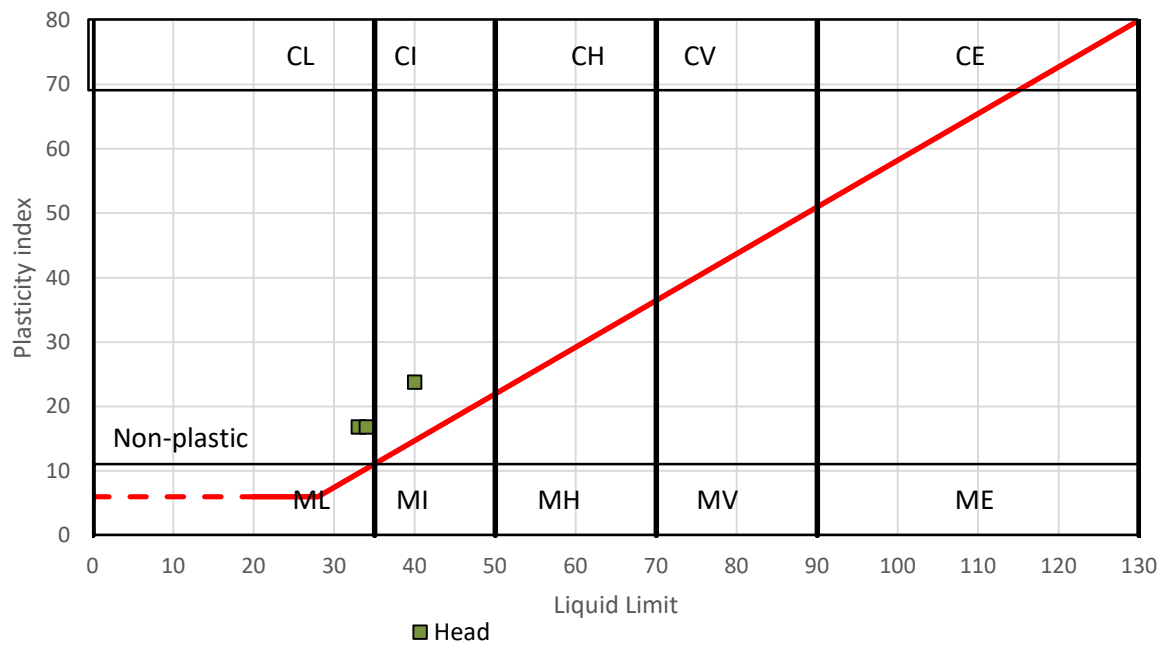
APPENDIX F

GEOTECHNICAL PLOTS

Milton Place SPT depth plot



Plasticity Chart



APPENDIX G

GROUND GAS MONITORING

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site: Milton Place, Gravesend
Date: 09.06.2023

Visit No: 1 of 3
Operator: AW



Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
WS01A	10:41		0.0		1.6		18.0			0.1				DRY	2.75	
BH02	10:51		0.0		2.3		17.9			0.2				9.00	24.70	
WS04	11:04		0.0		0.5		19.1			0.2				DRY	2.37	
WS02	11:12		0.0		0.2		19.3			0.2				DRY	4.90	
Max		NA	0.0	NA	2.3	NA	19.3	NA	NA	0.2	NA	NA	NA	9.00	24.70	
Min		NA	0.0	NA	0.2	NA	17.9	NA	NA	0.1	NA	NA	NA	DRY	2.37	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

Wind:

Cloud cover:

Precipitation:

Time monitoring performed:

Barometric pressure (mbar):

Pressure trend (Daily):

Source:

Air Temperature (Deg. C):

☒ Dry	☐ Moist	☐ Wet	☐ Snow	☐ Frozen
☒ Calm	☐ Light	☐ Moderate	☐ Strong	
☒ None	☐ Slight	☐ Cloudy	☐ Overcast	
☒ None	☐ Slight	☐ Moderate	☐ Heavy	
	10:39 Start		11:15 End	
	1014 Start		1014 End	
	☐ Falling	☒ Steady	☐ Rising	
GA5000				
	21 Before		21 After	

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter:

GA5000

Gas Range:

CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range:

+100/-50 l/hour

Differential Pressure:

(+/-) 1000 Pa

Ambient air check:

CH₄ 0.0 CO₂ 0.1 O₂ 20.5

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site: Milton Place, Gravesend
Date: 23.06.2023

Visit No: 2 of 3
Operator: AW



Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
WS01A	07:40		0.0		1.2		18.8			0.1				DRY	2.75	
WS04	07:44		0.0		1.6		18.2			0.2				DRY	2.40	
WS02	07:50		0.0		1.1		19.1			0.1				DRY	4.80	
BH02	08:00		0.0		2.1		18.2			0.1				9.00	24.70	
Max		NA	0.0	NA	2.1	NA	19.1	NA	NA	0.2	NA	NA	NA	9.00	24.70	
Min		NA	0.0	NA	1.1	NA	18.2	NA	NA	0.1	NA	NA	NA	DRY	2.40	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

Wind:

Cloud cover:

Precipitation:

Time monitoring performed:

Barometric pressure (mbar):

Pressure trend (Daily):

Source:

Air Temperature (Deg. C):

☒ Dry	☐ Moist	☐ Wet	☐ Snow	☐ Frozen
☒ Calm	☐ Light	☐ Moderate	☐ Strong	
☒ None	☐ Slight	☐ Cloudy	☐ Overcast	
☒ None	☐ Slight	☐ Moderate	☐ Heavy	
	07:35 Start		08:03 End	
	1015 Start		1015 End	
	☐ Falling	☒ Steady	☐ Rising	
GA5000				
	17 Before		17 After	

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter:

GA5000

Gas Range:

CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range:

+100/-50 l/hour

Differential Pressure:

(+/-) 1000 Pa

Ambient air check:

CH₄ 0.0 CO₂ 0.1 O₂ 20.4

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site: Milton Place, Gravesend
Date: 29.06.2023

Visit No: 3 of 3
Operator: AW



Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
WS01A	16:38		0.0		1.5		17.7			0.1				DRY	2.75	
WS04	16:43		0.0		0.4		18.5			0.2				DRY	2.40	
WS02	16:50		0.0		0.9		19.0			0.1				DRY	4.80	
BH02	16:58		0.0		2.0		18.2			0.3				9.10	24.70	
Max		NA	0.0	NA	2.0	NA	19.0	NA	NA	0.3	NA	NA	NA	9.10	24.70	
Min		NA	0.0	NA	0.4	NA	17.7	NA	NA	0.1	NA	NA	NA	DRY	2.40	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

Wind:

Cloud cover:

Precipitation:

Time monitoring performed:

Barometric pressure (mbar):

Pressure trend (Daily):

Source:

Air Temperature (Deg. C):

☒ Dry	☐ Moist	☐ Wet	☐ Snow	☐ Frozen
☐ Calm	☐ Light	☒ Moderate	☐ Strong	
☐ None	☒ Slight	☐ Cloudy	☐ Overcast	
☒ None	☐ Slight	☐ Moderate	☐ Heavy	
	16:35 Start		17:05 End	
	1020 Start		1020 End	
	☐ Falling	☒ Steady	☐ Rising	
GA5000				
	19 Before		19 After	

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter:

GA5000

Gas Range:

CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range:

+100/-50 l/hour

Differential Pressure:

(+/-) 1000 Pa

Ambient air check:

CH₄ 0.0 CO₂ 0.1 O₂ 20.9

Traffic Light Classification	Methane		Carbon Dioxide	
	Typical Maximum Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Maximum Concentration (%v/v)	Gas Screening Value (l/hr)
Green	1	0.16	5	0.78
Amber 1	5	0.63	10	1.56
Amber 2	20	1.56	30	3.10
Red				

Appendix 1: NHBC Traffic Light System Classification. Traffic Lights with Typical Maximum Concentrations and Gas Screening Values

Traffic Light Classification	Ground Gas Protection Measures Required
Green	No ground gas protection required.
Amber 1	Low level protection, including membrane and ventilated sub-floor void (minimum one complete change in 24 hours) to create a permeability contrast and limit ingress of ground gas into buildings.
Amber 2	High level protection, including membrane and ventilated sub-floor void (minimum one complete change in 24 hours) to create a permeability contrast and prevent ingress of ground gas into buildings.
Red	Development not normally acceptable without further ground gas risk assessment and/or remedial mitigation measures to reduce / remove the source of ground gas.

Appendix 2: NHBC Traffic Light System Classification. Ground Gas Protection Measures Required for the Traffic Lights

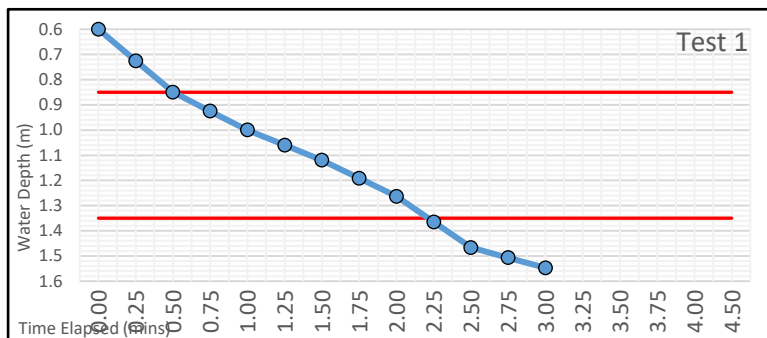
APPENDIX H

SOAKAGE TEST RESULTS

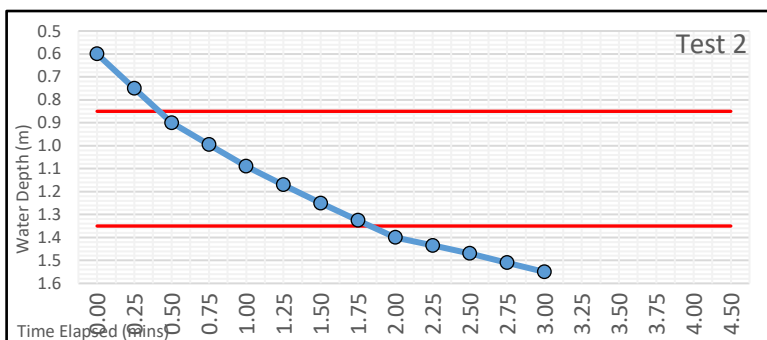
Site:	Milton Place, Gravesend		
Client:	Hill Partnerships Ltd		
Job No:	P23-2863	Date:	23/05/2023

Soil type at test level	Structureless CHALK		
Groundwater	Not encountered	Stone Filled?	Yes
Sidewall stability	Stable, vertical	Voids Ratio (%)	0.41

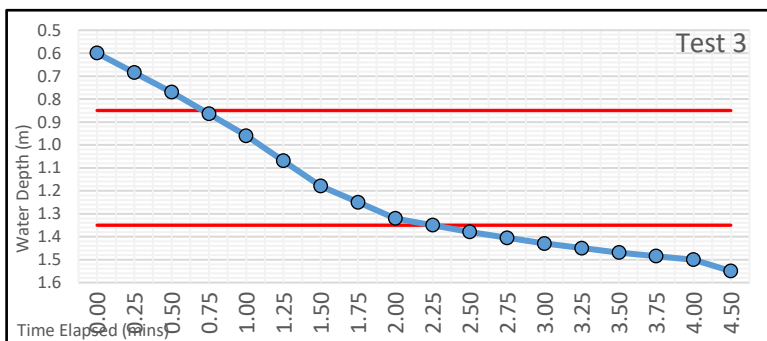
Trial Pit Dimensions (m)	
Length	1.60
Width	0.30
Depth	1.60
Test volume (m ³)	0.48
Effective Depth	1.00



$V_{p75-25} \text{ (m}^3\text{)}$	0.10
$A_{S50} \text{ (m}^2\text{)}$	2.38
$t_{p75-25} \text{ (mins)}$	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	3.94E-04



$V_{p75-25} \text{ (m}^3\text{)}$	0.10
$A_{S50} \text{ (m}^2\text{)}$	2.38
$t_{p75-25} \text{ (mins)}$	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	4.31E-04



$V_{p75-25} \text{ (m}^3\text{)}$	0.10
$A_{S50} \text{ (m}^2\text{)}$	2.38
$t_{p75-25} \text{ (mins)}$	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	4.59E-04

[illegible]

Remarks

- 1 Infiltration testing carried out between 0.6m and 1.6m
2 Datalogger number 825023
3 Test 1 carried out on 23/05/2023
4 Test 2 carried out on 24/05/2023
5 Test 3 carried out on 24/05/2023

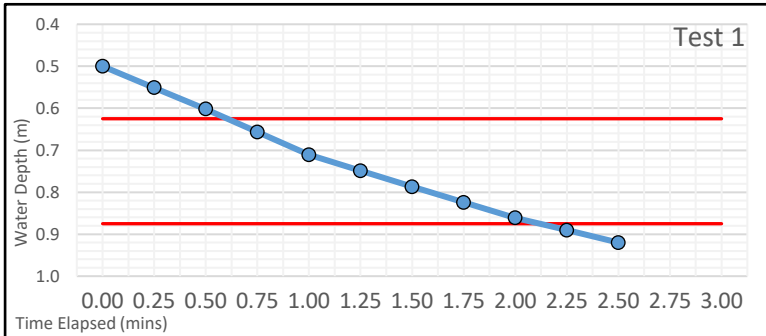
Analysis by: TB

Checked by: CB

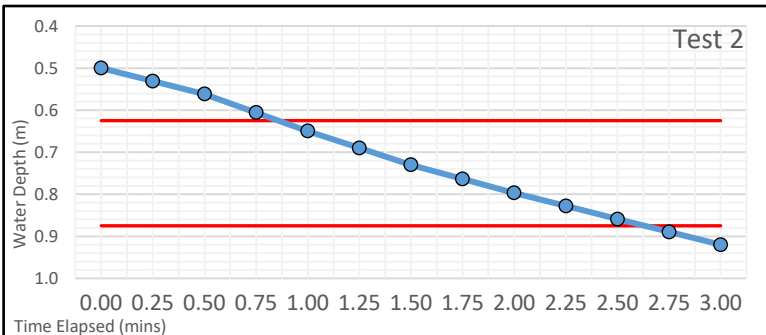
Site:	Milton Place, Gravesend		
Client:	Hill Partnerships Ltd		
Job No:	P23-2863	Date:	23/05/2023

Soil type at test level	Structureless CHALK		
Groundwater	Not encountered	Stone Filled?	Yes
Sidewall stability	Stable, vertical	Voids Ratio (%)	0.41

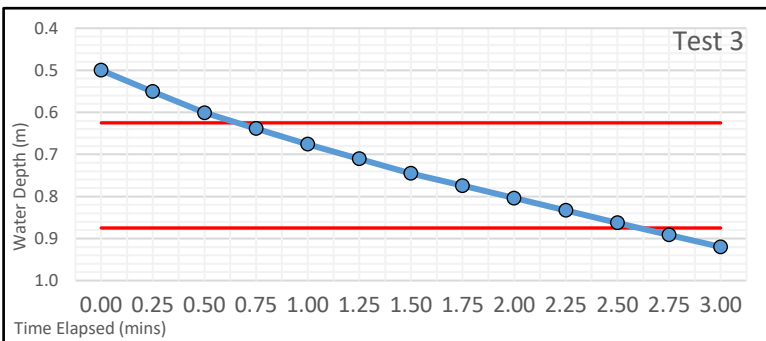
Trial Pit Dimensions (m)	
Length	1.40
Width	0.30
Depth	1.00
Test volume (m ³)	0.21
Effective Depth	0.50



$V_{p75-25} \text{ (m}^3\text{)}$	0.04
$A_{S50} \text{ (m}^2\text{)}$	1.27
$t_{p75-25} \text{ (mins)}$	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	3.64E-04

[illegible]

$V_{p75-25} \text{ (m}^3\text{)}$	0.04
$A_{S50} \text{ (m}^2\text{)}$	1.27
$t_{p75-25} \text{ (mins)}$	1
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	4.35E-04



$V_{p75-25} \text{ (m}^3\text{)}$	0.04
$A_{S50} \text{ (m}^2\text{)}$	1.27
$t_{p75-25} \text{ (mins)}$	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	2.82E-04

<u>Remarks</u>

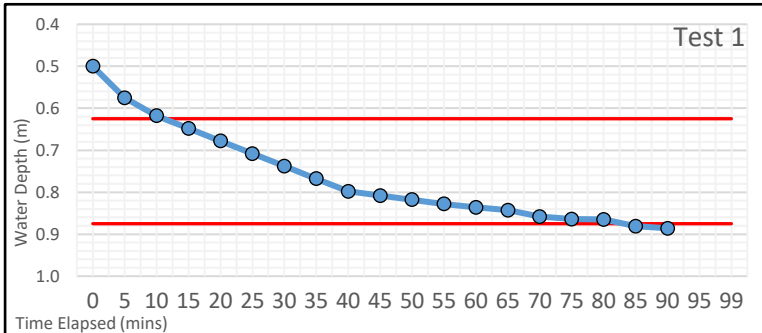
- | | |
|--|------------|
| 1 Infiltration testing carried out between 0.5m and 1.0m | |
| 2 Datalogger number | 823595 |
| 3 Test 1 carried out on | 23/05/2023 |
| 4 Test 2 carried out on | 23/05/2023 |
| 5 Test 3 carried out on | 23/05/2023 |

Analysis by: TB
Checked by: CB

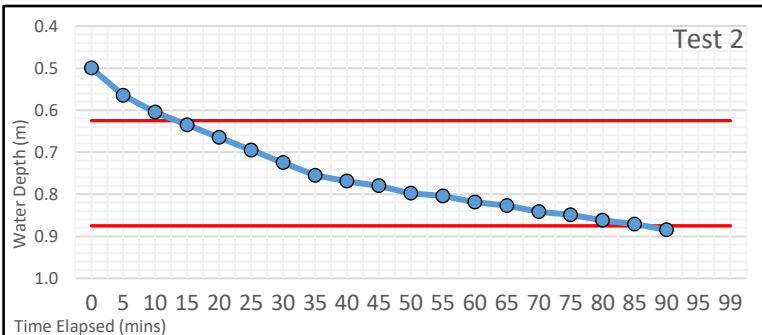
Site:	Milton Place, Gravesend		
Client:	Hill Partnerships Ltd		
Job No:	P23-2863	Date:	23/05/2023

Soil type at test level	Structureless CHALK		
Groundwater	Not encountered	Stone Filled?	Yes
Sidewall stability	Stable, vertical	Voids Ratio (%)	0.41

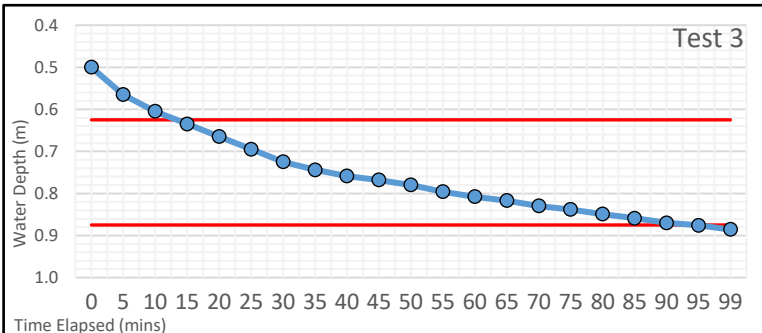
Trial Pit Dimensions (m)	
Length	1.30
Width	0.30
Depth	1.00
Test volume (m ³)	0.20
Effective Depth	0.50



$V_{p75-25} \text{ (m}^3\text{)}$	0.04
$A_{S50} \text{ (m}^2\text{)}$	1.19
$t_{p75-25} \text{ (mins)}$	69
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	8.11E-06



$V_{p75-25} \text{ (m}^3\text{)}$	0.04
$A_{S50} \text{ (m}^2\text{)}$	1.19
$t_{p75-25} \text{ (mins)}$	68
Soil infiltration rate	8.29E-06
$f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	



$V_{p75-25} \text{ (m}^3\text{)}$	0.04
$A_{S50} \text{ (m}^2\text{)}$	1.19
$t_{p75-25} \text{ (mins)}$	71
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	7.89E-06

[illegible]

Remarks

- 1 Infiltration testing carried out between 0.5m and 1.0m
2 Datalogger number 823595
3 Test 1 carried out on 23/05/2023
4 Test 2 carried out on 23/05/2023
5 Test 3 carried out on 23/05/2023

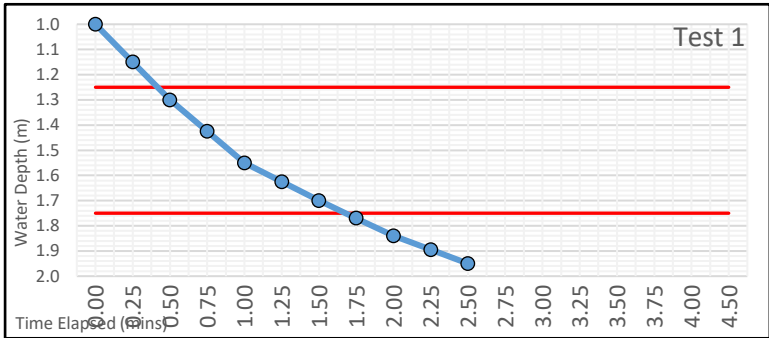
Analysis by: TB

Checked by: CB

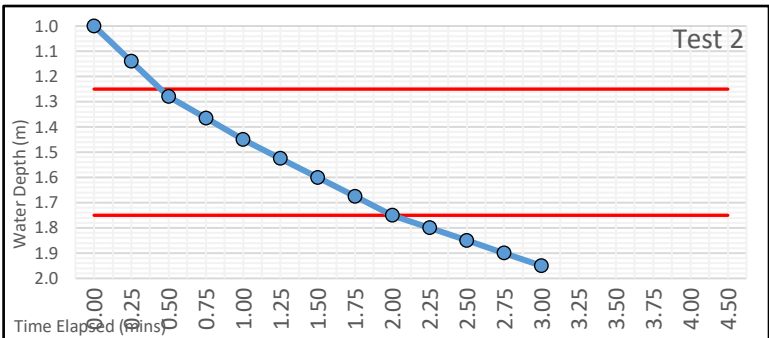
Site:	Milton Place, Gravesend		
Client:	Hill Partnerships Ltd		
Job No:	P23-2863	Date:	23/05/2023

Soil type at test level	Structureless CHALK		
Groundwater	Not encountered	Stone Filled?	Yes
Sidewall stability	Stable, vertical	Voids Ratio (%)	0.41

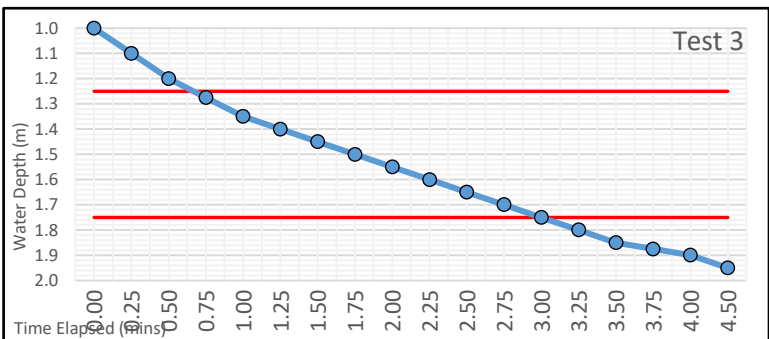
Trial Pit Dimensions (m)	
Length	1.70
Width	0.30
Depth	2.00
Test volume (m ³)	0.51
Effective Depth	1.00



$V_{p75-25} \text{ (m}^3\text{)}$	0.10
$A_{S50} \text{ (m}^2\text{)}$	2.51
$t_{p75-25} \text{ (mins)}$	1
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	5.14E-04

[illegible]

$V_{p75-25} \text{ (m}^3\text{)}$	0.10
$A_{S50} \text{ (m}^2\text{)}$	2.51
$t_{p75-25} \text{ (mins)}$	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	4.48E-04



V_{p75-25} (m ³)	0.10
A_{S50} (m ²)	2.51
t_{p75-25} (mins)	2
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	2.95E-04

Remarks

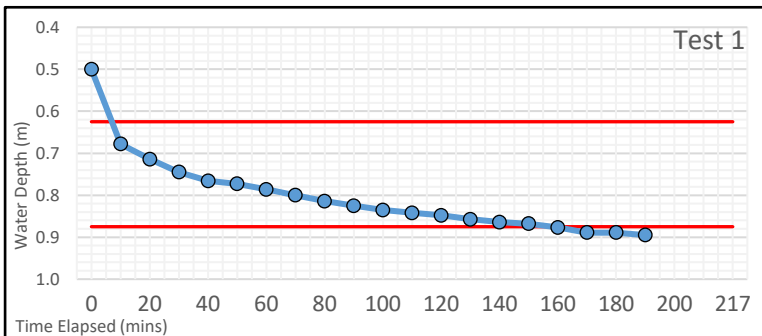
- | | |
|--|------------|
| 1 Infiltration testing carried out between 1.0m and 2.0m | |
| 2 Datalogger number | 823591 |
| 3 Test 1 carried out on | 23/05/2023 |
| 4 Test 2 carried out on | 24/05/2023 |
| 5 Test 3 carried out on | 24/05/2023 |

Analysis by: TB
Checked by: CB

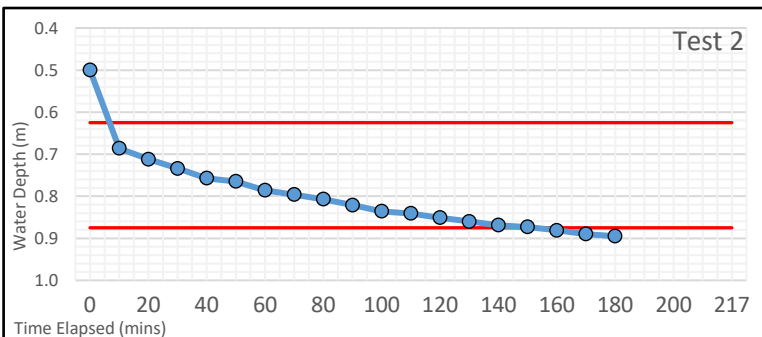
Site:	Milton Place, Gravesend		
Client:	Hill Partnerships Ltd		
Job No:	P23-2863	Date:	23/05/2023

Soil type at test level	MADE GROUND		
Groundwater	Not encountered	Stone Filled?	Yes
Sidewall stability	Stable, vertical	Voids Ratio (%)	0.41

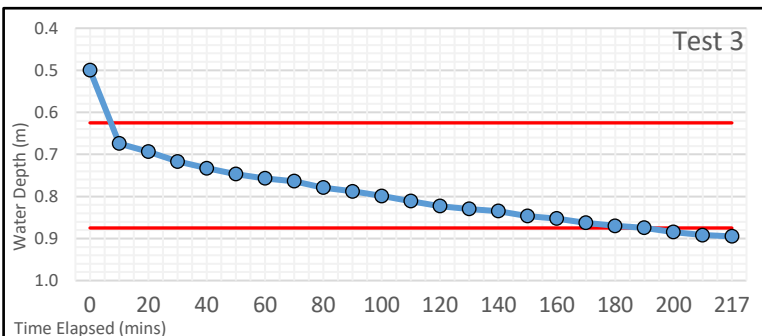
Trial Pit Dimensions (m)	
Length	1.70
Width	0.30
Depth	1.00
Test volume (m ³)	0.26
Effective Depth	0.50



$V_{p75-25} \text{ (m}^3\text{)}$	0.05
$A_{S50} \text{ (m}^2\text{)}$	1.51
$t_{p75-25} \text{ (mins)}$	152
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	3.80E-06



$V_{p75-25} \text{ (m}^3\text{)}$	0.05
$A_{S50} \text{ (m}^2\text{)}$	1.51
$t_{p75-25} \text{ (mins)}$	149
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	3.89E-06



$V_{p75-25} \text{ (m}^3\text{)}$	0.05
$A_{S50} \text{ (m}^2\text{)}$	1.51
$t_{p75-25} \text{ (mins)}$	184
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	3.14E-06

[illegible]

Remarks

- 1 Infiltration testing carried out between 0.5m and 1.0m
2 Datalogger number 823838
3 Test 1 carried out on 23/05/2023
4 Test 2 carried out on 23/05/2023
5 Test 3 carried out on 24/05/2023

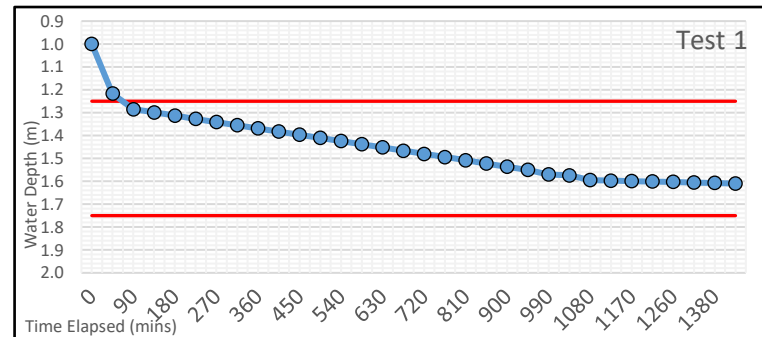
Analysis by: TB

Checked by: CB

Location	TP06
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Site:	Milton Place, Gravesend		
Client:	Hill Partnerships Ltd		
Job No:	P23-2863	Date:	23/05/2023

Soil type at test level	Slightly Silty CLAY		
Groundwater	Not encountered	Stone Filled?	Yes
Sidewall stability	Stable, vertical	Voids Ratio (%)	0.41



$V_{p75-25} \text{ (m}^3\text{)}$	0.10
$A_{550} \text{ (m}^2\text{)}$	2.51
$t_{p75-25} \text{ (mins)}$	N/A
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{550} \times t_{p75-25}}$	TEST FAIL

Trial Pit Dimensions (m)	
Length	1.70
Width	0.30
Depth	2.00
Test volume (m ³)	0.51
Effective Depth	1.00

Time (mins)	Test 1	Test 2	Test 3
0	1.00	-	-
45	1.22	-	-
90	1.29	-	-
135	1.30	-	-
180	1.31	-	-
225	1.33	-	-
270	1.34	-	-
315	1.35	-	-
360	1.37	-	-
405	1.38	-	-
450	1.40	-	-
495	1.41	-	-
540	1.42	-	-
585	1.44	-	-
630	1.45	-	-
675	1.47	-	-
720	1.48	-	-
765	1.49	-	-
810	1.51	-	-
855	1.52	-	-
900	1.54	-	-
945	1.55	-	-
990	1.57	-	-
1035	1.57	-	-
1080	1.60	-	-
1125	1.60	-	-
1170	1.60	-	-
1215	1.60	-	-
1260	1.60	-	-
1320	1.61	-	-
1380	1.61	-	-
1440	1.61	-	-

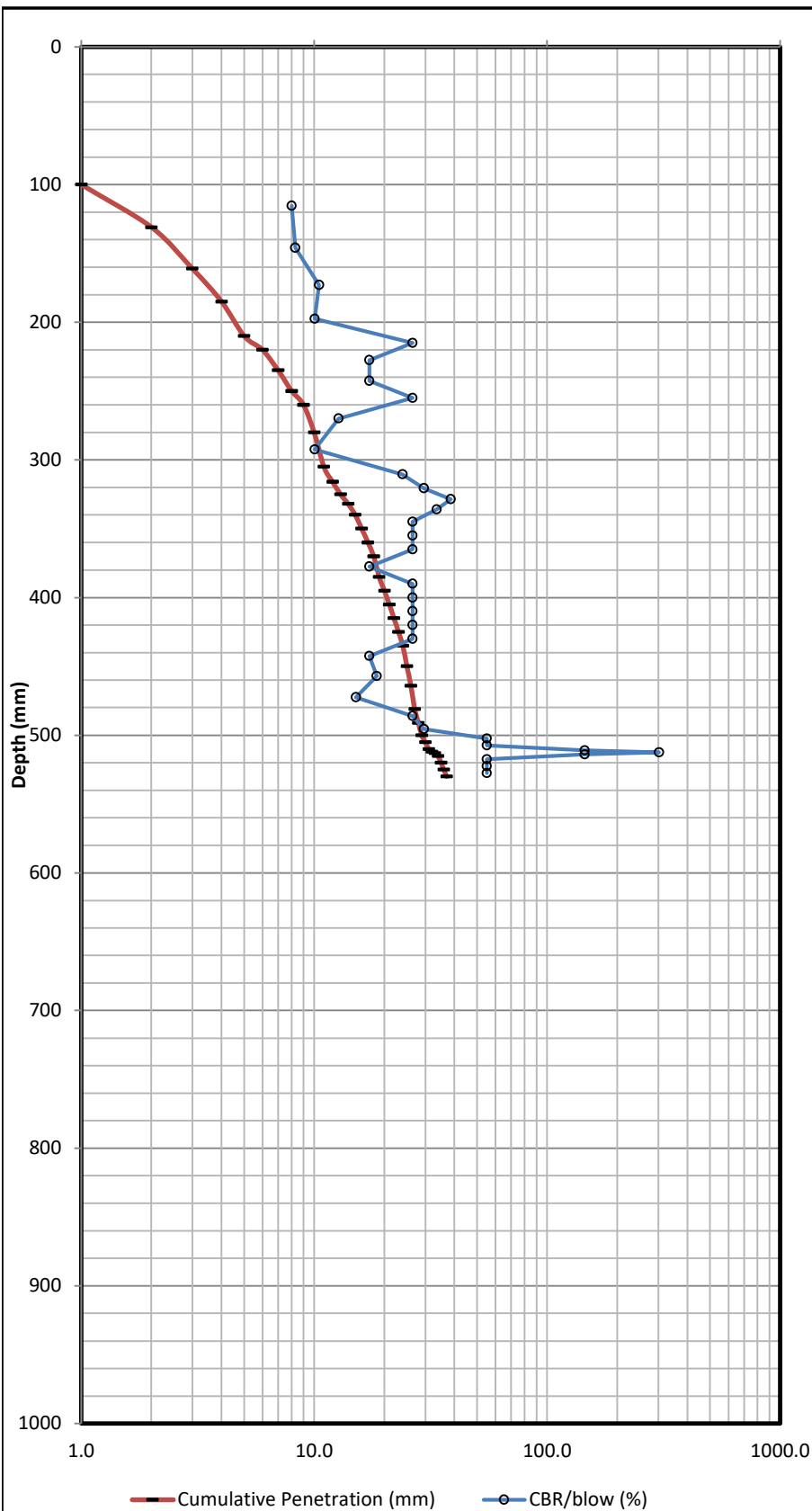
Remarks 1 Infiltration testing carried out between 1.0m and 2.0m 2 Datalogger number 823594 3 Test 1 carried out on 23/05/2023 4 Test failed due to insufficient drainage in 24 hour period	Analysis by: TB Checked by: CB
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APPENDIX I

DYNAMIC CONE PENETROMETER RESULTS

Date	22/05/2023
Job Number	P23-2863
Site	Milton Place, Gravesend
Engineer	TB

Location	TP02
	DCP02



Interpreted CBR Value

100mm Made Ground removed

Start of Test

Initial Penetration

MADE GROUND

21.2

HEAD

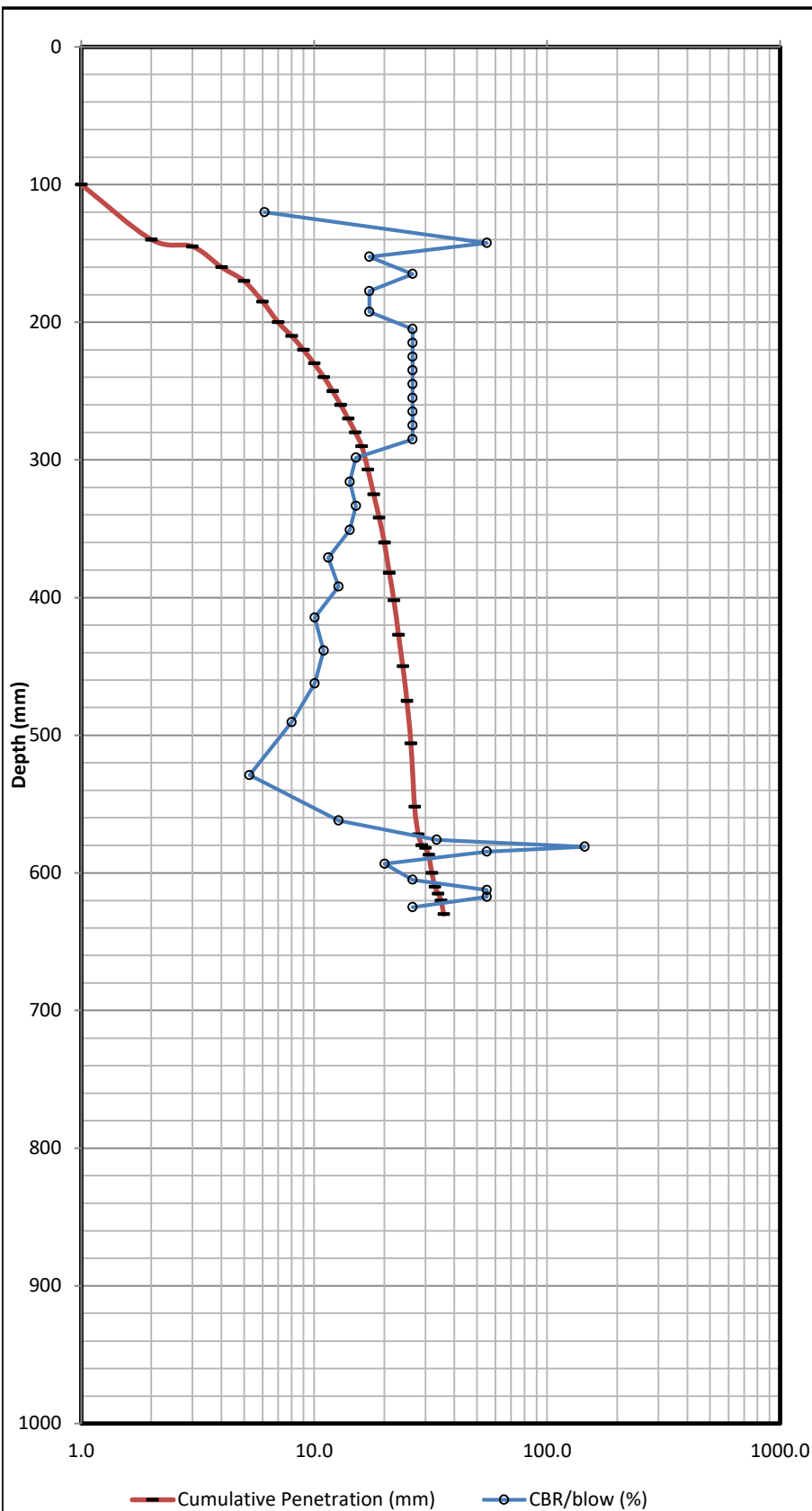
CHALK

End of test

1. 100mm Made Ground removed prior to starting test
2. Test refused at 530mm

Date	22/05/2023
Job Number	P23-2863
Site	Milton Place, Gravesend
Engineer	TB

Location	TP04
	DCP04



Interpreted CBR Value

100mm Made Ground removed

Start of Test

Initial Penetration

MADE GROUND

8.8

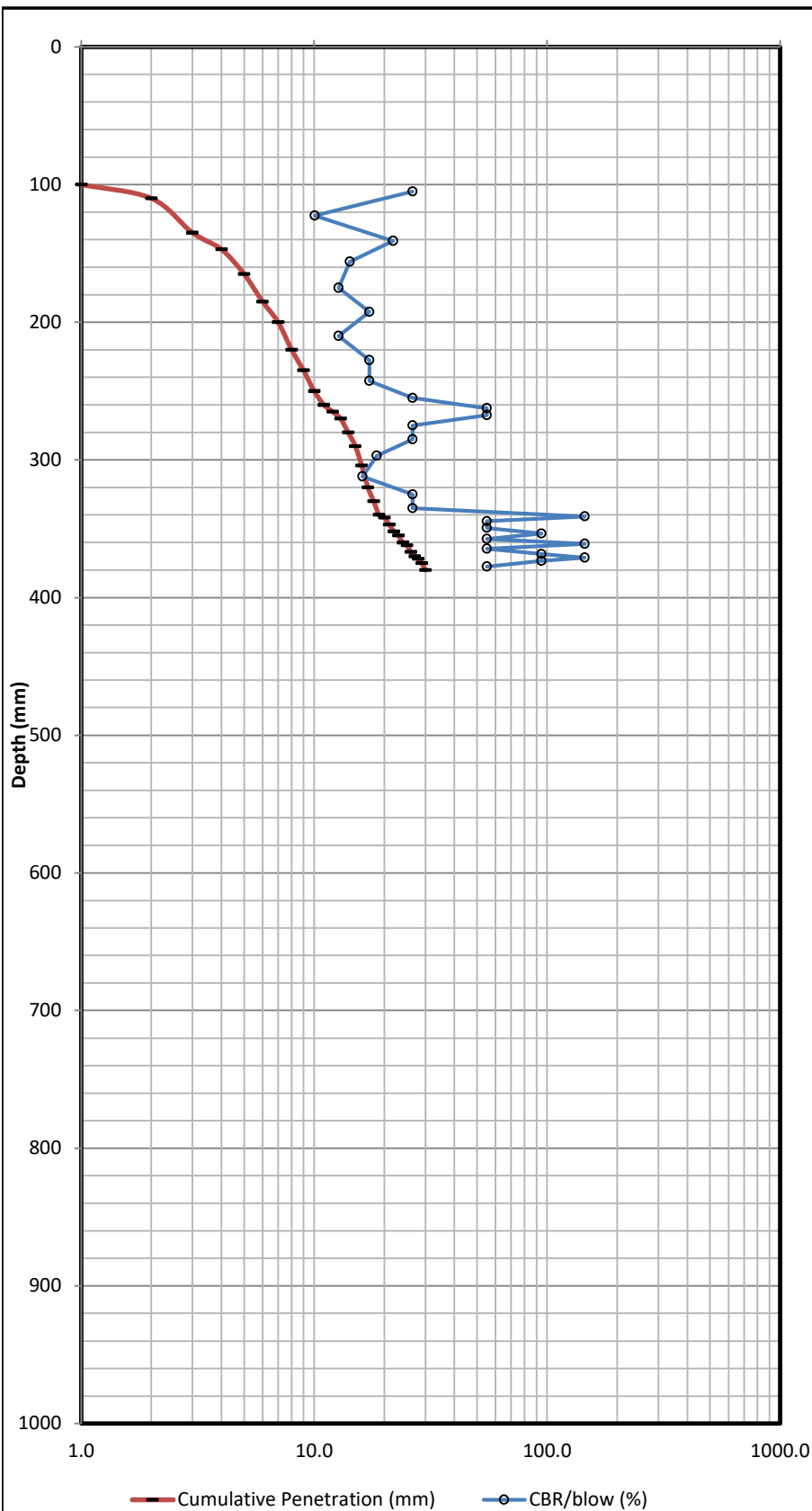
CHALK

End of test

1. 100mm Made Ground removed prior to starting test
2. Test refused at 630mm

Date	22/05/2023
Job Number	P23-2863
Site	Milton Place, Gravesend
Engineer	TB

Location	TP05
	DCP05



Interpreted CBR Value	
100mm Made Ground removed	
Start of Test	
Initial Penetration	
(18.6)	MADE GROUND
End of test	

1. 100mm Made Ground removed prior to starting test
2. Test refused at 380mm