Phase 2

Ground Investigation Report
For former British Airways and Vodafone Plots

Former British Airways and Vodafone Plots, North Hyde Gardens, Hayes, UB3 4QQ

A REPORT PREPARED

FOR AND ON BEHALF OF ARK DATA CENTRES LIMITED

C/O HURLEY PALMER FLATT

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NON-TECHNICAL SUMMARY

KEY INVESTIGATION FINDINGS

	Rationale For The Investigation
1.	The development site is situated within the wider Bulls Bridge Industrial Estate in Hayes, for which Ark Data Centres Limited are the current freeholder. The client, Hurley Palmer Flatt (HPF) on behalf of Ark Data Centres Limited has been appointed as the structural engineer for the development of a data centre and MV energy centre on the former British Airways (BA) plot, and a substation on the former Vodafone plot. Planning permission was granted for this development by the London Borough of Hillingdon under planning reference 75111/APP/2020/1955.
2.	The wider industrial estate comprises five main parcels of land that are referred to throughout this report as: Vodafone, Abellio, British Airways, Addison Lee and FM Conway (Maintenance Yard). Neither the FM Conway or Addison Lee plots are subject to this application and at the time of the investigation access to Abellio was not possible. The access road: North Hyde Gardens is also within the site's demise. The development site is relatively flat with reduced elevations in the eastern part of the site where the River Crane (also known as the Yeading Brook) runs. In addition, the Grand Union Canal is off site and located within 5m of the southern boundary of the Vodafone plot.
3.	Paragon completed a previous Phase 1 and Phase 2 investigation on behalf of Ark Data Centres Limited in 2019 for due diligence purposes. It is understood that the client has full reliance on the data collected in these investigations and relevant information is used and referred to herein. This document has been prepared to discharge Condition 33 for planning ref. 75111/APP/2020/1955. As agreed with the London Borough of Hillingdon, given the above, the approach taken is for Condition 31 to be discharged in connection to the whole site with the exception of the Abellio plot. The overall effect is that Condition 31 will be partially discharged.
4.	The Phase 1 investigation identified the site has a history of being used as a creosote works, an oil fired power station and a former railway. It is also understood from British Geological Survey (BGS) mapping that the site comprises artificial ground which is presumed to be from informal landfilling at the site.
5.	The Phase 2 investigation comprised a series of boreholes, trial pits and hand pits across the wider industrial estate. A second phase of works was then commissioned to assess the footprint of the historical building within the BA plot. The results of these investigations identified asbestos fibres within the Made Ground, marginal exceedances of contaminants within the groundwater and a low risk of ground gas. As such, recommendations were made for an additional stage of work once the site had been purchased, more time available and formal development designs made available. In addition, the report suggested shallow foundations were unlikely to be suitable without significant ground stabilisation works and further investigation would be required once designs are finalised.

6. This report details the additional works completed by Paragon in 2020 which comprised eight boreholes within the BA plot and Vodafone plot, drilled by means of a sonic drilling rig to depths of between 10mbgl and 35mbgl. Chemical testing was undertaken on soils and groundwater, in-situ geotechnical testing including Standard Penetration Tests (SPTs), California Bearing Ratio (CBRs), ex-situ geotechnical laboratory analysis, and four rounds of gas monitoring were undertaken. The results of this work have been compared to the previous investigations to provide a robust dataset for interpretation.

Ground Conditions

7. The British Geological Survey (BGS) mapping for the site identified it is underlain by the Lynch Hill Gravel Member, over the London Clay Formation. The boreholes drilled onsite encountered hardstanding over Made Ground (cohesive and granular lenses) to a maximum depth of 5.8mbgl over Lynch Hill Gravel (cohesive and granular lenses) to 10.2mbgl over London Clay Formation to a maximum drilled depth of (35mbgl). The Lynch Hill Gravel Member was notably clayey in places and only around 1.8m thick on average.

8. The Environment Agency designate the superficial deposits underlying the site, the Lynch Hill Gravel Member, as a Principal Aquifer. The bedrock underlying the site, the London Clay, is designated as unproductive strata. The site is not within a Source Protection Zone.

9. Groundwater was encountered in the Lynch Hill Gravel at around 29mAOD in the centre of the site and closest to the river at 26.76-26.57mAOD. In comparison, the base of the River Crane channel adjacent to the site is around 25.00mAOD based on Environment Agency LiDAR data. Perched groundwater was also encountered in the Made Ground and London Clay.

Environmental Findings

10. The soil and groundwater samples recovered from the boreholes were submitted for laboratory testing for a range of contaminants in line with the historical uses of the site and findings of the previous investigations.

11. The results identified asbestos fibres were present within the shallow Made Ground across the site. The extensive hardstanding mitigates risks to site users in the current site layout, however when construction commences and hardstanding is broken out there will be a potential release of fibres to air. As such, careful management of the soils will be required throughout the construction phase to mitigate risks to construction workers and off-site receptors.

12. The concentrations of Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH) within the groundwater exceeded the Environmental Quality Standards (EQS), which were used to assess the risks to the River Crane/Yeading Brook (considered the most sensitive Controlled Water assessment). As such, additional investigation and remediation is likely to be required as part of the development.

13. The results from the gas monitoring and vapour analysis have identified slightly elevated concentrations of carbon dioxide and methane, and elevated concentrations of the naphthalene in one location. As such, there is a potential gas and vapour risk.

	Geotechnical Findings
14.	Geotechnical design parameters for the strata encountered have been provided. The parameters have been derived based on in-situ and ex-situ tests and published empirical relations. Geotechnical testing has included standard classification testing including plasticity index, moisture content, particle size distribution and strength testing including SPTs, undrained unconsolidated triaxial testing and hand shear vane testing. A design groundwater level has also been derived based on groundwater strikes encountered and monitoring results from the current site investigation. DS and ACEC classifications are also provided for the Made Ground and Lynch Hill Gravel Member.
15.	The recorded groundwater strikes and monitoring results appear to show that groundwater flows towards the Grand Union canal and River Crane/Yeading Brook. A design groundwater level of 29mOD is recommended.
16.	Geotechnical recommendations are summarised below.

RECOMMENDATIONS

	Environmental
1.	The chemical analysis has identified asbestos within the soil and elevated concentrations of TPH and PAH within the groundwater. In addition, a potential gas and vapour risk has been identified. These impacts are considered to relate to the historical development of the site, which has a longstanding industrial legacy as a creosote works and power station. Therefore, to facilitate the future development, the following recommendations are made: • Complete a Detailed Quantitative Risk Assessment (DQRA) to understand the risks to the River Crane/Yeading Brook and provide parameters for remediation purposes; • Consideration of in situ or engineered remediation techniques should the DQRA establish intolerable risks to the surface water courses; • Capping layers in soft landscaped areas; • Gas (methane and carbon dioxide) and vapour resistant membranes within future structures; • Asbestos control measures and materials management; • Personal Protective Equipment; • New pipework; • Piling Works Risk Assessment; and • Remediation and Verification reporting.

	Regulatory
2.	The above recommendations will be incorporated into a Remediation Strategy for the site, which accompanies this report. It is noted that this may be subject to updates / review following the results of any further monitoring or assessment that may be completed as part of the next design phase. However, in the first instance, this report and the separate Remediation Strategy should be submitted to the Local Planning Authority.
	Geotechnical
3.	Given the thickness and variability of the Made Ground and existing obstructions, shallow foundations are not recommended. It is understood that the current design includes a suspended floor slab, supported by piles, but is also in contact with the ground. Geotechnically, casting the floor slabs on the ground is acceptable provided that the slabs are designed to span between the piles and take no reliance on the ground between the piles for support (e.g. they are suspended). If reliance on the ground beneath the supports is required (e.g. the slabs are designed as ground bearing), then vibro compaction/ground improvement should be considered.
4.	Based on the above, and the groundwater levels encountered, it is recommended that all excavations are supported. Mitigation measures should also be provided to control the ingress of groundwater.
5.	A preliminary pile design has been provided based on three pile diameters within the report. Based on the site investigations carried out to date, the ground conditions below the site have been proven to a maximum depth of 35m bgl. Based on Eurocode 7, the pile depth should not exceed the borehole depth -5m, and as such a pile depth of 30mbgl (+1mOD) has been used to calculate potential loads under each pile diameter. Therefore, the approximate loadings for piles with a diameter of 400mm, 600mm, 900mm, 1050mm and 1200mm at a depth of 30mbgl would be 1200kN, 2000kN, 3200kN, 3700kN and 4400kN respectively. These are factored loads in accordance with Eurocode 7 Design Approach 1, combination 2. However, the pile capacities are dependent on the London Clay Formation, the surface of which has been found to vary across the site. This variation should be taken into consideration when finalising the pile length as it will affect the overall capacity. An intermediate level of 23mOD based on the top of the London Clay Formation has been selected for preliminary design. The assumed level of the top of the London Clay is selected as an intermediate value for the provision of an initial pile design; detailed design will need to consider the variation in levels.
6.	Based on the above, the London Clay Formation is considered to be a suitable bearing stratum at this stage. However, this will need to be reassessed once further information becomes available, because, if the loads increase, or the pile diameters reduce, then deeper boreholes would be required as the recommended minimum investigation depth required under Eurocode 7 could exceed the existing site investigation depth.
7.	The record drawings obtained from the Hillingdon Building Control Archives also show a number of obstructions from the historical site development, including the foundation of a chimney stack and pile foundations. In addition, historical construction drawings show that the former building on the BA plot had vibro piles installed below the shallow foundations. It is therefore recommended that a further site investigation be carried out to probe for buried obstructions in the vicinity of proposed locations. The site investigation could be undertaken using a CPT rig during RIBA Stage 3 – Developed Design.

8.	Based on the results of the pH and sulphate testing carried out on samples from the Made Ground and Lynch Hill Gravel Member, the DS and ACEC classification for these strata is DS-2 and AC-2. The DS and ACEC classification for the London Clay Stratum is dependent on the level to which the soil is disturbed and subsequently oxidised. Unweathered London Clay Formation typically contains pyrite, which when oxidised causes an increase the availability of Total Potential Sulphate (TPS). This leads to an increase in sulphate ions, which can reach the concrete and cause sulphate attack. For construction processes that avoid ground disturbance and subsequent oxidisation of the soil (such as precast or cast-in-situ piles) the DS and ACEC classification is DS-2 and AC-1s. For activities such as spread footings constructed in an excavation the classification is DS-4 and AC-3s.
9.	The proposed development is in close proximity to the Crane Valley Sewer, which runs across the site. It is recommended that an impact assessment is carried out for the asset. Guidance is provided in Section 13 regarding the main considerations for the impact assessments.
10.	Along the northern site boundary there is a railway line owned by Network Rail. Given the proximity of the railway line, it is likely that a Category 3 Design Check will be required for activities such as piling, working platforms and tower cranes. It is recommended that Network Rail be consulted to discuss the proposed construction activities.
11.	The Made Ground has been found to be predominantly cohesive and is variable across the site, a design CBR value of 3.5% based on insitu testing would be considered appropriate for initial road and pavement design. Note that proof-rolling or the inclusion of lime/cement in the top surface may improve this value. The roads should be designed in line with Design Manual for Roads and Bridges (DMRB), dated 2020 and Transport and Road Research Laboratory (TRRL) Laboratory Report 1132: The structural design of bituminous roads (dated 1984). Based on a preliminary guide and to account for potential future settlement of the road due to the underlying Made Ground and potentially landfilled material, 150mm subbase plus 350mm capping would be required. In addition, drainage should be managed through offsite routes rather than soakaways onsite to limit the potential for future settlement. Further testing will be required once final designs are prepared.

CONTENTS

PHASE 2 GROUND INVESTIGATION REPORT

CLIENT NAME:	Ark Data Centres Limited c/o Hurley Palmer Flatt
PROPERTY ADDRESS:	Former British Airways and Vodafone Plots North Hyde Gardens, Hayes
INSPECTION DATE:	20 – 29 January 2020

1.0 INSTRUCTIONS

1.1	Paragon Building Consultancy Limited were instructed by Ark Data Centres Limited c/o Hurley Palmer Flatt on 10 January 2020 to complete a Phase 2 Ground Investigation on a site referred to as Former British Airways and Vodafone Plots, North Hyde Gardens, Hayes, UB3 4QQ. The investigation included an intrusive investigation, laboratory analysis and risk assessment. These works have been completed in connection with redevelopment of the site as a data centre with MV energy centre and substation.

2.0 AIMS AND OBJECTIVES

2.1 This report has been prepared to discharge Condition 31(1b) of the planning application ref. 75111/APP/2020/1955 to cover the British Airways and Vodafone plots. The Abellio plot is to be investigated separately. The aims of this report are:

- To provide information on the geotechnical and environmental quality of the ground present onsite to highlight potential risks and abnormal development constraints associated with potential redevelopment of the site.
- To assess the potential health and environmental risks to the potential development and other significant receptors from onsite sources.
- To assess the potential offsite sources of contamination and their impact on the potential development.
- To complete a gas risk assessment.
- Provide provisional geotechnical recommendations in relation to the potential development.

2.2	The objectives of this report are: • To provide ground conditions information and recommendations in relation to the potential future redevelopment of the site. • Characterise the contamination onsite by completing an intrusive site investigation to characterise the site. • To suggest a potential remediation strategy should contamination be identified. • Determine the quality of the ground for geotechnical design by completing a ground investigation.

3.0 SCOPE OF WORKS

3.1	The ground investigation was undertaken in general accordance with the Code of Practice for Site Investigation British Standard BS5930 (2015), Code of Practice for the Investigation of Potentially Contaminated Sites BS10175:2011+A2:2017, Land Contamination: Risk Management (LCRM) 2020. Due regard is made to the Environmental Protection Act (EPA) 1990 Part 2A in connection with the contamination risk assessment and requirements of the National Planning Policy Framework (NPPF).
3.2	This report outlines the results from a second phase of intrusive site investigation works, which have been targeted to allow for conceptual design for the proposed development. Two previous phases of work have been completed by Paragon: A Phase 1 Desk Study and a Phase 2 Site Investigation. • An earlier Phase 1 Preliminary Risk Assessment was previously prepared by Paragon (19.0633/CB/NW, 21 August 2019 – Revised for planning, Rev D – November 2021) and as such this report presents a summary of the findings of that report. It has outlined the potential health and environmental risks identified from desk-based searches including online searches of the historical maps, geological maps, planning records and review of data on the Environment Agency website. A site walkover was completed and an initial Conceptual Site Model (CSM) was presented. • A Phase 2 Site Investigation Report was also undertaken by Paragon (19.0633/CB/AW, 21 August 2019) as part of the acquisition of the site. This comprised the intrusive investigation (drilling boreholes and trial pitting), laboratory testing of soils, groundwater and gas, onsite monitoring and environmental and geotechnical risk assessment.
3.3	In addition, a site investigation was completed by Jomas in 2018 (Jomas Associates Ltd 2018. Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report for North Hyde Gardens, Hayes, UB3 4QR. Dated: May 2018. Ref: P1470J1364/SL). The client was offered sight of this report for informative purposes upon their acquisition of the site. However, there is no reliance on the report and the data has not been used for risk assessment purposes. The report is included in the appendix for information purposes only. In summary, the investigation included drilling 10 boreholes in the British Airways plot only. The works included soil and groundwater sampling, chemical analysis, geotechnical analysis and gas monitoring.

4.0 INTRODUCTION

4.1 Site Location

4.1.1 Previous Phase 1 and Phase 2 investigations have been reported separately by Paragon as referenced above. The original Phase 1 should be read in conjunction with this report; the following is a summary.

4.1.2 The site is centred around National Grid Reference 510423, 179309 and is approximately 6.8Ha. The approximate elevation of the site is 31m Above Ordnance Datum (mAOD). Site information gathered during the preliminary report is summarised below and a Site Location Plan is provided in Appendix 1.

4.1.3 The wider site outlined in the previous investigation comprised five main parcels of land and access roads that are predominantly used for commercial and industrial uses, as shown in Figure 2, Appendix 1 and summarised below.

- Vodafone;
- British Airways (BA);
- Abellio bus garage (Abellio) (not in the red line for this planning application);
- Addison Lee (not in the red line for this planning application); and
- FM Conway (not in the red line for this planning application).

4.1.4 The 2020 investigation by Paragon included drilling boreholes within the Vodafone and BA plots. A summary of each parcel of land is described below.

Table 1. Occupant Descriptions

Occupant	Brief description of site activities
Vodafone	The building on the Vodafone plot has now been demolished. At the time of the Phase 2 investigation the plot comprised a detached office block arranged over three floors with a reception atrium at ground floor and a roof terrace at 3rd floor level. At the time of the fieldwork the building was vacant and has recently been occupied by travellers. There was a redundant diesel powered generator on site, which has now been removed.
British Airways	The building onsite was demolished in 2019 and this area is an open area of land with a large stockpile of crushed concrete in the centre.

4.1.5 The River Crane (also known as the Yeading Brook) runs within the wider site boundary, along the southeast boundary and north through the northeast part of the site (Conway's plot). The Grand Union Canal is off site and located within 5m of the southern boundary of the site.

4.1.6 Vegetation was noted along the banks of the River Crane, which made access difficult in that area. A chain link fence was noted at points along the channel.

4.1.7 The current investigation (January 2020) included additional testing of the ground within the BA plot and the Vodafone plot only.

4.2	**Proposed Development**
4.2.1	It is our understanding that a Phase 2 Ground Investigation Report is required to provide additional preliminary data on existing contamination, ground gas and geotechnical conditions at the site to facilitate the development of a data centre and MVenergy centre on the former BA plot and a substation on the Vodafone plot.
4.2.2	A preliminary drawing of the data centre has been provided by the client for guidance, however we understand this may be subject to change. It is understood that the maximum date centre pile loads may be in the order of 4,000kN (ULS).
4.2.3	The development proposals include site clearance and preparation, including the demolition of remaining buildings, and the redevelopment of the site to provide: a new four storey data centre, two open sided MV Energy Centres, a HV Sub-Station, a visitor reception centre, plant, the creation of a new footpath and cycleway link to the canal towpath, works to the highway, car parking, cycle parking, associated infrastructure, enclosures and necessary physical security systems, hard and soft landscaping (including works to the River Crane) and ancillary uses, as well as associated external works.
4.2.4	Proposed development plans have been provided by the client and are included in Appendix 1.
4.3	**Planning**
4.3.1	Planning permission has been granted by the London Borough of Hillingdon under planning reference. 75111/APP/2020/1955.
4.4	**General Description and Current Site Use**
4.4.1	At the time of the original Phase 1 and Phase 2 due diligence investigation, the former BA building was in the process of being demolished. At present, the demolition had been completed which has created a large, flat open area of land with a stockpile of crushed concrete. The BA plot is surrounded by North Hyde Gardens to the south, the River Crane/Yeading Brook to the east, a railway to the north, and Addison Lee car garage to the west.
4.4.2	The buildings on the Vodafone plot have now been demolished. At the time of the survey the plot comprised a single office building, with car park, generator with above ground fuel storage tank (AST) and bin store. The generator and AST were located in the northeast part of the Vodafone plot. The tank was situated within a building. The external areas comprised an asphalt surfaced car park with paving and minor areas of planted vegetation along the site's boundary. The eastern part of the Vodafone plot slopes down to the River Crane/Yeading Brook and is covered with dense vegetation. In addition, the Parkway flyover is located east of the river. The Vodafone plot is surrounded by North Hyde Gardens to the north, a vehicle maintenance yard to the east, the Grand Union Canal and tow path to the south.

4.5 History

4.5.1 The earliest available map from 1865 shows the site as mostly vacant with a river running north to south along the eastern part of the site. This map also shows a railway and creosoting works in the northeast corner. Excavations and ground workings were noted from 1910. By 1932, the creosoting works had extended onto the site and a building was shown in the centre. The creosoting works were no longer shown by 1973 and a power station with chimney was shown in the western part of the site by 1983. By 2002, the power station was no longer shown and the British Airways building were shown. The Vodafone building was shown by 2010. A review of planning applications indicate that no environmentally significant conditions were attached to the application to redevelop the site in 1998.

4.5.2 The surrounding area has supported various industrial (potentially contaminative) land uses, including factories, brick fields, mills, railway, electricity substation, creosoting works, and rubber works.

4.5.3 Historical landfilling has been identified on site and east of the River Crane/Yeading Brook since 1936 and records indicate the landfill accepted commercial waste. In addition, the British Geological Survey (BGS) artificial ground mapping covers the entire site.

4.6 Geology

4.6.1 From a review of BGS mapping (255, 256, 269, and 270), the geology of the subject site is reported to comprise of the Lynch Hill Gravel underlain by the London Clay Formation. The mapping also shows Artificial Ground, Langley Silt and Alluvium within 50m of the site. The Alluvium runs in the location of the river with deposits shown to be absent either side of the river. This is likely to be due to the slope on either bank. The Langley Silt may encroach onto the southern part of the site.

4.6.2 The surrounding area is known for being historically mined to extract the gravel. As such, there are many landfills and reservoirs in this area. It is therefore possible that the gravel deposits were largely extracted which allowed the landfilling to occur.

4.6.3 The results from the Preliminary Phase 2 Due Diligence Investigation are presented in Table 2 below.

Table 2. Ground Conditions

Depth From (min/max) (m)	Depth To (min/max) (m)	Soil Type	Description
Ground level	0.10 / 0.50	Hardstanding	Concrete
Ground level	0.20 / 0.35	Topsoil	TOPSOIL. Grass over brown clayey, slightly gravelly Sand. Sand is fine to medium. Gravel is fine to medium flint.
Ground level / 0.15	0.75 / 5.00	MADE GROUND	MADE GROUND. Comprising black sandy Gravel of fine to coarse, angular to sub-angular brick, flint and clinker. Organic odour noted in some boreholes.
1.15 – 3.60	2.75 – 4.00	SAND / GRAVEL	Grey, black, orangish brown, sandy GRAVEL. Sand is coarse, gravel is angular to sub-rounded flint. (Lynch Hill Gravel)
0.75 / 3.60	5.00	GRAVELLY CLAY	Black and green gravelly CLAY. Gravel comprised fine to coarse flint. The clay was described as peat in TP3 between 1.70 and 2.75. (Reworked Lynch Hill Gravel and Alluvium)

4.6.4 The geology across the site comprised Made Ground beneath hardstanding that was a black, sandy gravel with brick, flint and clinker. The Made Ground was underlain by Alluvium, Langley Silt and Lynch Hill Gravels. The investigation did not encounter the London Clay, which is likely to be found at depths greater than 6m bgl. An area of peaty clay was identified in TP3 between 1.70m and 2.75m bgl, this may be part of an alluvial deposit or deposited within the landfill.

4.6.5 By reviewing the logs from various phases of investigation, the Made Ground has been found to vary significantly across the site. The desk study has indicated that the site was historically a landfill with industrial and commercial wastes being placed up to circa 1936. It is considered likely that the landfilling occurred as a result of gravel abstraction which was common place in the surrounding area. The deepest areas of Made Ground were identified within the west and southern parts of the site, although it is noted that a number of exploratory holes in Paragon's preliminary Phase 2 Site Investigation did not fully penetrate the Made Ground. Furthermore, buried obstructions led to refusals at shallow depths.

4.6.6 The Made Ground was predominantly underlain by Lynch Hill Gravel which was generally a granular material described as a grey, black, orange brown, sandy gravel. Sand was found to be coarse and gravel was angular to sub-rounded flint. However, in some areas cohesive deposits were encountered directly beneath the Made Ground. These were found in areas where shallow Made Ground was present and could have represented materials that were not economically viable to abstract. These cohesive deposits have also been interpreted as Lynch Hill Gravel and were generally described as a brown clayey gravel. Example exploratory holes of where the cohesive Lynch Hill Gravel was encountered include TP4, TP5 and WS02.

4.7 Hydrogeology

4.7.1 The Lynch Hill Gravel is classified as a Principal Aquifer of high permeability and the London Clay Formation is classified as an Unproductive Stratum. The previous investigation identified groundwater levels between 1.80mbgl and 4.90mbgl within the Made Ground and Lynch Hill Gravel and identified the direction of flow was generally towards the Yeading Brook/River Crane.

4.7.2 The site is not situated within a Groundwater Source Protection Zone (SPZ).

4.7.3 There is one licensed groundwater abstraction within 1km of the subject site. This is located approximately 530m southeast of the site for evaporative cooling by Virtus Hayes Limited.

4.8 Hydrology

4.8.1 The River Crane/Yeading Brook runs southwards through the eastern part of the site. The Grand Union Canal is located 10m south of the site and runs eastwards. No surface water abstractions have been identified within 1km of the site.

4.8.2 There are three discharge consents within 250m of the site. These relate to records approximately 10m north for miscellaneous discharge to land, 85m south and 95m south of the site from trade discharges to the River Crane/Yeading Brook.

4.9	**Flooding**
4.9.1	Predominantly within Flood Zone 1 but with all parts of the site adjacent to the River Crane within Flood Zone 2 and Flood Zone 3.
4.9.2	Ark Data Centres Limited commissioned a separate Flood Risk Assessment and Sustainable Urban Drainage Strategy (SUDS), which should be reviewed for comments on flood risks.
4.10	**Regulatory Enquiries**
4.10.1	The Local Authority has not been contacted by Paragon at this time. However, it is considered unlikely that the site is currently designated as contaminated land under the provisions of the EPA 1990 Part 2A. No planning application has been lodged at this time, however, it is intended that this report be submitted in support of a planning application for the site.
4.10.2	The Environment Agency has not been contacted by Paragon as part of this assessment at this stage.
4.11	**Environmental Database Information**
4.11.1	No Areas of Outstanding Natural Beauty, Environmentally Sensitive Areas, Sites of Special Scientific Interest or Special Protection Areas have been identified within a 1km radius of the site.
4.12	**Ground Stability Hazards:**
4.12.1	Records indicate that the area in general has a moderate risk of subsidence hazards as a result of shrinking/swelling of underlying clay.
4.12.2	The site is not located in a coal affected area.
4.13	**Unexploded Ordnance (UXO)**
4.13.1	Online information indicates that there were several bomb strikes recorded around the site during World War II. As such, a specialist assessment was undertaken by Brimstone Site Investigation Limited and comprised a Stage 2 Detailed UXO Risk Assessment (Dated: 3 July 2019, Ref DRA-19-1105) to identify constraints on the proposal. This has been reported separately and a summary is provided below.
4.13.2	The report reviewed the original London bomb plot maps covering the entire German bombing campaign. The data confirmed the wider study area was bombed on at least eight separate occasions, resulting in 29 large ‘iron’ bombs and one parachute mine within 500m of the site. One ‘iron’ bomb strike is located within the site boundary. In addition, no records were made for the first month of the 1940 Blitz and areas of soft landscaping would disguise entry points and be unobserved. As such, there is the potential for more unidentified bombs to be present.
4.13.3	The risk assessment within the report suggests that the construction of the power station may have required deep foundations, and as such UXO could have been encountered and removed. However, in other undeveloped areas of the site, buried German dropped bombs would likely remain in-situ.

4.13.4 The report concluded there was a low to moderate risk from UXO and recommended mitigation measures. The risk mitigation measures included UXO safety awareness briefings, onsite supervision during excavations in the southern part of the site and a magnetometer probe survey if piling is to be implemented.

4.14 Radon

4.14.1 The site is not located within a radon affected area. Less than 1% of homes are above the radon Action levels, as such, no radon protection measures are considered necessary.

4.15 Constraints

4.15.1 The previous due diligence investigation was constrained by UXO, utilities and demolition. Notably the Crane Valley Sewer has been identified onsite and runs northeast/southwest through Vodafone, British Airways and part of FM Conway's Maintenance Yard. An inspection cover was opened within the Vodafone plot which identified a deep inspection chamber with multiple levels and water level at around 10m below ground level. We understand the client is commissioning a survey of the sewer under separate cover, however, this has not been received at this juncture.

4.15.2 Paragon identified concrete obstructions beneath the hardstanding. Once the slab has been excavated, additional clearance of below ground obstructions may be required to form a suitable formation level.

5.0 PRELIMINARY CONCEPTUAL SITE MODEL

5.1 Conceptual Site Model (CSM)

5.1.1 A CSM, based on the results from the preliminary Phase 2 investigation, is presented in Table 3 below. The model is based upon the source-pathway-contaminant linkage concept set out in the Environmental Protection Act 1990 and accompanying statutory guidance. For a site to be designated under Part 2A of the EPA 1990 as contaminated land, there must be at least one plausible contaminant linkage and a significant risk to the receptor must exist as a result.

Table 3. Revised Conceptual Site Model

Receptor	Potential sources	Pathways	Risk	Justification
Human Heath				
Construction and maintenance workers / Users of the site	Organic and metal contamination	Direct contact, ingestion, and inhalation via outdoor soils or translocated soil and dust indoors.	L M	**Low to Moderate risk:** Ingestion, inhalation and dermal contact with contaminated soils in excavations or stockpiles cannot be discounted. Personal Protective Equipment (PPE) and Risk Assessments and Method Statements are required.
	Ground gas and vapours	Inhalation, Migration through granular and fractured soils into confined spaces.	L M	**Low to Moderate risk:** Inhalation of vapours from contaminated soils or groundwater below the site cannot be discounted due to the historical use of the site and the extent of previously untested areas.

Future site users	Organic and metal contamination in soils and groundwater	Direct contact, ingestion, and inhalation of outdoor soils or translocated soil and dust indoors.	L M	**Low to Moderate risk:** Inhalation of vapours from contaminated soils or groundwater below the site.
	Ground gas and vapour	Inhalation, migration through granular and fractured soils into confined spaces.	L M	**Low to Moderate risk:** Inhalation of vapours from contaminated soils or groundwater below the site cannot be discounted.
Offsite Residents (250m southwest)	Organic and metal contamination in soils, groundwater and gas	Direct contact, ingestion, and inhalation of outdoor soils or translocated soil and dust indoors.	L	**Low risk:** Residents 300m southwest are unlikely to be at risk form contaminants arising from the site as they will be cut off by the Grand Union canal. The likelihood for migration to properties a similar distance to the northwest is minimal given the considerable distance to the properties and several other areas of industrial land in between.
Property				
Site structures and services	TPH in site soils	Direct contact between soil and structures or services.	L	**Low Risk:** Direct contact of building materials including foundations and buried services with contaminated soils and groundwater is low as testing did not find any significant TPH.
	Ground gas and vapour	Migration through granular and fractured soils into confined spaces.	L M	**Low to Moderate risk:** Initial readings suggest that there is the potential for migration of gases through soil pore space and to the surface from underlying Made Ground and historical ground workings cannot be discounted.

5.1.2 ***Table 3. Revised Conceptual Site Model. (Continued)***

Receptor	Potential sources	Pathways	Risk	Justification
Property				
Plants /Landscaping	Metals and organic contamination in soils	Root contact and uptake	L	**Low risk:** The risk from root uptake of phytotoxic contaminants within the underlying soils is low.
Adjacent Property				
Building fabric of adjacent properties	Metals and organic contamination in soils	Soil leaching and migration and translocation as dust of soil contamination.	L	**Low risk:** Direct contact of building materials including foundations and buried services with contaminated soils and groundwater is low based on the low level of contaminants identified.
Groundwater				
Principal Aquifer	Metals and organic contamination in soils	Soil leaching and migration of potential soil contamination.	L M	**Low to Moderate risk**: Exceedances of the EQS and DWS have been identified in groundwater and leachate, however there are no abstractions within the vicinity of the site and the site is not located within a source protection zone. Gross contamination was not identified within the soils or leachate and it is likely that contaminants identified are localised and could be a result of landfilling or offsite sources.

Surface Waters				
River Crane/Yeading Brook (onsite) Grand Union Canal (5m south)	Leachable metals and organic contamination	Soil leaching and migration into drains and sewers which discharge into the ditch.	L M	**Low to Moderate risk:** The drainage survey has identified a need for oil interceptors to be installed due to the potential for oil to drain into the river. In addition, exceedances of the EQS and DWS have been identified from groundwater analysis, however there are no abstractions within the vicinity of the site and the site is not located within a source protection zone. Gross contamination was not identified within the soils or leachate and it is likely that contaminants identified are localised and could be a result of landfilling or offsite sources.

5.2 Key Environmental Risks Requiring Further Investigation

5.2.1 Further investigations were deemed to be required in order to determine the risk (if any) from potential soil and groundwater contamination and to provide preliminary information on ground conditions in relation to the proposed redevelopment of the site.

5.2.2 The Preliminary Phase 2 Due Diligence Investigation by Paragon comprised two phases of work with a total of 36 exploratory holes including windowless sample boreholes, machine excavated trial pits and hand excavated pits. Soil samples were collected, and geochemical and geotechnical testing was undertaken at dedicated laboratories. The results of the testing identified chrysotile asbestos fibre bundles within the Made Ground and marginal exceedances of assessment criteria within groundwater. Based on these results, Paragon concluded that there was potential for these contaminants within the groundwater to migrate to the nearby River Crane/Yeading Brook and Lynch Hill Gravel Aquifer. Further investigation was therefore recommended to confirm whether contaminants exist on site at concentrations high enough to cause harm to the receptors identified within the CSM.

5.2.3 Furthermore, the results from the gas monitoring visits carried out to date indicate the site falls within Characteristic Situation 2 (low risk) whereby some degree of protective measures are likely to be required under BS8485:2015. However, the earlier investigation only completed a limited number of monitoring visits and additional gas monitoring was required to confirm the gas regime.

5.2.4 In addition, based on the presence of asbestos fibres, where large excavations are open and soils is being screened, the requirement for an environmental management plan was highlighted to ensure asbestos is controlled and risks to site users, construction workers and off-site receptors are mitigated. Where surplus Made Ground is present in areas of proposed soft landscaping, it was highlighted that this would need to be removed and replaced with a clean cover system.

6.0 GEOTECHNICAL RISK ASSESSMENT

6.1 Risk Assessment

6.1.1 The Phase 1 and Phase 2 investigations identified potential geotechnical hazards which have been summarised in Table 4.

Table 4. Geotechnical Risk Assessment

Hazard	Risk Rating	Rationale
Made Ground	M	Made Ground has been identified onsite and is considered to be due to historical landfilling at the site. Due to the highly variable nature of the Made Ground identified, foundations of the proposed development are likely to require deepening to ensure that a suitable bearing stratum is identified.
Collapsible / Unstable Excavations	M	Due to the presence of Made Ground, there is the potential for excavations to be unstable and prone to collapse. An allowance for shoring should be considered during groundworks.
Shallow Groundwater	M	Groundwater levels have been identified to range between 1.80mbgl and 4.90mbgl. In addition, the River Crane/Yeading brook are situated in the eastern part of the site. As such, there is the potential for shallow groundwater to impact the stability of excavations and as such dewatering may be required.
Compressible strata	M	Made Ground, Alluvium and clay soils have been identified onsite which indicate foundations will require deepening to a competent bearing stratum.
Aggressive ground conditions for concrete	M	There is the potential for naturally occurring sulphate within the natural soils or Made Ground to produce ground that is aggressive to concrete. Current test results indicate the Design Class for the Made Ground would be DS-2 AC-2. No data is currently available for the London Clay, and as such further assessment is required.
Dissolution	L	The site is unlikely to be affected by dissolution.
Landslide	L	The topography of the site is relatively flat and the risk of landslides is low.
Mining	L	The site has not been identified as being at risk of historical mining.

6.2 Key Geotechnical Risks Requiring Further Investigation

6.2.1 The relevant British Geological Survey (BGS) map shows subject site is underlain by the Lynch Hill Gravel and the London Clay Formation. The mapping also shows Artificial Ground, Langley Silt and Alluvium within 50m of the site. However, the ground conditions onsite identified concrete hardstanding or topsoil over Made Ground to ca. 5.00mbgl, over sand and gravel of the Lynch Hill Gravel to ca. 4.00mbgl or, a gravelly clay which is likely to be reworked fill of Lynch Hill Gravel and Alluvium.

6.2.2 Due to the thickness of Made Ground shallow foundations may not be appropriate and a piled foundation solution may be a more viable option. As such a suspended floor slab is likely to be needed and obstructions beneath the hardstanding may require removal prior to piling. However, ground improvement measures could be considered to reduce costs, although this would require significant groundworks, excavations, screening and potentially import of gravel. Since the Preliminary Phase 2 Due Diligence investigation completed by Paragon, the approximate loadings of the new development have been made available. It is understood that current maximum data centre pile loads may be in the order of 4,000kN (ULS). As such, further testing was required to provide information for the structural engineer’s pile design. Furthermore, in relation to the sewer, deeper boreholes in the proximity of the sewer are required to identify a potential bridged pile solution (subject to a build over agreement being put in place).

6.2.3 Reference to BRE Special Digest 1 and the sulphate test results indicates the results from the Made Ground fall within Design Sulphate Class DS-2 AC-2, although additional testing would be required to confirm this. In addition, due to the lack of data from the London Clay, additional sulphate testing is required.

6.2.4 Due to inherent variability of the Made Ground a CBR value of 2% is recommended for preliminary road and pavement design purposes based on TRRL guidance. Further testing should be completed to provide a more robust CBR value for design.

7.0 GROUND INVESTIGATION

7.1 Investigation Rationale

7.1.1 The objectives for the investigation were to identify and characterise the ground conditions, the sources, pathways and receptors (in general accordance with the Environmental Protection 1990 Part 2A), to reduce uncertainties and to provide an overview of site conditions. Details of the site methods are presented in Appendix 3.

7.1.2 The ground investigation was undertaken in general accordance and with reference, where relevant to the following documents:

- Specification for Ground Investigation, Site Investigation Steering Group, Thomas Telford, 1994;
- British Standard BS10175:2011 (A2) Investigation of potentially contaminated sites – code of practice, as amended;
- Environment Agency (2000) Secondary model procedures for the development of appropriate soil sampling strategies for land contamination. Technical Report P5-066/TR; and
- BS IS0 5667-22:2010 Water quality. Sampling. Guidance on the design and installation of groundwater monitoring points.

7.1.3 The intrusive investigation was specified by the client and was completed between 13 and 22 January 2020 and comprised a total of nine exploratory holes, located to provide geotechnical parameters in targeted locations onsite. In addition, boreholes were drilled in the eastern part of the site to allow for further chemical testing to assess the risks to the river. This included:

- 2 boreholes drilled using a sonic drilling rig to 35mbgl for geotechnical testing;
- 4 boreholes drilled using a sonic drilling rig to 15m for geotechnical testing;
- 2 boreholes drilled using a sonic drilling rig to 10m for chemical testing;
- 10 CBR tests at 0.5mbgl by Plate Bearing Tests using a JCB as a reactive load;
- Geotechnical laboratory testing (in situ Standard Penetration testing (SPTS) and ex situ sampling for laboratory testing;
- Geoenvironmental laboratory testing commensurate with the findings of the CSM; and
- 4 groundwater and ground gas monitoring visits.

7.1.4 A site plan showing the locations of each exploratory hole is provided in Appendix 1.

7.2 Monitoring Wells

7.2.1 Combined ground gas and groundwater wells were installed in the boreholes as outlined below. Full details of the installations are also provided on the borehole logs presented in Appendix 4.

Table 5. Monitoring Well Installation Details

	Level (mAOD)	Extent of borehole (m)	Plain Well Section (m)	Slotted Well Section (m)	Bentonite Seal (m)
BH01	31.50	35.0	No install required by client.		
BH02	30.75	15.0	0.0 – 4.6	4.6 – 6.3	0.0 – 4.6
BH03	31.40	15.0	No install required by client.		
BH04	31.30	35.0	No install required by client.		
BH05	31.25	15.0	No install required by client.		
BH06	29.90	15.0	No install required by client.		
BH07	30.85	10.0	0.0 – 1.0	1.0 – 6.0	0.0 – 1.0
BH08	31.40	10.0	0.0 – 4.5 0.0 – 9.0	4.5 – 6.0 9.0 – 10.0	0.0 – 4.5 0.0 – 9.0

7.3 Sampling and Testing Strategy

7.3.1 Soil samples were collected from the Made Ground and natural strata. Samples were submitted for geochemical and geotechnical testing in general accordance with relevant versions of BSEN ISO 17892-6:2017, BSEN ISO 14688-1:2002, and BSEN 1997-2:2007. Environmental samples were submitted under controlled conditions with a Chain of Custody to i2 Analytical, a UKAS and MCerts accredited facility.

7.3.2 Environmental soil samples were tested for a suite of testing considered commensurate with the risks identified in the Phase 1 report:

- Heavy metals including; arsenic, cadmium, chromium (total and VI), copper, lead, mercury, nickel, selenium, and zinc;
- Cyanide;
- Phenols;
- Petroleum Hydrocarbons (PHC) – Total Petroleum Hydrocarbons Criteria Working Group (TPH-CWG);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Polyaromatic Hydrocarbons (PAH) – Speciated 16;
- Asbestos screen and identification; and
- Total Organic Carbon (TOC), Sulphates and pH.

7.3.3 Monitoring wells were installed within BH02, BH07 and BH08. Groundwater samples were recovered using Waterra bailers and submitted for analysis of the parameters set out below.

- pH, electrical conductivity, total organic carbon, nitrates, sulphates, dissolved oxygen, hardness, turbidity, dissolved solids and suspended solids;
- Ammoniacal nitrogen;
- Heavy metals including; arsenic, cadmium, chromium (total and VI), copper, lead, mercury, nickel, selenium, and zinc;
- Cyanide;
- Phenols;
- Petroleum Hydrocarbons (PHC) – Total Petroleum Hydrocarbons Criteria Working Group (TPH-CWG);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Polyaromatic Hydrocarbons (PAH) – Speciated 16; and
- Volatile Organic Compounds and Semi-Volatile Organic Compounds.

7.3.4 The results of the environmental laboratory testing are provided in Appendix 7.

7.3.5 Boreholes were monitored for ground gas using a Photoionisation Detector (PID) and hand held gas analyser and the ground water level was monitored using an interface meter. Groundwater samples were collected using bailers. The results of the monitoring are presented in Appendix 8.

7.3.6 Geotechnical testing included:

- Atterberg testing with natural moisture content;
- Particle Size Distribution;
- Undrained Triaxial Test; and

Sulphates and pH (BRE SD1).

7.3.7 The results of the geotechnical testing are presented in Appendix 9.

8.0 GROUND CONDITIONS

8.1 General

8.1.1 The ground conditions are described in detail in the logs that are presented within Appendix 4. A summary of the ground conditions is also presented below in Table 6.

8.1.2 ***Table 6. Summary of Ground Conditions***

Depth From (min/max) (m)	Depth To (min/max) (m)	Soil Type	Description
0.0	0.1 / 0.05	Concrete / Tarmacadam	Concrete / Tarmacadam hardstanding
0.05 / 0.1	1.5 / 5.8	Made Ground	Variable Made Ground comprising soft to firm, dark brown, gravelly clay. Gravel is brick, suspected slag, clinker, timber fragment, concrete and mixed lithologies.
1.5 / 5.8	5.7 / 10.2	Gravel	Yellowish orange brown sandy GRAVEL. Gravel is sub-rounded to well-rounded fine to coarse mixed lithologies. Lynch Hill Gravel
5.7 / 10.2	Unproven	Clay	Firm to stiff silty CLAY. London Clay

Olfactory and Visible Evidence of Contamination

8.1.3 The olfactory and visible evidence of contamination is outlined in Table 7.

8.1.4 ***Table 7. Summary of Olfactory and Visible Evidence of Contamination***

BH No.	Depth (m bgl)	Comments
BH02	1.5	Black stained timber fragment and slight hydrocarbon odour
BH02	1.8	Hydrocarbon sheen
BH04	2.7	Black stained timber fragment and slight hydrocarbon odour
BH04	3.7 – 4.0	Stained grey
BH04	5.0 – 5.05	Hydrocarbon sheen and slight odour
BH08	5.5 – 6.2	Strong hydrocarbon odour and staining.

8.2 **Groundwater**

8.2.1 Groundwater strikes were recorded in the following boreholes during drilling.

8.2.2 ***Table 8. Summary of Groundwater Strikes***

BH No.	Groundwater Depth During Drilling 20 – 27 January 2020 (m bgl) [mOD]	Stratum	Rate of Ingress
BH01	4.0 [27.5]	Made Ground	Slow Ingress
	6.5 [25.0]	Lynch Hill Gravel	Moderate Ingress
	13.5 [18.0]	London Clay	Fast Ingress
BH02	3.0 [27.75]	Made Ground	Very Slow Ingress
	6.2 [24.55]	London Clay	Fast Ingress
BH03	1.5 [29.9]	Made Ground	Very Slow Ingress
	6.0 [25.4]	Lynch Hill Gravel	Fast Ingress
BH04	1.5 [29.8]	Made Ground	Fast ingress
BH05	1.5 [29.75]	Made Ground	Fast ingress
BH06	6.0 [23.9]	London Clay	-
BH07	7.0 [24.85]	London Clay	-
BH08	6.0 [25.4]	Lynch Hill Gravel	-

9.0 GEOTECHNICAL RESULTS

9.1 General

9.1.1 The geotechnical laboratory and in-situ test results from the latest site investigation are summarised in Table 9 and Table 10. The geotechnical results can be found in Appendix 9.

9.1.2 ***Table 9. Summary of Geotechnical Classification Testing Results***

Stratum	Particle Size Distribution (%)			Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
	Clay and Silt	Sand	Gravel				
Made Ground	23.6 to 89.4	9.3 to 25.3	1.3 to 51.2	13 to 43	45 to 70	20 to 30	23 to 66
Lynch Hill Gravel Member	2.5 to 6.4	37.9 to 41.3	55.7 to 56.2	-	-	-	-
London Clay	49.4[a]	5.5[a]	45.1[a]	22 to 31	65 to 74	25 to 31	37 to 45

Results obtained from BH02 at 9m depth. Results are not typical of the London Clay based on borehole records.

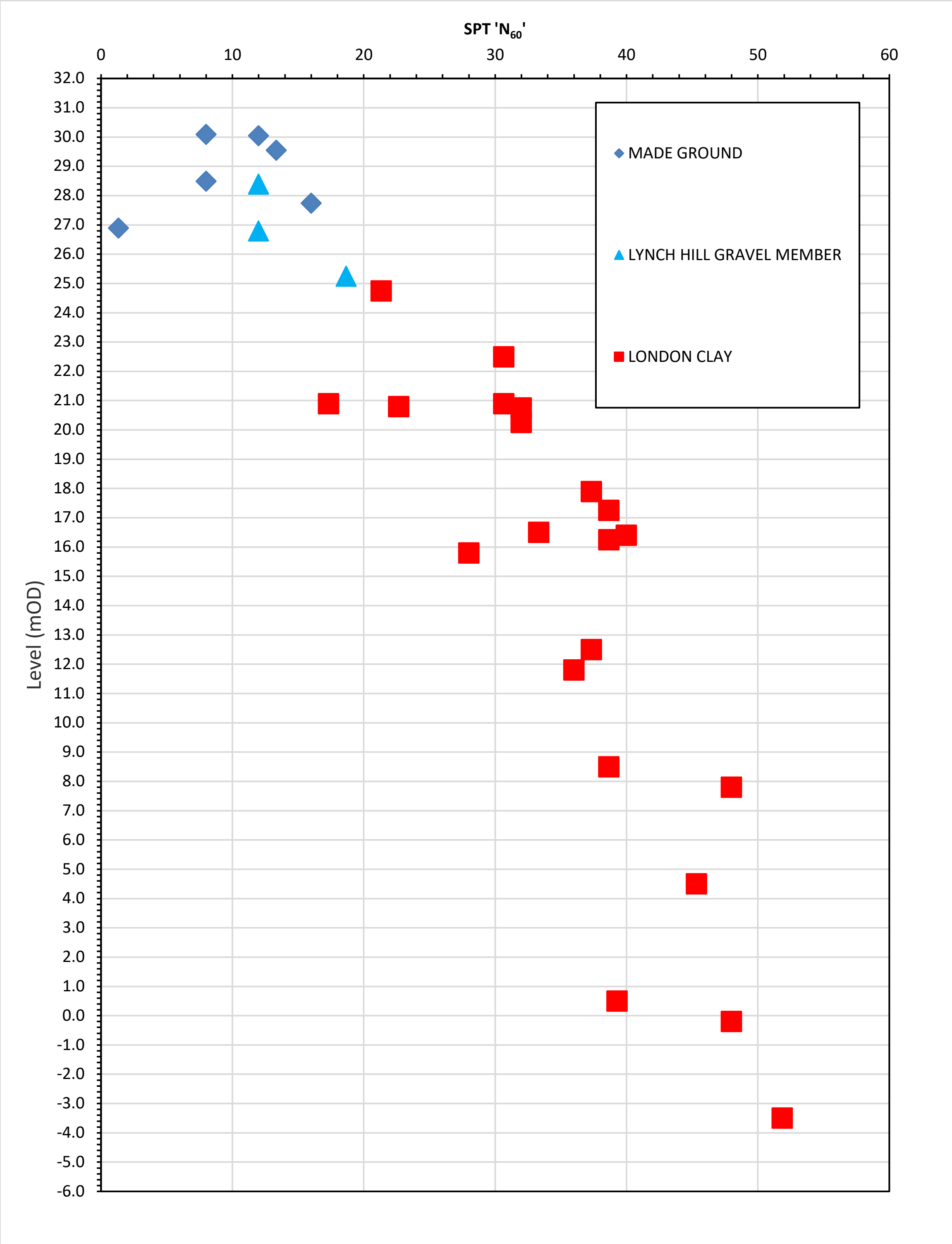
9.1.3 ***Table 10. Summary of In-situ and Laboratory Strength Testing***

Stratum	SPT N_{60} Value	Undrained Unconsolidated Triaxial Results (kPa)	Hand Shear Vane (kPa)
Made Ground - Cohesive	1 to 16	-	-
Made Ground - Granular	8 to 12	-	-
Lynch Hill Gravel Member - Cohesive	12	-	81 to 120[a]
Lynch Hill Gravel Member - Granular	12 to 19	-	-
London Clay	17 to 52	14 to 234	48 to 120[a]

Hand shear Vane limited to 120kPa

9.1.4 A plot of SPT 'N_{60}' values against elevation level is presented in Graph 1. The SPT 'N_{60}' values were obtained by converting the 'N' values based on the SPT hammer energy report, which can be found in Appendix 4, which states the hammer has an 80% energy efficiency.

9.1.5 ***Graph 1. SPT 'N60' value against level***



9.1.6 The results of the sulphate testing are presented in Table 11. Sulphate testing was undertaken to assess the risks from aggressive ground on buried concrete. Based on the results the Design Sulphate Class for Made Ground and Lynch Hill Gravel Member would be DS-2, AC-2. The Design Sulphate Class for the London Clay soil would be DS-2, AC-1s.

9.1.7 ***Table 11. Design Sulphate (DS) classification for encountered soil strata***

Stratum	pH	Water Soluble Sulphate as SO_4 (2:1) mg/l	Total Sulphur (mg/kg)	Oxidisable Sulphides (OS % SO_4)	Design Sulphate (DS) Class [ACEC]
Made Ground	7.2 to 8.8	28 to 960	-	-	DS-2 [AC-2]
Lynch Hill Gravel Member	7.2 to 7.9	29 to 510	-	-	DS-2 [AC-2]
London Clay Formation	8.5 to 8.9	280 to 850	3200 to 13000	0.906 to 3.74	DS-2 [AC-1s]

9.1.8 Plate bearing Tests were undertaken to calculate the California Bearing Ratio (CBR) for the Made Ground by digging a trial pit to 0.5mbgl, using a plate with a diameter of 0.3m and an applied pressure of between 3kN/m^2 and 482kN/m^2 using the JCB as a reactive load. The results are presented in Appendix 6. The CBR results ranged between 25% and 89%.

10.0 GEOENVIRONMENTAL RESULTS

10.1 Analytical Test Results

10.1.1 Chemical testing was completed on soil and water samples from the 2020 investigation to determine the concentration of potential contaminants arising from existing and historical site uses, in line with the Conceptual Site Model. The results of the environmental testing of the soil samples retrieved from the 2019 has also been used to increase the dataset and provide representative coverage. The results are presented in a screening table in Appendix 7 and summarised below. The laboratory test certificates are also provided in Appendix 7.

10.1.2 The results of the soil and groundwater analysis have been compared to a screening value to determine whether contamination has occurred. Where possible, a statistical assessment has been carried out based on the methodology set out in CIEH report 2008: Guidance on comparing Soil Contamination Data with a Critical Concentration. The statistical assessment has involved calculating the upper confidence level (U95 value) which is compared with the mean of the dataset. The U95 is the level at which we would be 95% confident that the true mean is less than the screening value. Statistical analysis has been undertaken on populations of 6 or more.

10.1.3	An assessment for outliers has also been undertaken, however these have not automatically been removed from the dataset. The CIEH (2008) guidance notes that outliers should be excluded from a dataset where they are the result of an error that can be identified and explained, or indicate that more than one soil population exists. If during the assessment, an outlier has been suspected, this has been presented and discussed separately.
10.2	**Analytical Test Results – Made Ground Soils**
10.2.1	The results from the Made Ground have been compared to industry accepted screening values known as Generic Assessment Criteria (GAC) to determine the risks to human health. The GAC used in this investigation includes Category 4 Screening Levels and Suitable 4 Use Levels (C4SLs and S4ULs).
10.2.2	The GAC selected is based on a commercial use. The screening assessment is presented in Table 12 (below). A detailed methodology for the assessment is presented in Appendix 11.
10.2.3	The results have identified Chrysotile Asbestos in the form of loose fibres and cement in seven of the twenty-two Made Ground samples. Currently, there is no GAC for asbestos in soil. Industry guidance produced by CIRIA C7335 (2014) '*Asbestos in soil and made ground: a guide to understanding and managing risks*' states that "in the case of asbestos in soil, there is no published Soil Guideline Value (SGV) or C4SL.
10.2.4	Agreement has yet to be reached in the UK on an appropriate toxicological criterion on which such a GAC could be based". However, asbestos is not considered to be mobile and based on the extensive hardstanding across the site, the risk to site users in its current layout is minimal. In the event of redevelopment, material management will be required when the ground is broken out. Furthermore, the risks to human health will need careful consideration. Further detail is presented in Section 11.
10.2.5	No other exceedances, above acceptable thresholds for a commercial land use GAC, were identified of the contaminants tested from the Made Ground.

10.2.6 ***Table 12. Chemical Analysis (Made Ground Soils)***

Contaminant	Maximum Result (mg/kg)	Number of Samples	U95 (mg/kg)	Evidence Level (%)	GAC (mg/kg)	Exceedances
Asbestos	Chrysotile (Loose Fibres)	15	N/A	N/A	N/A	7* (WS3, WS6A, WS8, TP6, TP201 and BH02 between depths of 0.3mbgl and 1.5mbgl)
Arsenic	317	15	123.7	100	640	None
Cadmium	5.8	15	2.3	100	410	None
Chromium	143	15	52.1	100	8600	None
Copper	360	15	1.1	100	68000	None
Lead	843	15	184.3	100	2330	None
Mercury	2.2	15	434.8	100	58	None
Nickel	56	15	1.3	100	980	None
Selenium	< 1.0	15	30.6	100	12000	None
Zinc	285	15	1.7	100	730000	None
Hexavalent Chromium	< 1.2	15	208.0	100	49	None
Naphthalene	4.65	15	2.2	100	190	None
Acenaphthylene	1.1	15	0.5	100	83000	None
Acenaphthene	79	15	29.1	100	84000	None
Fluorene	62	15	23.0	100	63000	None
Phenanthrene	70	15	30.8	100	22000	None
Anthracene	83	15	30.9	100	520000	None
Fluoranthene	95	15	39.9	100	23000	None
Benzo(a)pyrene	11	15	2.2	100	76	None
Aliphatic >EC5 - EC6	< 0.001	15	< 0.001	100	3200	None
Aliphatic >EC6 - EC8	< 0.001	15	< 0.001	100	7800	None
Aliphatic >EC8 - EC10	< 0.001	15	1.3	100	2000	None
Aliphatic >EC10 - EC12	13	15	7.9	100	9700	None
Aliphatic >EC12 - EC16	250	15	140.2	100	59000	None
Aliphatic >EC16 - EC21	1500	15	765.6	100	1600000	None
Aliphatic >EC21 - EC35	754	15	332.1	100		None
Aromatic >EC5 - EC7	< 0.001	15	< 0.001	100	26000	None
Aromatic >EC7 - EC8	0.01	15	0.03	100	56000	None
Aromatic >EC8 - EC10	6	15	3.4	100	3500	None
Aromatic >EC10 - EC12	11	15	8.0	100	16000	None
Aromatic >EC12 - EC16	200	15	121.2	100	36000	None
Aromatic >EC16 - EC21	560	15	400.7	100	28000	None
Aromatic >EC21 - EC35	1584	15	181.6	100		None

** Note to table: Whilst no GAC is available for asbestos, the seven samples where asbestos has been identified has been noted as above detectable concentrations.*

10.3 Analytical Test Results – Natural Soils

10.3.1 The results of the chemical analysis on the natural soil samples are presented in Appendix 7 and summarised in Table 13. The results were compared to the GAC for a commercial use.

10.3.2 No exceedances, above acceptable thresholds for a commercial land use, were identified of the contaminants tested from natural soils.

10.3.3 ***Table 13. Chemical Analysis (Natural Soils)***

Contaminant	Maximum Result (mg/kg)	Number of Samples	GAC (mg/kg)	Exceedances
Asbestos	None	3	N/A	None
Arsenic	22.0	3	640	None
Cadmium	< 0.2	3	410	None
Chromium	30.0	3	8600	None
Copper	14.0	3	68000	None
Lead	14.0	3	2330	None
Mercury	< 0.3	3	58	None
Nickel	33.0	3	980	None
Selenium	< 1.0	3	12000	None
Zinc	43.0	3	730000	None
Hexavalent Chromium	< 1.2	3	49	None
Naphthalene	79.0	3	190	None
Acenaphthylene	3.4	3	83000	None
Acenaphthene	100.0	3	84000	None
Fluorene	270.0	3	63000	None
Phenanthrene	200.0	3	22000	None
Anthracene	76.0	3	520000	None
Fluoranthene	380	3	23000	None
Benzo(a)pyrene	11.0	3	76	None
Aliphatic >EC5 - EC6	< 0.001	3	3200	None
Aliphatic >EC6 - EC8	< 0.001	3	7800	None
Aliphatic >EC8 - EC10	< 0.001	3	2000	None
Aliphatic >EC10 - EC12	9.5	3	9700	None
Aliphatic >EC12 - EC16	41.0	3	59000	None
Aliphatic >EC16 - EC21	32.0	3	1600000	None
Aliphatic >EC21 - EC35	23.0	3	1600000	None
Aromatic >EC5 - EC7	< 0.001	3	26000	None
Aromatic >EC7 - EC8	< 0.001	3	56000	None
Aromatic >EC8 - EC10	< 0.001	3	3500	None
Aromatic >EC10 - EC12	110.0	3	16000	None
Aromatic >EC12 - EC16	930.0	3	36000	None
Aromatic >EC16 - EC21	1900.0	3	28000	None
Aromatic >EC21 - EC35	480.0	3	28000	None

10.4 Analytical Test Results – Leachate Testing

10.4.1 Leachate analysis was completed on the Made Ground and natural soil to assess the impact to Controlled Water from site derived contamination. The results were compared with Environmental Quality Standards (EQS) for freshwater where available, due to the presence of the River Crane/Yeading Brook adjacent to the BA plot. The results of the leachate testing are presented in Appendix 7 and summarised in Table 14.

10.4.2 The river is considered the most sensitive surface water receptor. No assessment against the Drinking Water Standards (DWS) has been completed as there are no sensitive potable abstractions within a 1km radius and the site is not within an SPZ.

10.4.3 Exceedances of the EQS were identified for heavy metals (chromium, copper, and lead), PAH (Naphthalene, Anthracene, and Fluoranthene) and Total TPH.

10.4.4 ***Table 14. Chemical Analysis (Leachate)***

Contaminant	Result Range (µg/l)	Number of Samples	EQS (µg/l)	Exceedances
Arsenic	<1.1 – 6.5	4	50.0	None
Beryllium	<0.2	4	15	None
Cadmium	<0.08	4	0.08	None
Chromium	0.8 – 18.0	4	4.7	2 (TP204 and TP208)
Copper	2.8 – 14.0	4	1.0	4 (TP204, TP208, BH07 and BH08)
Lead	<1.0 – 14.0	4	4.0	2 (TP204 and TP208)
Mercury	<0.5 – 1.0	4	0.07	1 (TP208)
Nickel	<0.3 – 1.8	4	4.0	None
Zinc	3.4 – 10.0	4	10.9	None
Free Cyanide	<10.0	4	1	None
Naphthalene	<0.01 – 4700.0	4	2.0	2 (BH07 and BH08)
Anthracene	<0.01 – 5.8	4	0.1	2 (BH07 and BH08)
Fluoranthene	0.75 – 4.8	4	0.1	3 (TP208, BH07 and BH08)
Benzo(a)pyrene	<0.01 – 0.01	4	0.02	None
Total PAH	<0.2 – 5000.0	4	< LOD	3 (TP208, BH07 and BH08)
Benzene	<1.0	4	10.0	None
Toluene	<1.0	4	74.0	None
TPH-CWG Aliphatic and Aromatic bands	<10.0 – 8700.0	4	10.0	3 (TP208, BH07 and BH08)

10.5 Analytical Test Results – Groundwater

10.5.1 The results from the groundwater analysis have been compared with Tier 1 screening values, as for the soils. This has included Environmental Quality Standards (EQS) for freshwater, due to the presence of the River Crane/Yeading Brook adjacent to the BA plot, which would be considered the most sensitive surface water receptor. There is potential for dissolved phase contaminants in groundwater to migrate to the river if they are in continuity.

10.5.2 No assessment against the Drinking Water Standards (DWS) has been completed as there are no sensitive potable abstractions within a 1km radius and the site is not within an SPZ. Furthermore, although the Lynch Hill Gravel Member is considered a receptor itself, it was found with an average thickness of only 1.8m and as such, the impact to the Aquifer is not considered to be a primary risk driver, but rather its potential as a pathway to the river is.

10.5.3 Over the monitoring period, groundwater levels were recorded. These are presented in Table 15.

10.5.4 ***Table 15. Groundwater Levels***

Borehole Name	Response Zone (mbgl)	Monitoring Date							
		25/6/19	27/6/19	3/7/19	23/7/19	22/1/20	29/1/20	12/2/20	19/2/20
BH1 - J	1.00 – 5.00	3.67		3.72		3.62	3.64	3.66	3.59
BH2 - J	1.00 – 5.00	2.20							
BH3 - J	1.00 – 5.00			1.82		1.70	1.69	1.74	1.70
WS2 - J	1.00 – 3.00	2.03		2.20				1.85	1.75
WS7 - J	1.00 – 4.60							1.95	1.88
WS3	1.00 – 2.00		Dry	1.67					
WS4	0.50 – 2.50			1.80					
WS5	1.00 – 4.00		Dry	2.86					
WS6	1.50 – 5.00		Dry	3.86					
WS7	1.00 – 5.00			3.25		3.08	3.06	3.20	3.18
WS8	1.00 – 5.00			4.90					
BH02	4.50 – 6.30						1.83	1.96	1.82
BH07	4.00 – 6.00						4.01	4.20	4.16
BH08 (S)	4.50 – 6.00						3.37	3.12	3.08
BH08 (D)	9.00 – 10.00						9.32	6.80	6.05

10.5.5 Groundwater was recovered from eight boreholes during the 2019 and 2020 phases of investigation by Paragon. The samples analysed included locations WS5, WS6, WS7, BH02, BH07, and BH08. The results from the analysis are presented in Table 16.

10.5.6 The results identified exceedances of the EQS (freshwater) for copper, nickel, phenols, naphthalene, anthracene, fluoranthene, total PAH, and total TPH. Notably PAH and TPH concentrations were greatest in the newest boreholes; BH02, BH07 and BH08.

10.5.7 ***Table 16. Chemical Analysis (Groundwater)***

Contaminant	Result Range (µg/l)	Number of Samples	EQS (µg/l)	Exceedances
Arsenic	<5.0 – 21.0	6	50.0	None
Beryllium	<0.1	6	15	None
Cadmium	<0.02 – 0.03	6	0.08	None
Chromium	0.3 – 0.5	6	4.7	None
Copper	0.6 – 2.0	6	1.0	2 (BH02 and BH07)
Lead	0.3 – 0.7	6	4.0	None
Mercury	<0.05	6	0.07	None
Nickel	3.3 – 7.3	6	4.0	3 (WS7, BH02 and BH08)
Zinc	2.4 – 9.3	6	10.9	None
Free Cyanide	<10.0	6	1	None
Total Phenols	<10 – 280	6	7.7	2 (BH02 and BH08)
Naphthalene	<0.01 – 585	6	2.0	1 (BH08)
Anthracene	<0.01 – 0.79	6	0.1	3 (BH02, BH07 and BH08)
Fluoranthene	<0.01 – 0.9	6	0.1	3 (BH02, BH07 and BH08)
Benzo(a)pyrene	<0.01	6	0.02	None
Total PAH	0.03 – 612.0	6	< LOD	6 (WS5, WS6, WS7, BH02, BH07, and BH08)
Benzene	<1.0 – 3.5	6	10.0	None
Toluene	<1.0 – 6.9	6	74.0	None
TPH-CWG Aliphatic and Aromatic bands	<140.0 – 3400.0	6	10.0	3 (BH02, BH07 and BH08)

10.5.8 Three groundwater samples were submitted for VOC analysis as part of the 2020 investigation. The samples analysed included groundwater recovered from BH02, BH07 and BH08. The results of the contaminants with concentrations above the LOD are presented below.

10.5.9 ***Table 17. Chemical Analysis VOCs within Groundwater***

Contaminant	Result Range (µg/l)	Results Above LOD
Benzene	< 1.0 – 3.5	BH02 and BH08
Toluene	< 1.0 – 6.9	BH08
Ethylbenzene	< 1.0 – 81.1	BH02 and BH08
p & m-Xylene	< 1.0 – 170.0	BH08
o-Xylene	< 1.0 – 76.7	BH02 and BH08
Isopropylbenzene	< 1.0 – 4.4	BH08
1,3,5-Trimethylbenzene	< 1.0 – 19.1	BH08
1,2,4-Trimethylbenzene	< 1.0 – 41.9	BH02 and BH08

10.6 **Gas Monitoring Results**

10.6.1 Pollutant linkages associated with risks from ground gas and vapour to the property and to human health have been assed using BS 8485:2015+A1:2019 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

10.6.2 Eight gas monitoring visits have been completed on previously drilled boreholes by Jomas in 2018 and Paragon in 2019 and monitoring has also included four new boreholes drilled by Paragon in 2020. The boreholes are situated across the site. The schedule of monitoring visits and wells monitored is presented in Table 18.

10.6.3 ***Table 18. Summary of Gas Monitoring Visits***

Borehole Name	25/6/19	27/6/19	3/7/19	23/6/19	22/1/20	29/1/20	12/2/20	19/2/20
BH1 - J	x		x		x	x	x	x
BH2 - J	x							
BH3 - J			x		x	x	x	x
WS2 - J	x		x				x	x
WS7 - J							x	x
WS3		x	x					
WS4			x					
WS5		x	x					
WS6		x	x					
WS7			x		x	x	x	x
WS8			x					
BH02						x	x	x
BH07						x	x	x
BH08 (S)						x	x	x
BH08 (D)						x	x	x

10.6.4 The results from the gas monitoring visits are presented in Table 19. The gas monitoring records are presented in Appendix 8.

10.6.5 ***Table 19. Summary of Gas Monitoring Results***

Exploratory hole	Max Steady Flow (l/hr)	Max Steady Methane (%)	Max Steady Carbon Dioxide (%)	Minimum Oxygen (%)	Max Steady VOC (ppm)	Atmospheric Pressure Range (mbar)
BH1- J	0.5	<0.1	0.3	10.8	<0.1	988 - 1030
BH2 J	0.7	<0.1	0.1	20.3	NA	1016
BH3 - J	0.9	<0.1	0.8	19.1	<0.1	988 - 1028
WS2 - J	0.7	<0.1	0.3	20.0	<0.1	999 - 1024
WS7 - J	<0.1	<0.1	<0.1	15.0	0.2	1000 - 1021
WS3	0.9	<0.1	0.2	18.2	NA	1026
WS4	0.8	<0.1	0.9	20.0	NA	1024
WS5	0.9	<0.1	4.8	13.4	NA	1024 – 1026
WS6	0.8	0.4	0.6	14.7	NA	1024 – 1026
WS7	0.3	2.1	10.5	<0.1	2.4	988 - 1027
WS8	0.3	<0.1	0.4	19.7	NA	1024
BH02	<0.1	0.1	0.9	18.9	1.0	985 - 1022
BH07	<0.1	<0.1	0.2	11.7	0.6	988 - 1021
BH08 (S)	0.1	<0.1	1.9	19.9	6.0	988 - 1021
BH08 (D)	0.3	<0.1	0.3	20.2	2.8	988 - 1021

10.6.6 The concentration of methane was relatively low in all boreholes. The highest result was found in WS7 of 2.1% by volume in air (v/v).

10.6.7 The concentrations of carbon dioxide in each borehole ranged between <0.1% and 10.5% v/v. The highest result was found in WS7.

10.6.8 Hydrogen sulphide concentrations were found to be below the limit of detection.

10.6.9 The concentration of carbon monoxide ranged between <0.1 to 13.0ppm with the greatest concentration in BH02.

10.7 Vapour

10.7.1 The assessment for the vapour risk has been undertaken by directly comparing the results from the groundwater testing (6 samples) with the SoBRA groundwater vapour GAC (GACgwvap). The results are presented in Table 20, a screening table and laboratory certificates is presented in Appendix 7.

10.7.2 The concentrations of naphthalene in BH08 exceeded the GACgwvap. This was the sole exceedance but the concentration was over double the allowable concentration.

10.7.3 ***Table 20. Vapour Assessment***

Contaminant	Result (µg/l)	GACgwvap (µg/l)	Exceedances
Mercury	< 0.05	1.1	None
Naphthalene	< 0.01 – 585.00	220	1 (BH08 at 4.8mbgl)
Acenaphthylene	< 0.01 – 0.87	220000	None
Acenaphthene	< 0.01 – 13.70	170000	None
Fluorene	< 0.01 – 5.13	210000	None
Benzene	< 1.00 – 3.50	210	None
Toluene	< 1.00 – 6.90	230000	None
Ethylbenzene	< 1.00 – 81.10	10000	None
Xylenes	< 1.00 – 170.00	9500	None
MTBE	< 1.00	83000	None
TPH Aliphatic >C5 - C6	< 1.00	1900	None
TPH Aliphatic >C6 - C8	< 1.00	1500	None
TPH Aliphatic >C8 - C10	< 1.00	57	None
TPH Aliphatic >C10 - C12	< 10.00	37	None
TPH Aromatic >C5 - C7	< 1.00 – 3.50	210000	None
TPH Aromatic >C7 - C8	< 1.00 – 6.90	220000	None
TPH Aromatic >C8 - C10	< 1.00 – 390.00	1900	None
TPH Aromatic >C10 - C12	< 10.00 – 1500.00	6800	None
TPH Aromatic >C12 - C16	< 10.00 – 1000.00	39000	None

10.7.4 During the investigation, a Photoionization Detector (PID) was used to screen soil samples for VOCs. The results for the Made Ground across the site ranged between the limit of detection (<0.1) and 0.6ppm. The PID results for the Natural soils ranged between 0.1ppm and 28.7ppm. The greatest readings were found in BH08 between 5.0mbgl and 6.0mbgl. In addition, a PID was also used in during the 2019 investigation. The results indicated results ranged between <0.1 and 4.3ppm.

10.8 Barrier Pipework Assessment

10.8.1 The assessment for whether barrier pipework is likely to be required as part of the development has been undertaken by directly comparing the results from the soil testing with the PE, metal and barrier pipe thresholds. The results are presented in Table 21.

10.8.2 The results have found that barrier pipework is likely to be required due to the elevated BTEX, MTBE, TPH concentrations and due to the presence of free product on the soils and groundwater.

10.8.3 ***Table 21. Barrier Pipework Assessment***

Parameter Group	Testing Required	PE Pipe Threshold (mg/kg)	Metal or Barrier Pipe Threshold	Result	Outcome
Total VOC	Where preliminary risk assessment has identified land potentially affected by contamination	0.5	No Limit	<LOD	Pass
Total BTEX and MTBE		0.1	No Limit	<LOD	Pass
Total SVOC		2	No Limit	N/A	N/A
TPH >C5-C10		2	No Limit	<LOD	Pass
TPH >C10-C16		10	No Limit	<LOD – 473.0	Fail
TPH >C16-C40		500	No Limit	<LOD – 2950.0	Fail
Phenols (SVOC analysis)		2	No Limit	N/A	N/A
Cresols and chlorinated phenols from SVOC analysis		2	No Limit	N/A	N/A
Ethers	Only where identified from former land use	0.5	No Limit	N/A	N/A
Nitrobenzene		0.5	No Limit	N/A	N/A
Ketones		0.5	No Limit	N/A	N/A
Aldehydes		0.5	No Limit	N/A	N/A
Amines		<LOD	No Limit	N/A	N/A
Corrosive indicators, pH, conductivity EC and redox potential Eh	Where metal pipes are contemplated	No Limit	Wrapped steel: corrosive if pH<7 and EC>400uS/cm. Wrapped ductile iron corrosive if pH<5, Eh not neutral and EC>400uS/cm. Copper: corrosive if pH<5 and Eh positive	A	N/A
Presence of liquid free phase hydrocarbons	Observation	None allowed	None allowed	Sheen identified in Made Ground	Fail

11.0 DISCUSSION

11.1 Environmental Findings

11.1.1 This section evaluates the risks to potential receptors at the site from identified chemical contamination. Potential receptors have been identified in line with the CSM presented in Table 1 and reference to environmental guidance, whereby all receptors (humans, controlled waters, and buildings) have been considered. Additional information on the assessment is presented in Appendix 11.

11.2 Risks to Human Health from Soil Derived Contaminants

11.2.1 At this stage, the proposed development plans indicate the BA plot is to be redeveloped as a data centre with MV energy centre for a commercial end use. In addition, the Vodafone plot is to be developed into a substation. On this basis the laboratory results were compared against the GAC for a commercial land use. The results were separated between Made Ground and natural soils to provide a basis for a comparison.

Made Ground

11.2.2 The Made Ground was found to contain asbestos fibres in seven of the twenty-two Made Ground samples. The site is built on a historical creosote works and a landfill and the widespread asbestos may to be a result of infilling at the site. Whilst the site is currently surfaced with hardstanding, the risks to site users are mitigated. However, during development, controls will need to be in place when areas of hardstanding are broken out. In addition, asbestos containing soils are not to be retained onsite in areas of soft landscaping. As such, a clean cover system will need to be in place. Further information on the requirements of the cover system are presented in Section 12 together with control measures required during the construction phase.

11.2.3 Construction workers are likely to be at risk of exposure to asbestos, via inhalation pathways, as they would come into contact with soils during groundworks and excavations. It is anticipated that areas of Made Ground may be removed during groundworks and excavation of foundations as part of the construction process. As such, appropriate Risk Assessments and Method Statements are likely to be required outlining the specific health and safety standards to be followed in general accordance with Control of Asbestos Regulations 2012: Asbestos in Soil (CAR-SOIL). This should include, but not be limited to, an outline for requirements for Personal Protective Equipment and Respiratory Protective Equipment, damping down of excavations and controlled removal of Made Ground arisings to suitably licensed waste receivers.

11.2.4 Two samples were noted as having significantly greater concentrations of TPH bands than the remaining samples. These included BH07 at 2.55mbgl – 3.00mbgl and BH02 at 1.5mbgl. BH07 was situated in the eastern part of the site and closest to the River Crane / Yeading Brook. This sample was noted on the borehole logs to be a soft dark grey to black slightly gravelly slightly sandy clay with a slight hydrocarbon odour. The TPH banding with the greatest concentrations were Aliphatic >16-C21, Aliphatic >C21-C34, Aromatic >C16-C21 and Aromatic >21-35. The likely source is the creosote works which historically operated in this part of the site.

11.2.5 BH02 at 1.5mbgl was noted to have higher concentrations of TPH than the remaining samples. In addition, this sample was also identified as having a significantly greater concentrations of PAH compounds (specifically naphthalene) than the remaining samples. This borehole is situated in the central eastern part of the site. The borehole log describes this samples as a grey to dark grey slightly gravelly, slightly sandy clay with a timber fragment and slight hydrocarbon odour. The TPH banding with the greatest concentrations were Aliphatic >16-C21, and Aromatic >C16-C21 and PAH compounds with the greatest concentrations were found to be Acenaphthene, Phenanthrene, Anthracene, and Fluoranthene. These contaminants can be found as a result of a timber works in like with the Department of the Environment Industry Profile for 'Timber treatment works' (1995) and 'Gas works, coke works and other coal carbonisation plants' (1995). As such, it is possible that this timber is a remnant from the creosote works, which existed in the eastern part of the site as timber was possibly treated at the site using creosote, which is a known pesticide / wood preservative.

Natural Soils

11.2.6 The chemical analysis of the natural soils has also been compared to the GAC for a commercial use and the results have identified that no exceedances above acceptable thresholds for a commercial land use, were identified.

11.2.7 When drilling BH03, BH07 and BH08, visual signs of possible hydrocarbon contamination were noted within the natural soil. These samples were submitted for laboratory analysis to determine the possible source. The samples included BH03 at 3.8mbgl, BH07 at 5.8mbgl – 6.0mbgl and BH08 at 5.5mbgl – 6.0mbgl. BH03 is situated in situated in the northwest part of the site. The ground conditions at 3.8mbgl were described as having significant hydrocarbon staining and odour. BH07 in the eastern part of the site was described as having hydrocarbon odour and staining, and BH08 in the eastern part of the site was noted to have a strong hydrocarbon odour and staining and PID values were between 13.10ppm to 28.70ppm. Whilst BH07 and BH08 are relatively close to each other, BH03 is in the western part of the site and as such considered to be from a different source. It is likely that the results from BH07 and BH08 are a result of the creosote works, BH03 is likely to be a result of the railway or the oil fired power station which both occurred in the northwest part of the site.

Summary

11.2.8 On the basis of the above testing, a Low to Moderate risk to human health is considered to be present at the site. It is envisaged that development controls and mitigation measures can be employed to control risks.

11.3 Risks to Human Health from Dissolved Phase Contaminants

11.3.1 The risk from vapours has been considered based upon concentrations of hydrocarbons encountered in groundwater samples. These contaminants have the potential to volatilise and emit to outside air or ingress to indoor air space through cracks / entry points of the building.

11.3.2 The measured concentrations of hydrocarbons in groundwater have been compared with the SoBRA groundwater vapour GAC derived to assess the potential risk to human health from vapours generated from groundwater contaminants, based on a commercial end use.

11.3.3 A single exceedance of the thresholds was identified. This was for naphthalene, which was found at a concentration of 585.0µg/l in BH08 at 4.8mbgl within a groundwater sample with a response zone in the gravel. This result is higher than the threshold of 220.0µg/l.

11.3.4 In addition, the PID results for the Made Ground across the site ranged between <0.1 – 0.6ppm. The PID results for the natural soils ranged between 0.1ppm and 28.7ppm. The highest readings were found in BH08 between 5.0mbgl and 6.0mbgl.

Assumptions

11.3.5 When producing the vapour GAC, various assumptions were made by SoBRA. This includes the results of a sensitivity analysis undertaken by SoBRA that identified that a groundwater source at 4mbgl could increase the GACgwvap by up to 5 times. Therefore, the current GACgwvap used in this investigation could be overestimating the risk from groundwater vapours at the site as groundwater was identified at 4.8mbgl.

11.3.6 Furthermore, the model used to calculate the vapour GAC assumed a sandy soil for unsaturated and saturated zones. The ground conditions identified in BH08 found areas of cohesive Made Ground. As such, the SoBRA report comments that depending on the chemical, the soil type can increase the GACgwvap by up to 20 times, therefore the current GACgwvap used in this investigation could be overestimating the risk from groundwater vapours at the site.

11.3.7 The model was also based on the assumption that only dissolved phase contaminants are present in groundwater. However, an oily residue noted on the purged water in BH08 suggests possible free phase Non-Aqueous Phase Liquid (NAPL) may be present. As such, this could be underestimating the risk from groundwater vapours at the site.

11.3.8 The model also assumes that there is no biodegradation between source and receptor. However, significant oxygen depletion was noted across the site which indicates that biodegradation may be occurring. Although there may not be sufficient oxygen reaching the deeper soils to allow for oxygen recharge, and as such future biodegradation may be limited.

Summary

11.3.9 Based on the groundwater analysis and soil PID readings, it is considered that the elevated naphthalene is a result of the historical use of the site (creosote works) and as such the risks from vapour to human health are considered to be Moderate. This is a conservative estimate at this juncture since only one sample was found to be elevated. However, as the potential for NAPL was encountered, a more conservative assessment of risk is made at this juncture.

11.4 Risks to Human Health from Ground Gas

11.4.1 The Gas Risk Assessment has been carried out in general accordance with BS8485:2015+A1:2019 whereby the Characteristic Situation (CS) of the site has been identified. The Characteristic Situation ranges are between 1 and 6 and determine the gas risk to the property and the level of protection required. The process calculates a Gas Screening Value (GSV) based on gas monitoring which was undertaken based on boreholes within the Made Ground and natural geology.

11.4.2 The GSV for the site has been calculated based on the maximum concentration of methane or carbon dioxide monitored and the maximum flow rate recorded in the boreholes using the equation:

$$GSV = q\left(\frac{Chg}{100}\right)$$

Where:

- Chg = Concentration of a specific hazardous gas expressed as a percentage of total gas volume (%v/v)
- q = Total gas flow from a borehole in litres per hour (l/hr)
- Qhg = Calculated flow rate of a specific hazardous gas from a borehole reading

The results are then compared to tables set out in the guidance for assessment.

11.4.3 Made Ground has been identified at the site, which is a potentially gassing deposits, as such, shallow monitoring wells were installed into the Made Ground. In addition, where possible, gas monitoring has been undertaken over a range of atmospheric pressures to understand the gas regime in best case (high pressure) and worst case (low pressure) scenarios. If this has not been possible, a description of the reasons why has been outlined below.

11.4.4 In addition, nearby historical landfilling operations have been recorded within 250m of the site (east of the River Crane/Yeading Brook) since 1936, and part of the site is mapped by BGS as Artificial Ground.

BA Plot

11.4.5 The results for the gas monitoring identified within the BA plot found a maximum methane result of 0.4%, found in WS6 and a maximum carbon dioxide result of 4.8%, found in WS5. The GSV has been calculated for a worst-case scenario using the greatest flow reading (0.9l/hr) and the greatest GSV for methane or carbon dioxide. Based on a preliminary assessment, the BA plot should be classified as CS2, this is because although the GSV for carbon dioxide has been calculated as 0.04l/hr, the readings were taken during periods of high pressure, which represent the best possible case. It is therefore possible that the gas results could be rise in low pressure events. As such, the risk rating has been increased from CS1 to CS2 give the marginal nature of the GSV and the maximum carbon dioxide results. Furthermore, the guidance suggests increasing to CS2 where 5% v/v is recorded and given the highest result was 4.8% and the site is formed on landfill, conservatism is deemed appropriate at this juncture, especially since low pressure could lead to higher results.

11.4.6 It is possible that further monitoring during the detailed design phase could confirm the requirements for gas protection but mitigation measures are recommended at this stage.

Vodafone Plot

11.4.7 The results for the gas monitoring identified within the Vodafone plot found a maximum methane result of 2.1% and a maximum carbon dioxide result of 10.5%, found in WS7. In addition, the greatest flow rate identified within the Vodafone Plot was 03l/hr. The GSV has been calculated for a worst-case scenario using the highest flow reading and the highest GSV for methane or carbon dioxide. Based on five monitoring visits, a preliminary assessment has identified that the Vodafone plot should be classified as CS2. This is because, whilst the GSV has been calculated at 0.03l/hr (CS1), the concentration of carbon dioxide has been found at concentrations higher than 5% and as such, the risk rating has been increased to CS2 as per the rational set out above.

11.4.8	Based on an industrial building type (Type D) and a conservative CS score of 2, the total number of points required in line with BS8485:2015+A1:2019 would be 1.5. A potential measure to meet this score could involve installing a gas membrane that meets the following criteria: 1. Sufficiently impervious to the gases with a methane gas transmission rate <40.0 ml/day/m2/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); 2. Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; 3. Sufficiently strong to withstand in-service stresses e.g. settlement if placed below a floor slab); 4. Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc); 5. Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and 6. Verified in accordance with CIRIA C735 [N1]
11.4.9	The Phase 1 investigation identified that the property is not located within a Radon Affected Area and as such, radon gas protection is not considered to be required.
	Vapour
11.4.10	The assessment of the risks to human health from dissolved phase contaminants has identified a moderate risk of vapours at the site. As such, the risk of vapour ingress cannot be discounted.
11.4.11	The risk from vapour can be mitigated by upgrading the gas membrane to a vapour resistant gas membrane.
	Gas and Vapour Summary
11.4.12	Based on the above, it is likely that the ground gas is a result of informal infilling across the site, rather than a landfill with household or significantly degrading waste. In addition, it is unlikely that the offsite landfill to the east of the site has contributed to the ground gases, as direct pathways are restricted due to cohesive deposits and the presence of a river between the offsite landfill and the site.
11.4.13	As such, a **Moderate Risk** is appropriate for the risk from ground gas and vapour. This risk rating is subject to further monitoring which should be completed as part of the on-going development. By completing this work, the risk rating may reduce. In any case, whilst the floor slab may offer some degree of protection, based on the gas monitoring results, potential landfilling at the site and evidence of hydrocarbons, it is recommended that a membrane is installed to meet the requirements of BS8485:2015+A1:2019. The membrane should also be upgraded to be vapour resistant. Further recommendations are outlined in Section 12.
11.4.14	A gas membrane is not required in external areas. In addition, a gas membrane is not required in open sided structures including the MV energy centres and beneath the gantry slab to the data hall building.

11.5 Risks to Controlled Waters from Leachate and Groundwater

11.5.1 During the groundwater monitoring, free product (in the form of an oily sheen) and visual / olfactory indications of potential contamination were identified. Leachate testing was undertaken on two samples of the Made Ground and two samples of the natural gravel. As a first tier of assessment, samples were compared to Environmental Quality Standards (EQS) and based on the proximity to the River Crane / Yeading Brook, the EQS for Freshwater was used. The River Crane / Yeading Brook would be the most sensitive Controlled Waters receptor (as opposed to the Principal Aquifer – see 11.5.7 below).

11.5.2 The groundwater levels within the Made Ground and Lynch Hill Gravel Member appear to drop towards the Grand Union Canal to the south and River Crane/Yeading Brook to the east. Based on the monitoring results groundwater flow is likely to be towards the south-east.

11.5.3 The results of the leachate testing indicated moderate concentrations above the EQS of heavy metals (chromium, copper, and lead), and significant concentrations of PAH (Naphthalene, Anthracene, and Fluoranthene) and Total TPH. Similar exceedances were noted in the groundwater analysis, including heavy metals (copper, mercury, nickel, and zinc), phenols, PAH (naphthalene, anthracene, fluoranthene), and total TPH. Notably PAH and TPH concentrations were greatest in both leachate and groundwater in BH02, BH07 and BH08.

11.5.4 The concentrations of VOCs including 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene were significantly higher in BH08 than other samples. These compounds are typically associated with coal tar, which could be a result of the historical creosote works.

11.5.5 The majority of the contaminants listed above were also identified within the soils, albeit below the soil GAC, and therefore it is likely that the source is from the historical use of the site, rather than an offsite source.

Leachate and Groundwater Summary

11.5.6 Based on the above, the risks to groundwater within the Lynch Hill Gravel and the surface water features (River Crane/Yeading Brook) are considered to be **Moderate to High** on the basis that a number of exceedances above the EQS have been identified and the proximity to the river. It is considered likely that the groundwater underlying the site is in hydraulic continuity with the river. However, the exceedances appear to be localised to the eastern part of the site which is where the historical creosote works operated.

11.5.7 Whilst the groundwater within the aquifer is impacted, it is unlikely that there would be wider risks to public potable supply as there are no sensitive abstraction with 1km and there is no SPZ status locally. The Lynch Hill Gravels are of minimal thickness on the site. As such, the risks from dissolved phase contaminants in groundwater within the aquifer are considered in terms of their potential to act as a pathway to the surface water courses as the primary risk driver to Controlled Waters.

11.5.8 The extensive covering of hardstanding offered to the final development is likely to minimise infiltration. However, areas of soft landscaping are proposed where infiltration could occur. As such, further assessment is required to identify a suitable remediation strategy to mitigate the risk to Controlled Waters from the existing onsite contamination. It would be recommended to complete a Tier 2 Detailed Quantitative Risk Assessment (DQRA) to assess whether factors such as dilution would have a positive influence on the contaminant concentrations once they reached the River Crane / Yeading Brook. If following a DQRA, intolerable concentrations are still shown as being capable of causing significant harm to the river, then consideration for remediation should be made.

11.6 Property and Infrastructure

11.6.1 Plant growth can be affected due to the presence of phytotoxic contaminants including copper and zinc. These contaminants were identified at low levels within the Made Ground and as such, plant growth onsite is unlikely to be affected. As such, the risk to plants and vegetation from phytotoxic contaminants is deemed to be **Low**. Based on the recommendations for the installations of capping layers in soft landscaping this will create a suitable growth medium (fresh imported topsoil) for plant growth.

11.6.2 Sulphate testing was undertaken to assess the risks from aggressive ground on buried concrete. Based on the results the Design Sulphate Class for Made Ground and Lynch Hill Gravel Member would be DS-2, AC-2. The Design Sulphate Class for the London Clay soil would be DS-2, AC-1s. Consequently, the risk is considered to be **Low to Moderate**.

11.6.3 From a preliminary risk assessment of the results to thresholds set in the UK Water Industry Research (2010) '*Guidance for the selection of water supply pipes to be used in brownfield sites*', it is likely that barrier water pipes will be required for drinking water supply pipework. This is based on the contaminant concentrations recorded (in particular BTEX and MTBE, TPH C10 – C16 and TPH C16 – C40). As such, the risk rating is considered to be **Moderate**.

11.7 Waste Management

11.7.1 The chemical analysis of the Made Ground has identified low levels of contaminants below the relevant acceptance criteria for a commercial end use. The Made Ground can therefore remain onsite from a human health perspective. However, based on the thickness of Made Ground across the site, piled foundations are recommended. As such, it may be necessary to remove some Made Ground from pile arisings as waste. In addition, in areas of proposed soft landscaping, it is anticipated that imported subsoil and topsoil would be used. As such, there is the potential for surplus soil.

11.7.2 At this stage, no Waste Acceptance Criteria (WAC) tests have been carried out. The Waste Assessment completed in 2019 is presented in Appendix 10. These documents should be provided to a waste receiver to confirm an acceptable end point for disposal of surplus materials. WAC testing may be required as part of the ongoing development and quantification analysis may be required to assess a suitable end point of disposal for asbestos contaminated arisings.

11.7.3 Based on a preliminary waste classification assessment completed in 2019 by Paragon, the tested soils onsite (Made Ground and Natural Soil) appear to be Non-Hazardous in nature. The laboratory certificates, waste classification outputs and drilling logs, provided in the appendices, should be provided to the waste receivers to confirm their ability to accept waste arisings from the site. It is the waste producer's responsibility to classify and appropriately manage waste under duty of care (section 34 of the Environmental Protection Act 1990).

11.8 Risk Evaluation

11.8.1 Following the implementation of the Phase 2 site investigation, the pollutant linkages identified in the CSM have been re-evaluated and re-classified in relation to the additional information obtained. Overall there is a **Moderate Risk** associated with the site.

11.9 Revised Assessment of Potential Pollutant Linkages

Table 22. Revised Conceptual Site Model

Receptor	Potential sources	Pathways	Risk	Justification
Human Heath				
Construction and maintenance workers / Users of the site	Organic and metal contamination	Direct contact, ingestion, and inhalation via outdoor soils or translocated soil and dust indoors.	L M	**Low to Moderate risk:** Ingestion, inhalation and dermal contact with contaminated soils in excavations or stockpiles cannot be discounted. Personal Protective Equipment (PPE) and Risk Assessments and Method Statements are required.
	Ground gas and vapours	Inhalation, Migration through granular and fractured soils into confined spaces.	L M	**Low to Moderate risk:** Inhalation of vapours from contaminated soils or groundwater below the site cannot be discounted due to the historical use of the site and the extent of previously untested areas.
Future site users	Organic and metal contamination in soils and groundwater	Direct contact, ingestion, and inhalation of outdoor soils or translocated soil and dust indoors.	L M	**Low to Moderate risk:** Inhalation of vapours from contaminated soils or groundwater below the site and contact with Made Ground in areas of soft landscaping may be possible.
	Ground gas and vapour	Inhalation, migration through granular and fractured soils into confined spaces.	L M	**Low to Moderate risk:** Inhalation of vapours from contaminated soils or groundwater below the site cannot be discounted.
Offsite Residents (250m southwest)	Organic and metal contamination in soils, groundwater and gas	Direct contact, ingestion, and inhalation of outdoor soils or translocated soil and dust indoors.	L	**Low risk:** Residents 300m southwest are unlikely to be at risk form contaminants arising from the site as they will be cut off by the Grand Union canal. The likelihood for migration to properties a similar distance to the northwest is minimal given the considerable distance to the properties and several other areas of industrial land in between.

11.10

Table 22. Revised Conceptual Site Model. (Continued)

Receptor	Potential sources	Pathways	Risk	Justification
Property				
Site structures and services	TPH in site soils	Direct contact between soil and structures or services.	L M	**Low to Moderate risk:** Direct contact of building materials including foundations and buried services with contaminated soils and groundwater is low to moderate based on laboratory testing.
	Ground gas and vapour	Migration through granular and fractured soils into confined spaces.	M	**Moderate risk:** The results of the investigation suggest that there is the potential for migration of gases and vapour through soil pore space and to the surface from underlying Made Ground and historical ground workings cannot be discounted.
Plants /Landscaping	Metals and organic contamination in soils	Root contact and uptake	L	**Low risk:** The results of the soil analysis have been compared to BS3882 and the risk to existing plants is low. However, a capping system is likely to be required due to the presence of asbestos within the shallow Made Ground.
Adjacent Property				
Building fabric of adjacent properties	Metals and organic contamination in soils	Soil leaching and migration and translocation as dust of soil contamination.	L	**Low risk:** Direct contact of building materials including foundations and buried services with contaminated soils and groundwater is low based on the low level of contaminants identified near to off-site property in the wider estate.
Groundwater				
Principal Aquifer	Metals and organic contamination in soils	Soil leaching and migration of potential soil contamination to dissolved phase in groundwater	M	**Moderate risk**: Whilst the groundwater within the aquifer is impacted, the aquifer is not considered to be very thick and it is unlikely that there would be wider risks to public potable supply as there are no sensitive abstraction with 1km and there is no SPZ status locally. As such, the risks from dissolved phase contaminants in groundwater are considered in terms of their potential to act as a pathway to the surface water courses. Exceedances of the EQS have been identified in groundwater and leachate.
Surface Waters				
River Crane/Yeading Brook (onsite) Grand Union Canal (5m south)	Leachable metals and organic contamination	Soil leaching and migration into drains and sewers, which discharge into the ditch.	M H	**Moderate to High risk:** Elevated concentrations of TPH and PAH above the EQS have been identified onsite. A DQRA is considered to be required to fully assess the risks to the river.

12.0 GEOENVIRONMENTAL RECOMMENDATIONS

12.1 Contamination and Remediation

12.1.1 Due to the presence of asbestos within the Made Ground and identification of timber likely to be treated with hydrocarbons, within the Made Ground, some degree of additional testing and remediation is likely to be required.

12.1.2 Where landscaped areas are proposed, a capping layer will be required to prevent contact with underlying contaminants. At this stage, the following is deemed appropriate.

Table 23. Composition of Capping Layer.

Layer	Minimum Thickness
Topsoil	150
Subsoil	450
Geotextile	Terram 1,000 or similar

12.1.3 In addition, the Topsoil and Subsoil are to meet the requirements of BS3882, Specification for Topsoil. The supplier should provide a test certificate prior to purchase. It is then recommended to test the soils once they arrive onsite to ensure they meet the requirements for a commercial land use based on S4ULs and C4SLs.

12.1.4 Thickness and composition of the topsoil should be subject to inspection and validation by chemical analysis. The quality of the geotextile should also be undertaken through visual inspection.

12.2 Gas Protection Measures

12.2.1 Based on the proposed development which is understood to be a data centre with MV energy centres with open sided structures and substation, the site use is considered to be less sensitive than if the site was used for residential purposes. The monitoring undertaken to date has analysed boreholes from across the development area and within the wider site boundary. The results have shown the Characteristic Situation (as outlined in BS8485:2015+A1:2019) to range between CS1 within the BA plot and CS2 within the Vodafone plot.

12.2.2 In addition, in line with the results from the vapour risk assessment, although the sensitivity analysis reported by SoBRA in producing the vapour GAC identified the vapour GAC may be overestimating the risk, a conservative approach would be to allow for a gas membrane suitable to mitigate against vapours in enclosed buildings. As a standard gas membrane is considered to be a requirement for CS2, it is not considered onerous to upgrade this to a gas (methane and carbon dioxide) and vapour resistant membrane in fully enclosed buildings.

12.2.3 Gas membrane is not required in external areas. In addition gas membranes are not required where buildings are open sided, this includes the below the gantry slab to the data hall buildings and below the external areas of the MV energy centres.

12.2.4 Based on the results of the gas and vapour risk assessments, it is possible additional monitoring in the footprint of the new building could reduce the risk rating.

12.3	**Piling Works Risk Assessment**
12.3.1	There may be an increased risk to Controlled Waters from the piling required for the scheme from vertical migration of groundwater from the Made Ground to the underlying aquifers mobilised during piling. This is of particular importance if the final loading of the building increases significantly than the loads used in this investigation, as this would mean deeper piles would be required which may penetrate the London Clay and terminate in the underlying Chalk, which is classified as a Principal Aquifer and drinking water resource.
12.3.2	During the investigation, elevated concentrations of contaminants have been recorded, which have the potential to impact Controlled Waters. As such, a Piling Works Risk Assessment may be required to demonstrate that contamination will not be mobilised during piling from shallow horizons of Made Ground to the more sensitive horizons below. Reference should be made to the Environment Agency document relating to 'Piling into Contaminated Sites' (EA, 2002).
12.3.3	A watching brief should also be undertaken during the works to manage the segregation and storage of pile arisings to minimise volumes of soils created and to reduce the risk of surface water run-off in to the River Crane / Yeading Brook.
12.3.4	Ongoing monitoring should be undertaken during development to ensure that no adverse impacts to the river are caused during development. Monitoring should involve sampling existing boreholes (if possible) or from new boreholes drilled on the eastern part of the site. The monitoring should also include sampling of surface water from the river at upstream, middle and downstream points. Further information is presented in 12.8.
12.4	**Asbestos in Soil**
12.4.1	Based on the presence of asbestos fibres within the shallow soils onsite, it is likely that some degree of asbestos management will be required. The protection of workers from exposure to asbestos is regulated by the Control of Asbestos Regulations (HSE, 2012). As such, appropriate Risk Assessments and Method Statements should be put in place to ensure the risks are minimised. This should be not be limited to Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE), segregation of stockpiles, dust suppression by damping down stockpiles, and / or covering stockpiles with sheeting.
12.5	**Buried Services**
12.5.1	In accordance with the UK Water Research Guidance (2010), it is recommended that barrier water pipes are used based on the contaminant concentrations recorded. This report and appendices would be submitted to the local water authority to gain approval for the use of such pipes.

12.6 **Buried Concrete**

12.6.1 Based on the results of the pH and sulphate testing carried out on samples from the Made Ground and Lynch Hill Gravel Member, the DS and ACEC classification for these strata is DS-2 and AC-2. The DS and ACEC classification for the London Clay Stratum is dependent on the level to which the soil is disturbed and subsequently oxidised. Unweathered London Clay Formation typically contains pyrite, which when oxidised causes an increase the availability of Total Potential Sulphate (TPS). This leads to an increase in sulphate ions which can reach the concrete and cause sulphate attack. For construction processes that avoid ground disturbance and subsequent oxidisation of the soil (such as precast or cast-in-situ piles) the DS and ACEC classification is DS-2 and AC-1s. For activities such as spread footings constructed in an excavation the classification is DS-4 and AC-3s.

12.7 **Material Management and Waste**

12.7.1 Due to the presence of asbestos, localised PAH and TPH and more widespread asbestos, some degree of segregation may be required. A waste assessment was carried out as part of the 2019 investigation and identified soils were predominantly classified as non-hazardous waste. In addition, the quantification results for asbestos have been identified at concentrations below the threshold for hazardous waste. However, due to the potential hotspots of TPH and PAH and pockets of contaminated groundwater identified in the 2020 investigation, removal of some hazardous waste solid be allowed for.

12.7.2 The chemical analysis of the Made Ground has identified asbestos fibres across the site. Quantification has been undertaken on five samples with the greatest result of 0.019%. This is below the hazardous waste threshold. It is anticipated that waste will be formally assessed during groundworks. As an early indication, asbestos fibres will require careful management through dampening down stockpiles / sheeting before disposal.

12.7.3 The laboratory certificates and drilling logs, provided in the appendices, should be provided to the waste receivers to confirm their ability to accept waste arisings from the site. It is the waste producer's responsibility to classify and appropriately manage waste under duty of care (section 34 of the Environmental Protection Act 1990). Further asbestos qualification and WAC testing may be required as part of the future development.

12.8 **Controlled Waters**

12.8.1 Despite the results of the DQRA indicating the risk of site-derived contaminants impacting the river is low, based on the proximity of the River Crane to the site, ongoing monitoring should be undertaken during development to ensure that no adverse impacts to the river are caused during development. Monitoring should involve sampling existing boreholes (if possible) or from new boreholes drilled on the eastern part of the site. The monitoring should also include sampling of surface water from the river at upstream, middle and downstream points. The monitoring should be undertaken pre-development, during development and post-development. Contaminants to be analysed include metals, PAH, TPH CWG and BTEX, phenols, and ammonia/Ammoniacal nitrogen based on the testing completed to date based on the historical use of the site and contaminants previously identified. In addition, parameters including pH, EC, Salinity, NO3, NO2, Mn2+ and Mn3+ will be recorded.

12.9	**Verification**
12.9.1	Further details of the above will be set out in a Remediation Strategy at this juncture. It is noted that this may be subject to change / review upon completion of the DQRA and further gas monitoring (if completed).
12.9.2	A Remediation Method Statement will be required to be prepared once the final site designs are complete. This method statement should be submitted to the appropriate regulatory authorities. It is advised that the local authority is advised of the intended build programme in order that they can phase the sign off of planning conditions as required. It is anticipated that a Verification Report will be required by the Local Authority as a condition of planning. This report will detail the works undertaken and include copies of relevant information as listed below.
12.9.3	The verification works should include site inspection records, photographs, laboratory results, details from the inspection of formation levels, records where unexpected contamination are encountered, a review of Duty of Care / transfer records for the reuse, disposal and transport of soils.
12.9.4	Imported soils should be tested at source by the supplier. The validation engineers should then make spot checks as and when necessary once material has been imported.
12.9.5	Provision should also be made for dealing with further localised hotspots of contamination, which may come to light during construction. Any such soils should be inspected by the validation engineers and appropriate remedial action taken as necessary.

13.0 GEOTECHNICAL RECOMMENDATIONS

13.1	**Geotechnical Discussion – Ground Conditions**
13.1.1	The level of the London Clay drops by about 5m from south to north across the site, this is likely due to historical excavations in the north of the site as part of creosoting works and infrastructure in that area. This will affect required pile lengths/capacity in the north of the site. A contour plot showing the level of the London Clay (mOD) is provided in Appendix 1 overlain over the historical maps from 1935 (Figure 4), and 2018 aerial imagery (Figure 5).
13.1.2	No Lynch Hill Gravel Member was recovered in BH06 and BH07, however there is a thin gravel band in BH07 from 5.2m to 5.3m that is described as dark grey and black, and may be residual Lynch Hill Gravel remaining from previous historical excavations. The Lynch Hill Gravel drops in level from west to east by approximately 3m to 3.5m in total as shown in Figure 6, Appendix 1.

13.1.3 It is understood that vibro stone columns were installed across the site as part of its historical development, these are located beneath the former building on the BA plot and are likely to have comprised stone filled columns to the surface of the Lynch Hill Gravel Member/London Clay. Drawings of the historical development (see Appendix 1) also show substantial buried obstructions associated with the site's former usage, which appear to include a substantial chimney base up to 4m thick from a level of 27mOD (estimated – drawing is unclear). The drawing also refers to historical pile foundations. It is not clear whether these obstructions were removed, therefore pile probing/site clearance is recommended prior to full site commencement. The pile probing/site clearance could be undertaken by using a CPT rig to probe the ground in the vicinity of proposed pile locations.

13.1.4 Made Ground was recovered across the site and varies from 1.5m to 5.8m thick. The recovered material is predominately cohesive, however also contains a significant amount of granular material particularly in the north-east corner of the site. The density/consistency of the material is variable from loose/very soft to medium dense/firm. The Made Ground includes fragments of brick, concrete, tarmacadam, glass, suspected slag, timber, ceramic/pottery, mixed lithologies and some evidence of hydrocarbon contamination. Organic material was also recovered in BH01 at 27.5 to 27.0mOD, suggesting that some of the Made Ground may be reworked Alluvium.

13.2 Geotechnical Design Parameters

13.2.1 Geotechnical design parameters are based on the in-situ Standard Penetration Tests (SPTs), results of the laboratory testing and published data for the well-studied London geology. Parameters have been provided in Table 24.

13.2.2 ***Table 24. Summary of In-situ and Laboratory Strength Testing***

Stratum	**Design Level (mOD)**	**Bulk Weight, γ_b (kN/m³)**	**Undrained Cohesion, c_u (kPa) [c']**	**Angle of friction, φ' (°)**	**Young's Modulus, E_u (MPa) [E']**
Made Ground (cohesive)	31	18	40	25	16 [12]
Lynch Hill Gravel Member	27	20	-	33^{c}	29
London Clay	Varies between 25.2 to 21.05	20	$100 + 4.5z^{a}$ [5]	22^{b}	$60 + 2.7z^{z,d}$ [$45 + 2.03z^{z,e}$]

a. z – depth below top of stratum.
b. BS 8002:2015 Code of practice for Earth retaining structures, British Standards institution.
c. Peck, R.B., Hanson, W.E., and Thornburn, T.H., Foundation Engineering, 2nd Edn, John Wiley, New York, 1967, p.310.
d. Based on $600c_u$ - Burland, Standing J.R., and Jardine F.M. (eds) (2001), Building response to tunnelling, case studies from construction of the Jubilee Line Extension London, CIRIA Special Publication 200.
e. Based on 0.75Eu - Burland, Standing J.R., and Jardine F.M. (eds) (2001), Building response to tunnelling, case studies from construction of the Jubilee Line Extension London, CIRIA Special Publication 200.

13.3 Groundwater

13.3.1 Groundwater strikes were encountered in the Made Ground in the majority of the boreholes at between 27.5mOD in BH01 and 29.8mOD in BH04. Groundwater strikes in the Lynch Hill Gravel Member were encountered at between 25mOD in BH01 and 25.4mOD in BH03 and BH08. Groundwater strikes were also encountered within the London Clay Formation boreholes BH01, BH02, BH06 and BH07.

13.3.2 Groundwater monitoring was undertaken during and following the site investigation. The monitoring records can be found in Appendix 8. The monitoring results are summarised in Table 25. The results show the groundwater within the Made Ground and Lynch Hill Gravel Member only varied slightly. The groundwater within the London Clay Formation (monitoring well BH08 (D)) increased by about 2.5m over two weeks.

13.3.3

Table 25. Groundwater monitoring results

Monitoring Well	Response Zone Stratum	Water Level (mbgl) [mOD]		
		22/01/2020	29/01/2020	12/02/2020
BH1-J	Unknown	3.62	3.64	3.66
BH3-J	Unknown	1.7	1.69	1.74
BH02	Lynch Hill Gravel / London Clay	-	1.83 [28.92]	1.96 [28.79]
BH07	Made Ground	-	4.01 [26.84]	4.20 [26.65]
BH08 (S)	Lynch Hill Gravel Member	-	3.37 [28.03]	3.12 [28.28]
BH08 (D)	London Clay	-	9.32 [22.08]	6.80 [24.6]
WS2 - J	Unknown	-	-	1.85
WS7	Unknown	3.08	3.06	3.20
WS7 - J	Unknown	-	-	1.85

13.3.4 The groundwater levels within the Made Ground and Lynch Hill Gravel Member appear to drop towards the Grand Union Canal to the south and River Crane/Yeading Brook to the east. Based on the monitoring results groundwater flow is likely to be towards the south-east.

13.3.5 A groundwater strike recorded within the London Clay Formation in borehole BH01 at 13.5m bgl (18mOD) (likely claystone) is likely to be a layer of isolated perched water, which is expected to be of limited volume.

13.3.6 Whilst there may be artesian/sub-artesian pressure near the claystone at depth, there is not likely to be a substantial volume. Such water is unlikely to have an impact on the pile bearing capacity, however it should be considered during piling construction so that the contractor is aware of the presence of claystones and water at depth before they come to site and are able to select an appropriate methodology as they see fit and as such Groundwater conditions should be taken into consideration when selecting piling methodology.

13.3.7 Based on the results of monitoring rounds, a design groundwater level within the Made Ground and Lynch Hill Gravel Member of 29mOD is recommended. Water strikes were recorded at higher levels during the borehole investigation, however these are likely to represent perched/localised volumes of water within the Made Ground.

13.4 Shallow Foundations

13.4.1 The findings from the site investigation show a variable thickness of Made Ground and Lynch Hill Gravel Member across the site. The Made Ground is typically over 4m in thickness across the majority of the site and is variable. It is also understood that there are a number of existing concrete pad foundations from the former building on the BA plot.

13.4.2 Given the present ground conditions and concrete obstructions present across the site, shallow foundations are not recommended.

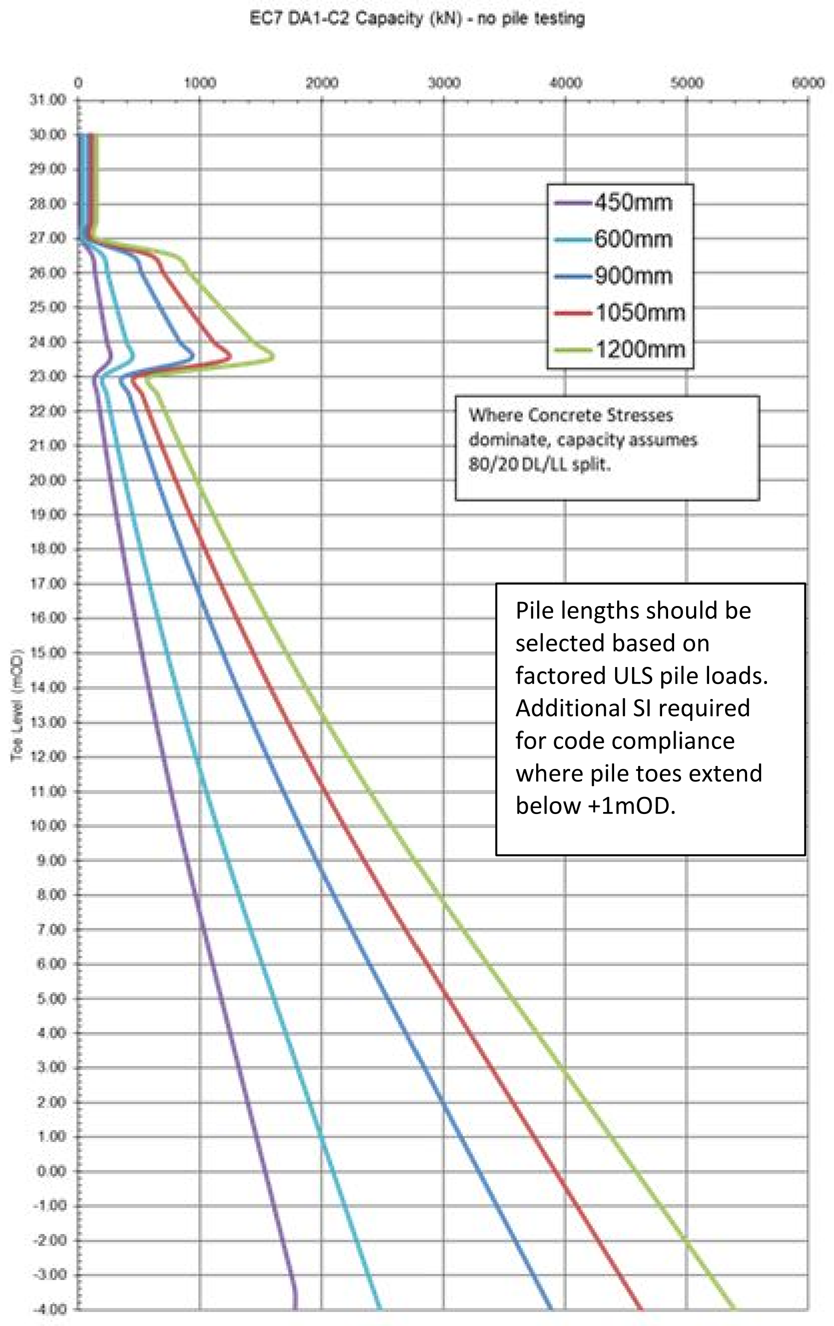
13.5 Piled Foundations

13.5.1 Pile foundations are considered feasible for the proposed scheme. Continuous Flight Auger (CFA) or bored piled foundations with isolated pile caps are considered suitable for the proposed development. CFA piling is typically limited to around 32m depth, while rotary bored piles are typically limited to 75m. It is recommended that a piling contractor be consulted to discuss the most appropriate pile construction method. Groundwater conditions should be taken into consideration when selecting piling methodology.

13.5.2 A preliminary pile design has been undertaken in general accordance with Eurocode 7 Design Approach 1, Combination 2. The preliminary pile design is presented in Graph 2. It is understood that preliminary Ultimate Limit State (ULS) loads are between 1500kN to 4000kN. The following assumptions have been made regarding the preliminary design.

- All piles will be cast in-situ, Continuous Flight Auger (CFA) or bored;
- A pile cut-off level of 30.5mOD and a pile platform level of 31mOD have been used;
- The preliminary design has been carried out in accordance with Eurocode 7 Design Approach 1, Combination 2 assuming no working or preliminary pile loads:
- Combination 2 applies partial factors to the dead and live loads of 1.0 and 1.3 respectively, with geotechnical partial factors of 1.6 for the skin friction, 2.0 for the base capacity and 1.4 for the model factor (model factor value is based on the case of no working or preliminary pile load tests);
- The bearing capacity from the Made Ground has been assumed to be negligible; and
- The top of the London Clay has been assumed to be 23mOD for preliminary pile design. A detailed design will need to consider the variation in levels. The capacity calculation for the stratum assumes an end bearing capacity factor (Nc) of 9, an adhesion value of 0.6 and a limited skin friction of 110kPa.

13.5.3 ***Graph 2. Preliminary pile design***



13.5.4	Eurocode 7 recommends that for pile foundations, the minimum borehole depth should be the largest of the following; note that current investigation data extends to 35mbgl (approximately -4mOD), therefore on this data, pile toe levels should be restricted to a minimum level of 30mbgl (+1mOD). • Pile length + smaller side of the rectangle circumscribing the group of the piles forming the foundation at the level of pile base; • Pile length + 5m; • Pile length + (3 times the pile base diameter).
13.5.5	Based on the above, the approximate loadings for piles with a diameter of 450mm, 600mm, 900mm, 1050mm and 1200mm at a depth of 30mbgl (+1mOD) would be 1200kN, 2000kN, 3200kN, 3700kN and 4400kN respectively. These are factored loads in accordance with Eurocode 7 Design Approach 1, combination 2. Therefore, the London Clay formation is considered to be a suitable bearing stratum at this stage. However, this will need to be reassessed once further information becomes available, because, if the loads increase, or the pile diameters reduce, then deeper boreholes would be required as the recommended minimum investigation depth required under Eurocode 7 could exceed the existing site investigation depth.
13.5.6	There are a number of buried infrastructure assets across the site including gas mains and a sewer. It is recommended that the pile foundations should be arranged around these assets and structural loads bridged over the assets to avoid surcharging the ground above them. Piles nearest to these assets may need to be cased to the asset invert level, in order to prevent additional surcharge. Given the proximity of the piles to these assets, it is recommended that an asset impact assessment is carried out for the sewer. As the gas main is at a shallow depth, an impact assessment is not considered necessary. The impact assessment on the sewer should take the following into consider: • Ground movements induced by pile installation and ground loss; • Piling induced ground borne vibrations; • Vertical loads from bearing piles; and • Construction activity loads at ground level above the assets.
13.5.7	The northern site boundary runs parallel to a Network Rail railway line. Given the proximity of the railway line to the site, it is likely that a third-party Category 3 design check would be required for activities such as a working platform design or a tower crane base. It is recommended that Network Rail be consulted to discuss the proposed works.

13.6 **Buried Concrete Sulphate Durability Classification**

13.6.1 Soil samples from the strata encountered were sent for laboratory testing to determine the sulphate concentrations and pH in general accordance with Building Research Establishment (BRE) SD1 guidance[1]. The test results can be found in Appendix 9. A summary of the Design Sulphate (DS) and Aggressive Chemical Environment for Concrete [ACEC] classes are provided in Table 26. The DS and ACEC classification for the London Clay Stratum is dependent on the level to which the soil is disturbed and subsequently oxidised. Unweathered London Clay Formation typically contains pyrite, which when oxidised causes an increase the availability of Total Potential Sulphate (TPS). This leads to an increase in sulphate ions which can reach the concrete and cause sulphate attack. For construction processes that avoid ground disturbance and subsequent oxidisation of the soil (such as precast or cast-in-situ piles) the DS and ACEC classification is DS-2 and AC-1s. For activities such as spread footings constructed in an excavation the classification is DS-4 and AC-3s.

13.6.2 ***Table 26. Design Sulphate (DS) classification for encountered soil strata***

Stratum	pH	Water Soluble Sulphate as SO_4 (2:1) mg/l	Total Sulphur (mg/kg)	Oxidisable Sulphides (OS % SO_4)	Design Sulphate (DS) Class [ACEC]
Made Ground	7.2 to 8.8	28 to 960	-	-	DS-2 [AC-2]
Lynch Hill Gravel Member	7.2 to 7.9	29 to 510	-	-	DS-2 [AC-2]
London Clay Formation	8.5 to 9.0	280 to 850	2900 to 13000	0.811 to 3.74	DS-2 [AC-1s]

13.7 **Floor Slabs**

13.7.1 Given the variability of the Made Ground, the likelihood of obstructions in the ground and the presence of live services across the site, suspended floor slabs are recommended. It is understood that the current design includes a suspended floor slab, supported by piles, but is also in contact with the ground. Geotechnically, casting the floor slabs on the ground is acceptable provided that the slabs are designed to span between the piles and take no reliance on the ground between the piles for support (e.g. they are suspended). If reliance on the ground beneath the supports is required (e.g. the slabs are designed as ground bearing), then vibro compaction/ground improvement should be considered.

[1] Building Research Establishment. (2005). Special Digest 1 – Concrete in aggressive ground, third edition.

13.8	**Pavements and Roads**
13.8.1	The Made Ground has been found to be predominantly cohesive and is variable across the site, a design CBR value of 3.5% based on insitu testing would be considered appropriate for initial road and pavement design. Note that proof-rolling or the inclusion of lime/cement in the top surface may improve this value. The roads should be designed in line with Design Manual for Roads and Bridges (DMRB), dated 2020 and Transport and Road Research Laboratory (TRRL) Laboratory Report 1132: The structural design of bituminous roads (dated 1984). Based on a preliminary guide and to account for potential future settlement of the road due to the underlying Made Ground and potentially landfilled material, 150mm subbase plus 350mm capping would be required. In addition, drainage should be managed through offsite routes rather than soakaways onsite to limit the potential for future settlement. Further testing will be required once final designs are prepared.
13.9	**Excavations**
13.9.1	The Made Ground has been found to contain areas of very soft/loose material which could be unstable during excavations. It is therefore recommended that all excavations are supported. Due to the shallow groundwater level across the site (at around 2m bgl) excavations will likely require groundwater mitigation measures, such as sump pumps.

14.0 CONCLUSIONS

14.1	The results from the investigation have indicated that the majority of the site is underlain by Made Ground to a depth of 5.8mbgl over the Lynch Hill Gravel Member to a depth of approximately 10.2mbgl. The chemical analysis has identified asbestos within the soil and elevated concentrations of TPH and PAH within the groundwater. In addition, a potential gas and vapour risk has been identified. These impacts are considered to relate to the historical development of the site, which has a longstanding industrial legacy as a creosote works and power station.
14.2	Overall, it is considered that there is a **Moderate Risk** associated with the site in respect of land contamination. However, such risks are commensurate with a brownfield site of this nature and it is anticipated that many of the risks would be addressed / mitigated as part of the development process as set out above. Following inclusion of such measures to the new development, it is anticipated that the risks identified would be reduced to low.
14.3	Based on the investigation carried out to date, it is anticipated that a piled foundation solution will be required. The ground conditions are commensurate with published geological records and given the significant loadings proposed from the current development design, a piled foundation is likely to be required. At this stage, CFA or bored piles could be considered, on the basis that a Pilling Works Risk Assessment is carried out and approved by the Environment Agency.

APPENDIX 1: FIGURES

0 50 100 m

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65 Southwark Street
London
SE1 0HR
020 7125 0112
www.paragonbc.co.uk

Notes:

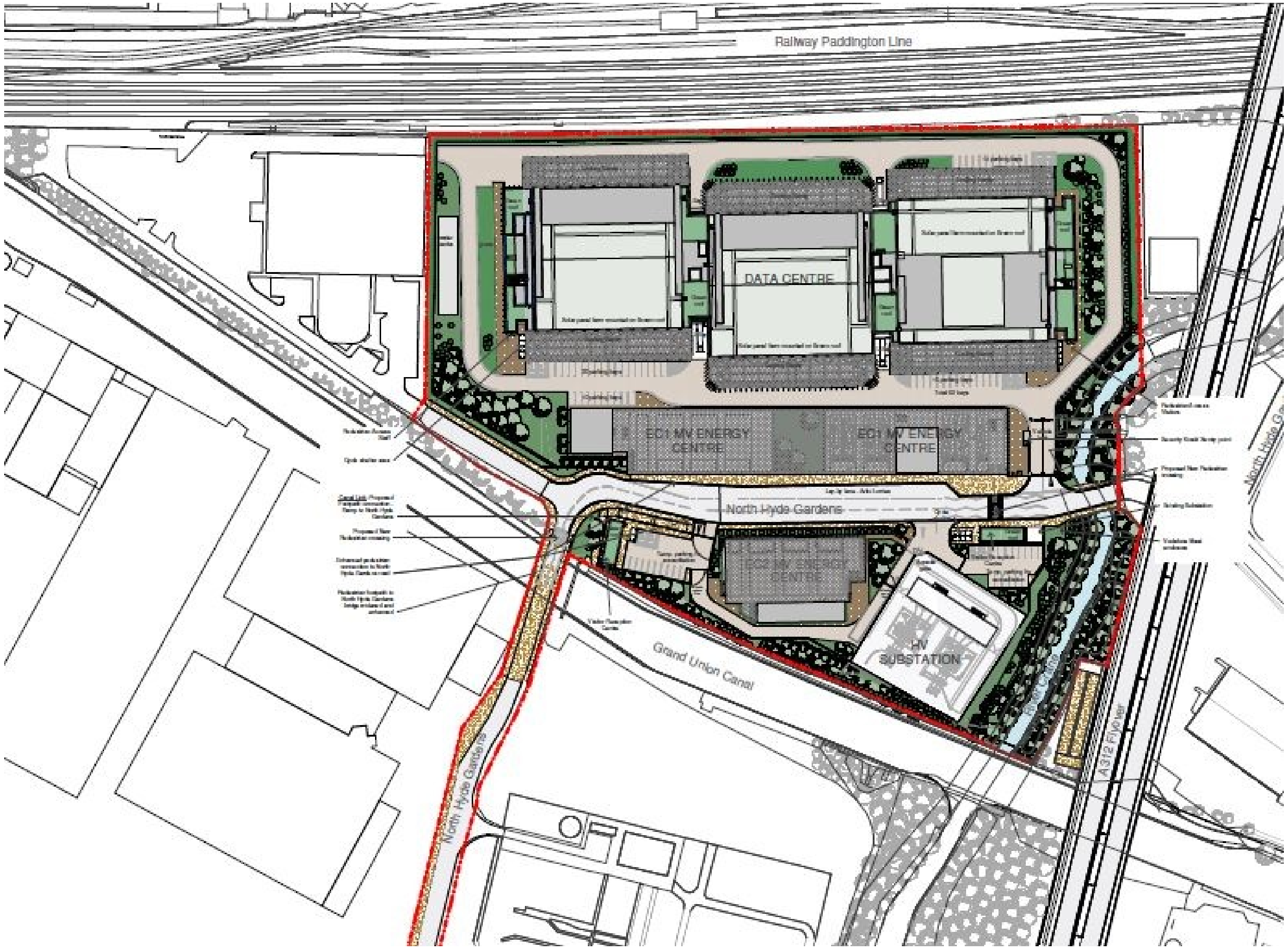
Basemap: Google 2019. Insert Map: Google 2019.

Site Location

Development Area

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale 1:3000 Drawn by CB Approved By CK
Title Site Location Plan	Drawing Number 1 Date 17/12/2020



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Notes:

Drawing based on Nicholas Webb Architects plc, Project Union A90 - External Works Site Plan, Aerial View. Ref: NWA-0471-SN-ZZ-DR-A-90-005. P01. Dated 27/03/20, amended 18/08/2021.

Development Plot

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale Not to scale Drawn by CB Approved By CK
Title Proposed Development Plan	Drawing Number 2 Date 03/11/2021

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Notes:

Drawing based on the results from the Ground Engineering Ltd Utility Survey. Ref: 35406. Dated: 19/07/2019.

Key

Exploratory Locations Paragon 2020

CBR

Borehole

Site Boundary

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale 1:3000 Drawn by CB Approved By CK
Title Intrusive Exploratory Locations	Drawing Number 3 Date 17/12/2020

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Notes:

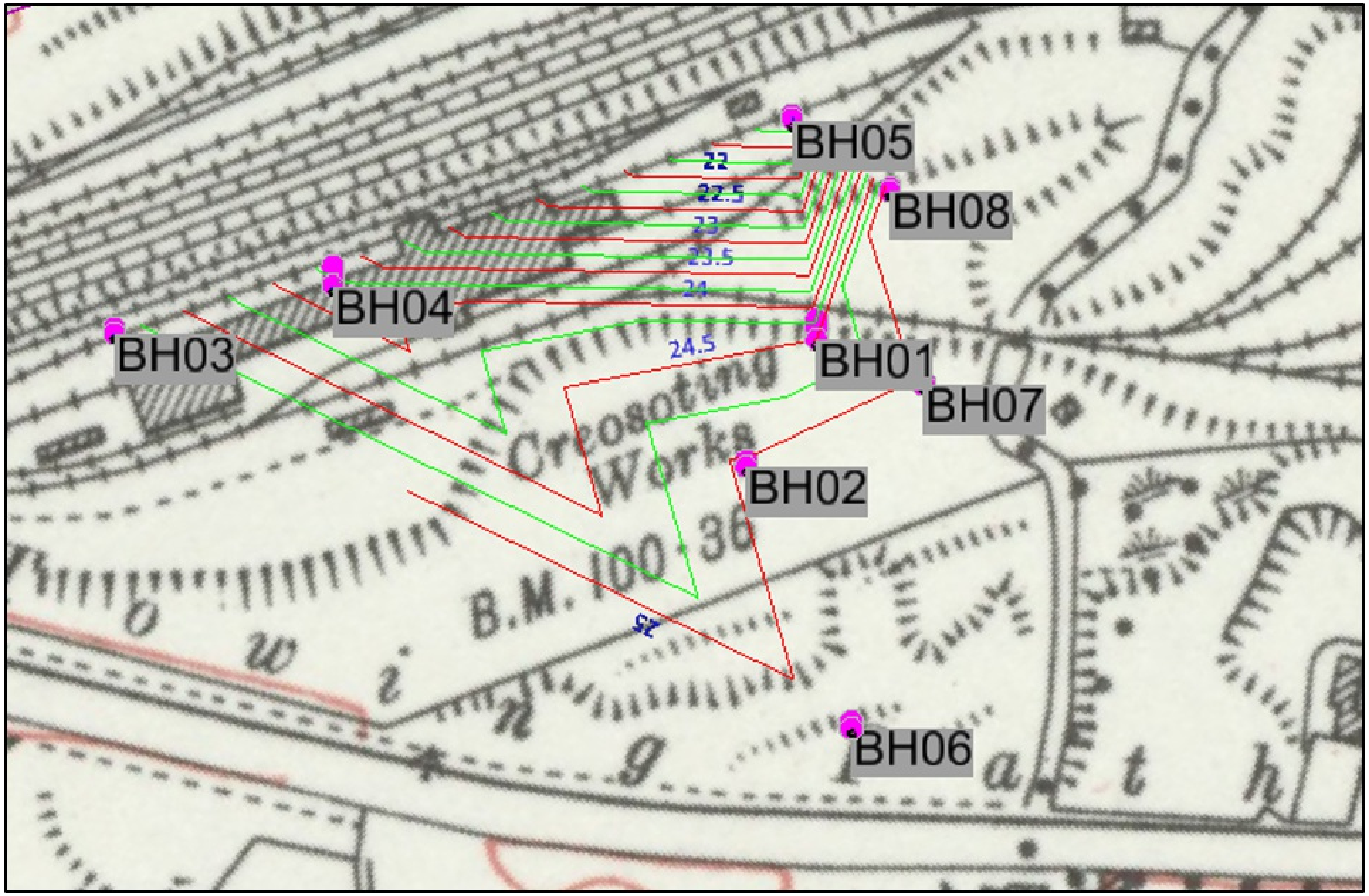
Drawing based on the results from the Ground Engineering Ltd Utility Survey. Ref: 35406. Dated: 19/07/2019.

Key

- CBR Paragon 2020
- Borehole Paragon 2020
- Hand Pit Paragon 2019
- Borehole Paragon 2019
- Trial Pit Paragon 2019
- Borehole Paragon 2019 Additional Phase
- Trial Pit Paragon 2019 Additional Phase
- Jomas Boreholes 2018
- Development Area

Rev	Description	Date

Project Bulls Bridge, Hayes	Scale 1:3000 Drawn by CB Approved By CK
Title Historical Investigation Locations	Drawing Number 4 Date 17/12/2020



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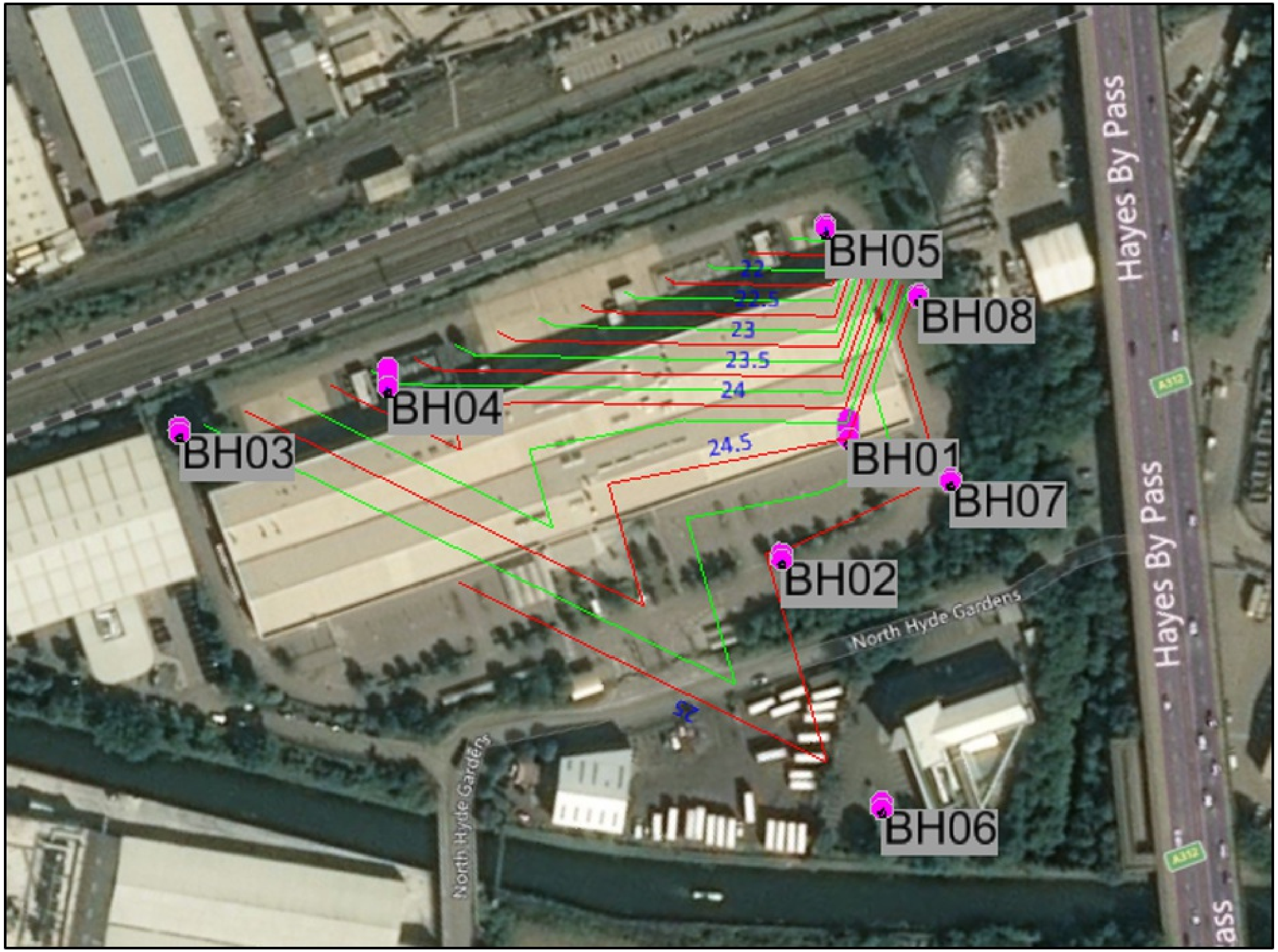
Rev	Description	Date

Project Bulls Bridge, Hayes	Scale Not to Scale
	Drawn by CB
	Approved By CK
Title Top of London Clay in Relation to a Historical Ordnance Survey Map from circa 1935	Drawing Number 4
	Date 28/02/2020



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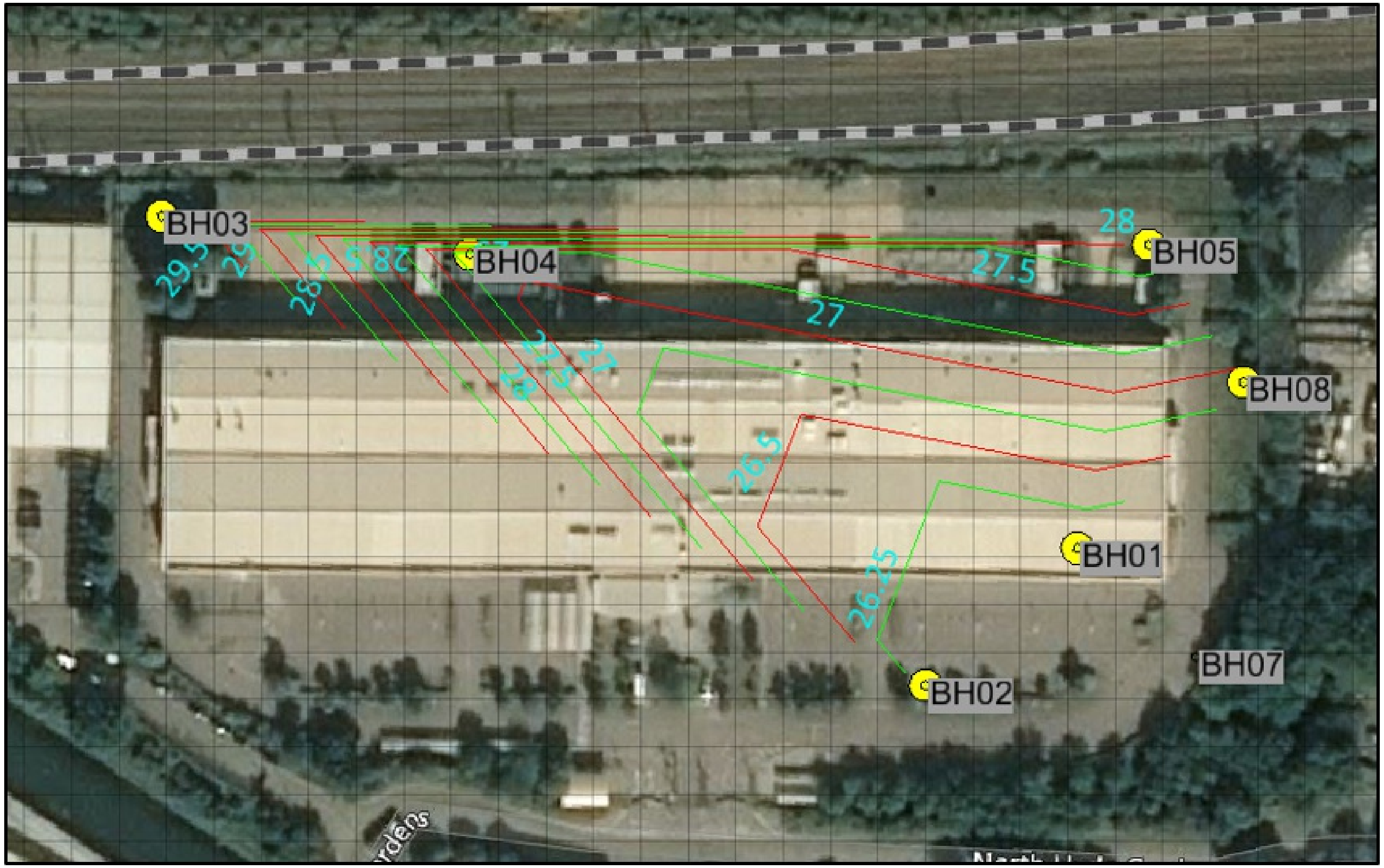
Rev	Description	Date

Project Bulls Bridge, Hayes	Scale Not to Scale Drawn by CB Approved By CK
Title Top of London Clay in Relation to 2018 Aerial Image	Drawing Number 5 Date 28/02/2020



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Rev	Description	Date

Project Bulls Bridge, Hayes	Scale Not to Scale
	Drawn by CB
	Approved By CK
Title Top of Lynch Hill Gravel Member in Relation to the 2018 Aerial Image	Drawing Number 6
	Date 28/02/2020

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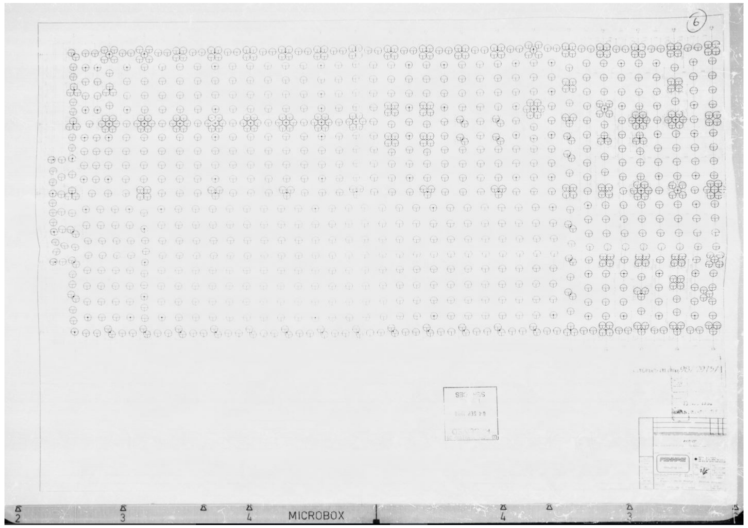
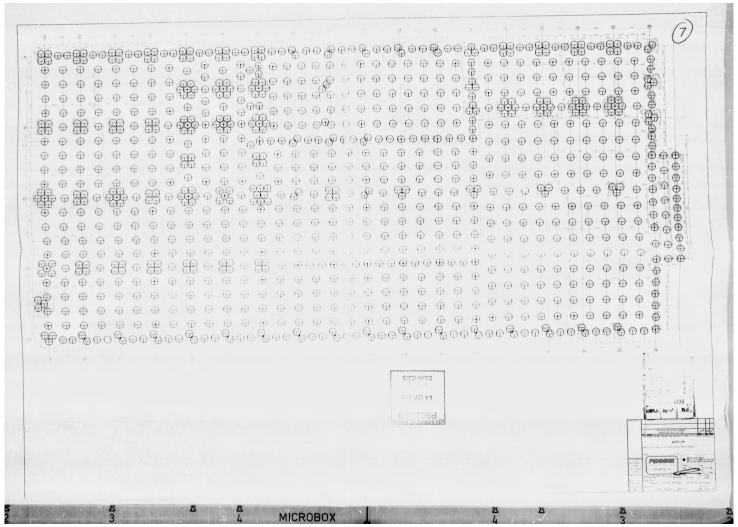
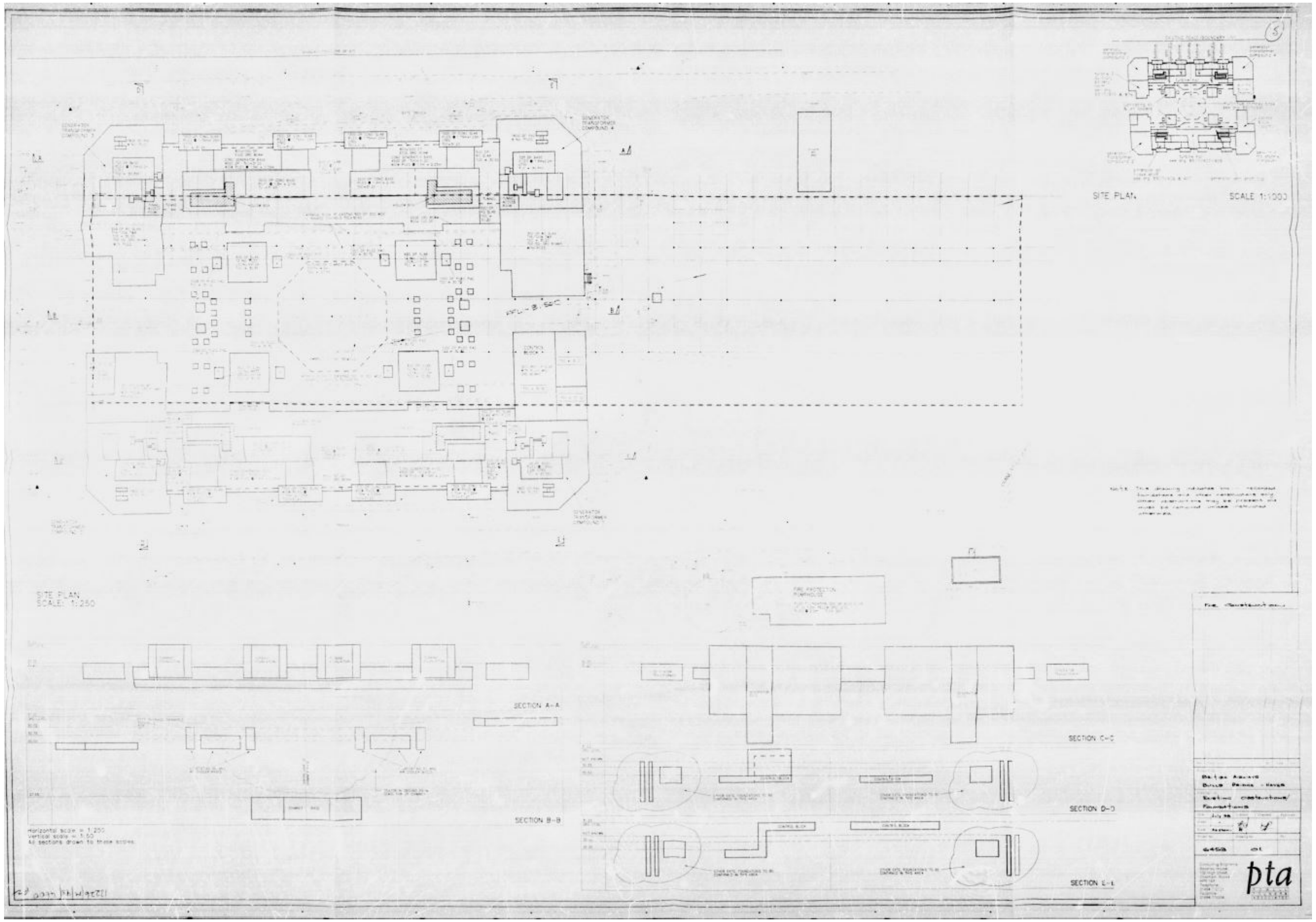




Rev	Description	Date

Project Bulls Bridge, Hayes	Scale Not to Scale
	Drawn by CB
	Approved By CK
Title Vibro Piles Beneath the former British Airways Building	Drawing Number 7
	Date 28/02/2020



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Rev	Description	Date

Project Bulls Bridge, Hayes	Scale Not to Scale
	Drawn by CB
	Approved By CK
Title Foundations beneath the Historical Power Station	Drawing Number 8
	Date 28/02/2020

APPENDIX 2: PHOTOGRAPHS

01: BA Plot Overview

02: BA Plot Overview

03: BA Plot Overview

04: Demolition material remaining onsite

05: Sonic Drilling Rig

06: Sonic Drilling Rig

07: Vodafone Plot

08: Vodafone Plot

APPENDIX 3: FIELD METHODS

3.0 FIELD METHODS

3.1 Design of Investigation

3.1.1 The site investigation was broadly undertaken in general accordance and with reference, where relevant to the following documents:

- Specification for Ground Investigation, Site Investigation Steering Group, Thomas Telford, 1994;
- British Standard BS10175:2011 (A2) Investigation of potentially contaminated sites – code of practice, as amended;
- Environment Agency (2000) Secondary model procedures for the development of appropriate soil sampling strategies for land contamination. Technical Report P5-066/TR;
- DEFRA/Environmental Agency Report: Land Contamination: Risk Management (LCRM) 2019;
- BS5930, 2015. Code of Practice for Ground Investigation;
- BS1377 (1990) Methods of test for Soils for Civil Engineering Purposes;
- BS EN 1997-2 (2007) Eurocode 7 – Geotechnical Design – Ground Investigation and Testing; and
- BS IS0 5667-22:2010 Water quality. Sampling. Guidance on the design and installation of groundwater monitoring points.

3.1.2 The works were progressed on site by a subcontractor who have been scrutinised by Paragon and are on Paragon's approved sub-contractor list. The investigation was designed to provide a preliminary assessment of the ground conditions at the subject site. Prior to the progression of the site investigation, all areas were checked for services.

3.2 Onsite Methods

3.2.1 The service inspection pits were excavated using a hand digging tools and a hand auger.

3.2.2 Boreholes were drilled using a sonic drilling rig. Casing was used to keep the borehole open and a water flush was added throughout drilling.

3.2.3 Onsite geotechnical testing included Standard Penetration Testing (SPT), and a hand vane was used to determine the shear strength.

3.2.4 Soils were logged by a qualified engineering geologist in general accordance with BS 5930: 1999+A2:2010 and BS EN ISO 14688 Pt 1&2. A Photo Ionisation Detector (PID) was used to detect volatile organic compounds in soil.

3.3 Constraints

3.3.1 The ground conditions reported relate only to the point of excavation and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the site. Whilst such exploratory holes would usually provide a reasonable indication as to the general ground conditions these cannot be determined with complete certainty.

3.4	**Monitoring Well Installation**
3.4.1	Upon completion of the borehole a monitoring well was installed with 50mm HDPE well pipe to depths presented on the borehole logs. A slotted section of well pipe was surrounded by gravel to provide a 'response zone'. A plain section of pipe was surrounded by bentonite to produce a seal.
3.4.2	Groundwater levels within the gas monitoring wells were recorded during each visit using an electronic dip/interface meter.
3.5	**Sampling and Testing Strategy**
3.5.1	All the exploratory holes were logged and sampled by a site engineer. Testing and sampling at the site was undertaken to investigate the ground conditions present.
3.5.2	Soil samples were collected from across the site and at different depths within each trail position to provide an even coverage of the site.
3.5.3	Geotechnical bulk disturbed samples were obtained from the strata encountered and were subjected to careful examination.
3.5.4	Environmental soil samples representative of the underlying conditions were collected and submitted for a suite of determinants based on the risks identified in the Phase 1 report and the specific ground conditions identified during the intrusive investigation. The soil samples were transported to an appointed United Kingdom Accreditation Service (UKAS) accredited laboratory.
3.6	**Quality Control**
3.6.1	The samples were despatched under a chain of custody procedure to a UKAS accredited laboratory, for subsequent chemical analysis. Where appropriate, samples were stored within cool boxes containing ice packs. A Chain of Custody is included with all sample consignments.
3.7	**Gas Monitoring**
3.7.1	The wells were monitored for methane, carbon dioxide, oxygen and hydrogen sulphide using a multi-gas analyser (GFM436).
3.7.2	The wells screened for the presence of Volatile Organic Compounds using a Photo Ionisation Detector (PID).
3.7.3	Ground gas monitoring was carried out in general accordance with the guidelines presented in CIRIA C665 'Assessing risk posed by hazard ground gases to buildings'. Flow was monitored for a period of two minutes where possible; maximum flow was recorded. Ground gases, including concentrations of methane, carbon dioxide, hydrogen sulphide and carbon monoxide were monitored for up to five minutes. During monitoring, ground gas readings were logged every thirty seconds.

3.7.4	Following gas monitoring, water levels are checked using an interface meter, which is also capable of detecting the presence of free product. If groundwater is present, then water samples were retrieved using bailers. Prior to groundwater sampling, up to three times the well volume was purged to remove stagnant / rain water.
3.8	**Health and Safety**
3.8.1	A site-specific Risk Assessment and Method Statement (RAMS) was produced prior to the works beginning on site; works were completed in general accordance with the methodology set up in this assessment. No incidents occurred during this investigation.

APPENDIX 4: BOREHOLE LOGS

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Unit 8
Orton Enterprise Centre
Orton Southgate
Peterborough
PE2 6XU

SPT Hammer Ref:	XL140 (Sonic Dual Head)
Test Date:	06/01/2020
Report Date:	06/01/2020
File Name:	XL140.spt
Test Operator:	CR

Instrumented Rod Data

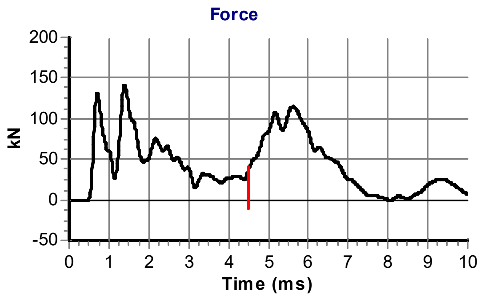
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	11941
Accelerometer No.2:	11942

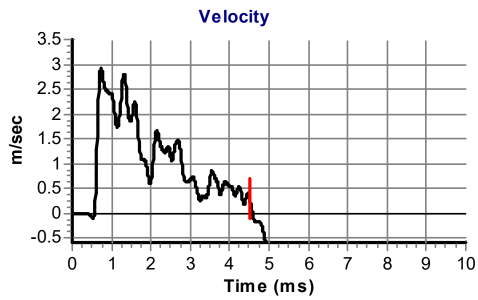
SPT Hammer Information

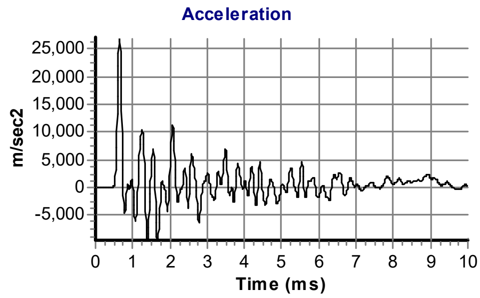
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	15.0

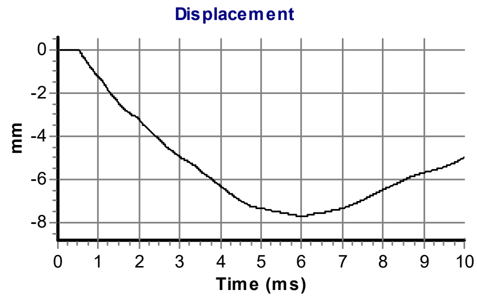
Comments / Location

Recommended calibration interval is 6 months.
Sonic CPT









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	382

Energy Ratio E_r (%): **80**

CR

Signed: CR
Title: Operator

IGE consulting

Suite 4, 14-32 Hewitt St. Manchester, M15 4GB
email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk
tel: 0161 237 9310

Sonic Borehole Log

ver. 1.3

Borehole No. **BH01**

Project Name:	Hayes	Co-ords:	510512E - 179302N
Location:	London	Level (m AOD):	31.50
Client:	Paragon Building Consultancy Ltd.	Date:	23/01/2020
		Weather:	Cold and dry

Project No. 3249
Logged By AJ
Checked By AL

Sample Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
			0.10	31.40	CONCRETE underlain by blue geotextile. MADE GROUND
0.30	PID	0.00ppm	0.40	31.10	Brownish grey, gravelly SAND. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
1.00	PID	0.00ppm	1.20	30.30	Soft to firm, dark brown, mottled reddish brown, slightly gravelly, slightly sandy CLAY. Gravel is angular to subangular of fine to coarse red brick (30%) and mixed lithologies (70%). MADE GROUND
2.40	PID	0.00ppm	2.50	29.00	Dark grey to black, slightly sandy, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse red brick (20%), suspected slag (20%) and mixed lithologies (60%). MADE GROUND
2.90 3.00	PID SPT(C)	0.00ppm N=6 (1,1/1,2,2,1)	3.00	28.50	Soft to firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			4.00	27.50	Very soft to soft, greyish brown, mottled dark grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
4.30	PID	0.00ppm	4.50	27.00	Very soft to soft, dark grey to black, slightly gravelly, slightly sandy CLAY with occasional gravel sized organic pockets. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			4.80	26.70	Dark grey, clayey GRAVEL. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
			5.50	26.00	Very soft to soft, brownish grey, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			6.25	25.25	Yellowish brown, sandy, slightly clayey GRAVEL. Gravel is subrounded to well rounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			6.60	24.90	Soft, orangish brown, sandy, silty CLAY. LYNCH HILL GRAVEL MEMBER
			6.65	24.85	Orangish brown SAND. LYNCH HILL GRAVEL MEMBER
6.80		HVP=85	7.00	24.50	Firm to stiff, orangish brown, slightly sandy, silty CLAY. LYNCH HILL GRAVEL MEMBER
7.00 7.20 7.40 7.50 - 7.95	 UT	HVP=71 HVP=72 HVP=73	8.00	23.50	Stiff, greyish brown, slightly sandy, silty CLAY. LONDON CLAY
9.00	SPT(C)	N=23 (4,4/5,5,6,7)	9.50	22.00	Soft to firm, greyish brown, slightly sandy, silty CLAY recovered as grey, slightly sandy, very clayey GRAVEL. LONDON CLAY
10.00		HVP=101			Firm to stiff, brown, slightly sandy, silty CLAY with rare gravel. Gravel is subangular to subrounded of fine to coarse mixed lithologies. LONDON CLAY

Remarks:
Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 22.00m bgl.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
4.00	Slow Ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk
tel: 0161 237 9310

Sonic Borehole Log

ver. 1.3

Borehole No. **BH01**

Project Name:	Hayes	Co-ords:	510512E - 179302N	Project No. 3249
Location:	London	Level (m AOD):	31.50	Logged By AJ
Client:	Paragon Building Consultancy Ltd.	Date:	23/01/2020	Checked By AL
		Weather:	Cold and dry	

Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
					Firm to stiff, brown, slightly sandy, silty CLAY with rare gravel. Gravel is subangular to subrounded of fine to coarse mixed lithologies. LONDON CLAY
10.30		HVP=93	10.35	21.15	Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
10.50		HVP=94			
10.70		HVP=120			
10.90		HVP=120			
11.10		HVP=120			
11.30		HVP=120			*Becoming stiff from 11.50m bgl*
11.90		HVP=120			
12.00	U				
			12.15	19.35	Stiff, greyish brown, slightly sandy, silty CLAY recovered as grey, slightly sandy, very clayey GRAVEL. LONDON CLAY
			12.40	19.10	Stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
12.50		HVP=120			
12.60		HVP=120			
12.70		HVP=103			
13.10		HVP=120			
			13.20	18.30	Stiff, greyish brown, slightly sandy, silty CLAY recovered as grey, slightly sandy, very clayey GRAVEL. LONDON CLAY
					U100 attempted at 13.50m bgl but gravel band encountered.
			13.80	17.70	Stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
13.90		HVP=104			
14.30		HVP=118			
14.60		HVP=120			
14.90		HVP=120			
15.00	SPT(C)	N=25 (4,4/5,6,7,7)			
15.20		HVP=120			
15.50		HVP=120			
15.80		HVP=120			
16.20		HVP=120			
16.40		HVP=120			
16.70		HVP=120			
17.00	U				
17.20		HVP=120			
17.40		HVP=120			
17.60		HVP=120			
17.80		HVP=120			
18.20		HVP=110			
18.50		HVP=112			
18.90		HVP=120			
19.00	SPT	N=28 (5,5/6,7,7,8)			
19.30		HVP=120			
19.50		HVP=120			
19.70		HVP=120			
			20.00	11.50	

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 22.00m bgl.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
4.00	Slow Ingress

IGE consulting	Suite 4, 14-32 Hewitt St. Manchester, M15 4GB email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 237 9310

Sonic Borehole Log

ver. 1.3

Borehole No. **BH01**

Project Name:	Hayes	Co-ords:	510512E - 179302N	Project No. 3249
Location:	London	Level (m AOD):	31.50	Logged By AJ
		Date:	23/01/2020	
Client:	Paragon Building Consultancy Ltd.	Weather:	Cold and dry	Checked By AL

Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
			20.40	11.10	Stiff, greyish brown, slightly sandy, silty CLAY recovered as grey, slightly sandy, very clayey GRAVEL. LONDON CLAY
20.60		HVP=100	20.70	10.80	Firm, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
20.80		HVP=120			Stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
21.00	U				
21.10		HVP=120			
21.50		HVP=120			
21.90		HVP=120			
23.00	SPT	N=29 (4,5/6,7,7,9)			
25.00	U				*Becoming firm between 25.00m and 25.30m bgl.*
25.20		HVP=48			*Becoming stiff to very stiff from 25.30m bgl.*
25.40		HVP=120			
27.00	SPT(C)	N=34 (6,7/7,8,9,10)			*Becoming firm to stiff between 27.00m and 27.80m bgl.*
27.60		HVP=108			
29.00	U				

Depth scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Remarks:

Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 22.00m bgl.

Casing Details			Sample Sleeve Runs		
Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike	
Depth Strike (m)	Remarks
4.00	Slow Ingress

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email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk
tel: 0161 237 9310

Sonic Borehole Log

ver. 1.3

Borehole No.	BH01
Sheet 4 of 4	
Project Name:	Hayes
Location:	London
Client:	Paragon Building Consultancy Ltd.
Co-ords:	510512E - 179302N
Level (m AOD):	31.50
Date:	23/01/2020
Weather:	Cold and dry
Project No.	3249
Logged By	AJ
Checked By	AL

Well / Backfill	Water Strikes	Sample and In Situ Testing Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
								Stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
		31.00	SPT(C)	N=50 (7,8/50 for 509mm)				
		33.50	U					
		35.00	SPT(C)	N=59 (9,10/59 for 455mm)	35.00	-3.50		Window Sample terminated at 35.00m.

Depth scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Remarks:

Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 22.00m bgl.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
4.00	Slow Ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

Rotary Core Photos	**BH01**
	Hayes

Image 1. :
Photo to be viewed from right to left, top to bottom:
3.00m - 3.75m bgl
3.75m - 4.50m bgl

Image 2. :
Photo to be viewed from right to left, top to bottom:
4.50m - 5.25m bgl
5.25m - 6.00m bgl
6.00m - 6.75m bgl
6.75m - 7.50m bgl

Rotary Core Photos

BH01

Hayes

Image 3. :
Photo to be viewed from right to left, top to bottom:
0.00m - 1.00m bgl
1.00m - 2.00m bgl
2.00m - 3.00m bgl

Image 4. :
Photo to be viewed from right to left, top to bottom:
8.00m - 8.75m bgl
8.75m - 9.50m bgl

Rotary Core Photos

BH01

Hayes

Image 5. :
Photo to be viewed from right to left, top to bottom:
9.50m - 10.00m bgl
10.00m - 10.50m bgl
10.50m - 11.00m bgl
11.00m - 12.00m bgl

Image 6. :
Photo to be viewed from right to left, top to bottom:
12.00m - 12.60m bgl
12.60m - 13.50m bgl

Image 7. :
Photo to be viewed from right to left, top to bottom:
18.00m - 19.00m bgl
19.45m - 20.00m bgl

Image 8. :
Photo to be viewed from right to left, top to bottom:
20.00m - 21.00m bgl
21.00m - 22.00m bgl
22.00m - 23.00m bgl
23.00m - 24.00m bgl
24.00m - 25.00m bgl

Rotary Core Photos

BH01

Hayes

Image 9. :
Photo to be viewed from right to left, top to bottom:
25.00m - 26.00m bgl
26.00m - 27.00m bgl
27.00m - 28.00m bgl
28.00m - 29.00m bgl
29.00m - 30.00m bgl

Image 10. :
Photo to be viewed from right to left, top to bottom:
30.00m - 31.00m bgl
31.00m - 32.00m bgl
32.00m - 33.00m bgl
33.00m - 34.00m bgl
34.00m - 35.00m bgl

Rotary Core Photos

BH01

Hayes

Image 11. :
13.88m - 14.50m bgl
14.50m - 15.75m bgl
15.75m - 16.75m bgl
16.75m - 18.00m bgl

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Sonic Borehole Log

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Borehole No. **BH02**

Project Name: Hayes	Co-ords:	510480E - 179273N	Project No. 3249
Location: London	Level (m AOD):	30.75	Logged By AJ
	Date:	23/01/2020	
Client: Paragon Building Consultancy Ltd.	Weather:	Cold and dry	Checked By AL

Sample Depth(m)	Type	Results
1.20	SPT(C)	N=10 (2,2/3,3,2,2)
1.50	ES	
1.50	PID	0.40ppm
1.80	PID	0.20ppm
3.00	SPT(C)	N=12 (2,2/2,3,3,4)
6.00	SPT	N=16 (2,3/3,4,4,5)
6.40		HVP=81
6.60		HVP=82
7.00		HVP=79
7.10		HVP=96
7.30		HVP=94
7.40		HVP=93
7.70		HVP=84
7.70		HVP=91
7.90		HVP=87
7.90		HVP=93
8.10		HVP=95
8.30		HVP=97
8.50		HVP=98
8.70		HVP=107
8.90		HVP=108
9.00 - 9.45	UT	
9.00		HVP=103
9.20		HVP=63
10.00		HVP=120

Water strikes at 3.00 m and 6.00 m.

Depth (m)	Level (m AOD)	Stratum Description
0.05	30.70	TARMACADAM. MADE GROUND
0.90	29.85	Dark grey SAND and GRAVEL. Gravel is angular to subrounded of fine to coarse concrete (20%), red brick (30%) and mixed lithologies (50%). MADE GROUND
4.60	26.15	Soft to firm, grey to dark grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND. *Becoming dark grey with a black stained timber fragment with slight hydrocarbon odour at 1.50m bgl.* *With slight hydrocarbon sheen at 1.80m bgl.*
5.40	25.35	Firm, yellowish brown, mottled grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
5.70	25.05	Yellowish brown, sandy, slightly clayey GRAVEL. Gravel is subangular to well rounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
6.00	24.75	Firm to stiff, brown, slightly sandy, silty CLAY. LONDON CLAY
6.30	24.45	Stiff, greyish brown, slightly sandy, silty CLAY recovered as grey, slightly sandy, very clayey GRAVEL. LONDON CLAY
		Firm to stiff, greyish brown, slightly sandy, silty CLAY. LONDON CLAY. *Becoming stiff from 7.00m bgl*

Remarks:

Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
3.00	Very Slow Ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Sonic Borehole Log

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Borehole No. **BH02**

Project Name: Hayes	Co-ords:	510480E - 179273N	Project No.	3249
Location: London	Level (m AOD):	30.75	Logged By	AJ
	Date:	23/01/2020		
Client: Paragon Building Consultancy Ltd.	Weather:	Cold and dry	Checked By	AL

Well / Backfill	Water Strikes	Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
							Firm to stiff, greyish brown, slightly sandy, silty CLAY. LONDON CLAY
		10.40		HVP=120			
		10.50	SPT	N=24 (4,4/5,6,6,7)			
		10.60		HVP=120			*With thin bands of brownish grey, clayey GRAVEL between 10.65m - 10.70m, and 10.90m - 11.00m bgl. Gravel is subangular to subrounded of fine to coarse mixed lithologies.*
		11.50		HVP=113			
		11.70		HVP=118			
		11.90		HVP=120			
		12.00 - 12.45	UT				*Becoming stiff to very stiff from 12.00m bgl*
		12.10		HVP=120			
		12.30		HVP=120			
		12.50		HVP=120			
		12.70		HVP=118			
		12.70		HVP=120			
		13.10		HVP=120			
		13.30		HVP=120			
		13.45		HVP=120			
		13.50	SPT	N=29 (4,5/6,6,8,9)			
		13.70		HVP=120			
		13.90		HVP=120			
		14.10		HVP=120			
		14.40		HVP=120			
		14.60		HVP=120			
		14.80		HVP=120			
		14.95		HVP=120	15.00	15.75	
							Window Sample terminated at 15.00m.

11 12 13 14 15 16 17 18 19 20

Remarks:
Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details		
Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike	
Depth Strike (m)	Remarks
3.00	Very Slow Ingress

Sample Sleeve Runs		
Depth Top (m)	Depth Base (m)	Diameter (mm)

Rotary Core Photos

BH02

Hayes

Image 1. :
Photo to be viewed from left to right, top to bottom:
4.50m - 5.25m bgl
5.25m - 6.00m bgl

Image 2. :
Photo to be viewed from left to right, top to bottom:
6.00m - 7.00m bgl
7.00m - 7.50m bgl

Image 3. :
Photo to be viewed from left to right, top to bottom:
12.50m - 12.85m bgl
12.85m - 13.50m bgl

Rotary Core Photos

BH02

Hayes

Image 4. :
Photo to be viewed from left to right, top to bottom:
13.50m - 14.00m
14.00m - 15.00m

Image 5. :
Photo to be viewed from left to right, top to bottom:
0.50m - 1.50m bgl

Image 6. :
Photo to be viewed from left to right, top to bottom:
1.50m - 2.00m bgl
2.00m - 3.00m bgl

Rotary Core Photos

BH02

Hayes

Image 7. :
Photo to be viewed from left to right, top to bottom:
3.00m - 3.50m bgl
3.50m - 4.50m bgl

Image 8. :
Photo to be viewed from left to right, top to bottom:
7.50m - 8.00m bgl
8.00m - 9.00m bgl

Image 9. :
Photo to be viewed from left to right, top to bottom:
10.50m - 11.00m bgl
11.00m - 12.00m bgl

Image 10. :
Photo to be viewed from left to right, top to bottom:
9.50m - 10.50m bgl

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Borehole No. **BH03**

Project Name:	Hayes	Co-ords:	510319E - 179372N
Location:	London	Level (m AOD):	31.40
Client:	Paragon Building Consultancy Ltd.	Date:	24/01/2020
		Weather:	Cold and dry

Project No. 3249
Logged By AJ
Checked By AL

Sample Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
					Grey to dark grey, slightly clayey SAND and GRAVEL. Gravel is angular to subangular of fine to coarse red brick (30%), concrete (20%) and mixed lithologies (50%). MADE GROUND
			0.80	30.60	Firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
			1.50	29.90	Soft to firm, orangish brown, slightly sandy, silty CLAY. LYNCH HILL GRAVEL MEMBER
3.00	SPT	N=9 (1,1/2,2,2,3)			
			3.60	27.80	Orangish brown, sandy, clayey GRAVEL. Gravel is angular to subangular of fine to coarse mixed lithologies. Significant hydrocarbon staining and odour. LYNCH HILL GRAVEL MEMBER
3.80	ES				
3.80	PID	1.50ppm			
4.30	PID	1.30ppm			
			4.50	26.90	Soft, brown, slightly sandy, silty CLAY. LYNCH HILL GRAVEL MEMBER
			4.70	26.70	Orangish brown, sandy, slightly clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			5.40	26.00	Firm, orangish brown, slightly sandy, silty CLAY. LYNCH HILL GRAVEL MEMBER
			6.00	25.40	Brown, damp, slightly clayey SAND and GRAVEL. Gravel is subangular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			6.50	24.90	Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
7.00 - 7.45	UT				
7.00		HVP=118			
7.20		HVP=91			
7.40		HVP=120			
7.60		HVP=108			
7.90		HVP=120			
8.10		HVP=109			
8.30		HVP=116			
8.70		HVP=120			
8.95		HVP=120			
9.10		HVP=78			

Remarks:
Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
1.50	Very Slow Ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Sonic Borehole Log

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Borehole No. **BH03**

Project Name: Hayes	Co-ords:	510319E - 179372N	Project No. 3249
Location: London	Level (m AOD):	31.40	Logged By AJ
Client: Paragon Building Consultancy Ltd.	Date:	24/01/2020	Checked By AL
	Weather:	Cold and dry	

Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
10.10		HVP=120			Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
10.40		HVP=120			
10.50	SPT	N=23 (4,5/5,5,6,7)			
10.80		HVP=120			
11.20		HVP=120			
11.60		HVP=120			
12.00 - 12.45	UT				
12.10		HVP=120			
12.50		HVP=120			
12.80		HVP=120			
13.10		HVP=118			
13.45		HVP=120			
13.70		HVP=120			
14.00		HVP=120			
14.20		HVP=120			
14.50		HVP=120			
14.85		HVP=120			
15.00	SPT	N=30 (5,6/7,7,8,8)	15.00	16.40	Window Sample terminated at 15.00m.

Depth scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:

Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details		
Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike	
Depth Strike (m)	Remarks
1.50	Very Slow Ingress

Sample Sleeve Runs		
Depth Top (m)	Depth Base (m)	Diameter (mm)

Rotary Core Photos

BH03

Hayes

Image 1. :
Photo to be viewed from right to left, top to bottom:
0.60m - 1.50m bgl

Image 2. :
Photo to be viewed from right to left, top to bottom:
7.50m - 8.25m bgl
8.25m - 9.00m bgl

Image 3. :
Photo to be viewed from right to left, top to bottom:
10.50m - 11.10m bgl
11.10m - 12.00m bgl

Rotary Core Photos

BH03

Hayes

Image 4. :
Photo to be viewed from right to left, top to bottom:
12.50m - 13.50m bgl

Image 5. :
Photo to be viewed from right to left, top to bottom:
1.50m - 2.00m bgl
2.00m - 3.00m bgl

Image 6. :
Photo to be viewed from right to left, top to bottom:
3.00m - 3.50m bgl
3.50m - 4.50m bgl

Rotary Core Photos

BH03

Hayes

Image 7. :
Photo to be viewed from right to left, top to bottom:
4.50m- 5.00m bgl
5.00m - 6.00m bgl

Image 8. :
Photo to be viewed from right to left, top to bottom:
6.00m - 7.00m bgl

Image 9. :
Photo to be viewed from right to left, top to bottom:
9.00m - 9.80m bgl
9.80m - 10.50m bgl

Rotary Core Photos

BH03
Hayes

Image 10. :
Photo to be viewed from right to left, top to bottom:
13.50m - 14.00m bgl
14.00m - 15.00m bgl

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Project Name: Hayes	Co-ords:	510384E - 179364N	Project No. 3249
Location: London	Level (m AOD):	31.30	Logged By AJ
Client: Paragon Building Consultancy Ltd.	Date:	27/01/2020	Checked By AL
	Weather:	Wet and cold	

Water Strikes	Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
						Dark grey SAND and GRAVEL. Gravel is angular to subrounded of fine to coarse red brick (20%), clinker (20%) and mixed lithologies (60%). MADE GROUND
	1.20	SPT(C)	N=6 (1,1/2,1,1,2)	1.30	30.00	Firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse concrete (20%), red brick (20%) and mixed lithologies (60%). MADE GROUND
▼				1.50	29.80	Soft to firm, grey, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of fine to coarse red brick (10%) and mixed lithologies (90%) MADE GROUND
	2.70	PID	0.20ppm			*Timber fragment stained black with slight hydrocarbon odour at 2.70m bgl.*
	2.80	PID	0.40ppm			
						Stained dark grey between 3.70m and 4.00m bgl
				4.20	27.10	Yellowish brown, sandy GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
	4.50	SPT(C)	N=9 (2,2/2,3,2,2)			
	5.00	PID	0.10ppm			*Hydrocarbon sheen and slight odour between 5.00m and 5.05m bgl.*
	7.00 - 7.45	UT				
				7.50	23.80	Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
	7.70		HVP=92			
	7.90		HVP=90			
	8.10		HVP=91			
	8.30		HVP=98			
	8.50		HVP=95			
	8.70		HVP=103			
	8.90		HVP=119			
	9.10		HVP=101			*Becoming stiff from 9.00m bgl.*
	9.30		HVP=115			
	9.50		HVP=113			
	9.70		HVP=117			
	9.90		HVP=119			

Remarks:
Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 19.50m bgl.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
1.50	Fast ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Sonic Borehole Log

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Borehole No. **BH04**

Project Name:	Hayes	Co-ords:	510384E - 179364N	Project No. 3249
Location:	London	Level (m AOD):	31.30	Logged By AJ
		Date:	27/01/2020	
Client:	Paragon Building Consultancy Ltd.	Weather:	Wet and cold	Checked By AL

Depth(m)	Type	Results
10.10		HVP=120
10.30		HVP=118
10.50	SPT	N=17 (3,4/4,4,5,4)
10.60		HVP=119
10.80		HVP=118
11.10		HVP=120
11.30		HVP=120
11.50		HVP=119
11.70		HVP=120
11.90		HVP=120
12.00 - 12.45	UT	
12.60		HVP=120
12.80		HVP=120
13.20		HVP=120
14.00		HVP=120
14.40		HVP=120
14.80		HVP=120
15.20		HVP=120
15.40		HVP=120
15.50	SPT	N=21 (4,4/4,5,6,6)
16.00		HVP=120
16.40		HVP=120
16.50 - 16.95	UT	
17.20		HVP=120
17.50		HVP=120
17.90		HVP=120
18.40		HVP=120
18.90		HVP=120
19.40		HVP=120
19.50	SPT	N=27 (5,5/6,6,7,8)

Stratum Description

Firm to stiff, brownish grey, slightly sandy, silty CLAY.
LONDON CLAY

Becoming very stiff from 15.00m bgl

Depth scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:

Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 19.50m bgl.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
1.50	Fast ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Sonic Borehole Log

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Borehole No.
BH04
Sheet 3 of 4

Project Name:	Hayes	Co-ords:	510384E - 179364N
		Project No.	3249
Location:	London	Level (m AOD):	31.30
		Logged By	AJ
Client:	Paragon Building Consultancy Ltd.	Date:	27/01/2020
		Weather:	Wet and cold
		Checked By	AL

Well / Backfill	Water Strikes	Sample and In Situ Testing Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
								Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
		22.00 - 22.45	UT					
		23.50	SPT	N=36 (5,6/7,9,9,11)				
								Fissured between 24.00m and 24.50m bgl.
		27.00 - 27.50	UT					

Depth scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Remarks:
Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 19.50m bgl.

Casing Details: Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike: Depth Strike (m)	Remarks
1.50	Fast ingress

Sample Sleeve Runs: Depth Top (m)	Depth Base (m)	Diameter (mm)

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Sonic Borehole Log

ver. 1.3

Borehole No.
BH04

Project Name:	Hayes	Co-ords:	510384E - 179364N	Project No.	3249
Location:	London	Level (m AOD):	31.30	Logged By	AJ
Client:	Paragon Building Consultancy Ltd.	Date:	27/01/2020	Checked By	AL
		Weather:	Wet and cold		

Well / Backfill	Water Strikes	Sample Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
							Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
		31.50	SPT	N=36 (6,7/7,8,9,12)			
		34.50 - 34.95	UT				
					35.00	-3.70	Window Sample terminated at 35.00m.

Depth scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Remarks:
Borehole terminated at 35.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.
London clay too stiff for hand shear vanes from 19.50m bgl.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
1.50	Fast ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

IGE	Rotary Core Photos	BH04
		Hayes

Image 1. :
Photo to be viewed from left to right, top to bottom:
1.50m - 1.80m bgl
1.80m - 3.00m bgl

Image 2. :
Photo to be viewed from left to right, top to bottom:
3.00 - 3.70m bgl
3.70m - 4.50m bgl

Image 3. :
Photo to be viewed from left to right, top to bottom:
6.00m - 6.75m bgl
6.75m - 7.50m bgl

Image 4. :
Photo to be viewed from left to right, top to bottom:
8.00m - 9.00m bgl

Image 5. :
Photo to be viewed from left to right, top to bottom:
9.00m - 9.60m bgl
9.60m - 10.50m bgl

Image 6. :
Photo to be viewed from left to right, top to bottom:
10.50m - 11.50m bgl
11.50m - 12.00m bgl

Rotary Core Photos	BH04
	Hayes

Image 7. :
Photo to be viewed from left to right, top to bottom:
12.50m - 13.50m bgl

Image 8. :
Photo to be viewed from left to right, top to bottom:
13.50m - 14.50m bgl
14.50m - 15.00m bgl

Image 9. :
Photo to be viewed from left to right, top to bottom:
15.00m - 15.50m bgl
15.50m - 16.50m bgl

Rotary Core Photos	BH04
	Hayes

Image 10. :
Photo to be viewed from left to right, top to bottom:
18.00m - 18.50m bgl
18.50m - 19.50m bgl

Image 11. :
Photo to be viewed from left to right, top to bottom
19.50m - 20.00m bgl
20.00m - 21.00m bgl

Image 12. :
Photo to be viewed from left to right, top to bottom:
21.00m - 21.30m bgl
21.30m - 22.50m bgl

Image 13. :
Photo to be viewed from left to right, top to bottom:
23.00m - 24.00m bgl

Image 14. :
Photo to be viewed from left to right, top to bottom:
24.00m - 24.50m bgl
24.50m - 25.50m bgl

Image 15. :
Photo to be viewed from left to right, top to bottom:
25.50m - 26.00m
26.00m - 27.00m

Image 16. :
Photo to be viewed from left to right, top to bottom:
27.50m - 28.50m bgl

Image 17. :
Photo to be viewed from left to right, top to bottom:
28.50m - 29.10m bgl
29.10m - 30.00m bgl

Image 18. :
Photo to be viewed from left to right, top to bottom:
30.00m - 30.50m bgl
30.50m - 31.50m bgl

Image 19. :
Photo to be viewed from left to right, top to bottom:
33.00m - 33.50m bgl
33.50m - 34.50m bgl

Image 20. :
Photo to be viewed from left to right, top to bottom:
0.80m - 1.50m bgl

Image 21. :
Photo to be viewed from left to right, top to bottom:
4.50m - 5.00m bgl
5.00m - 6.00m bgl

Rotary Core Photos

BH04
Hayes

Image 22. :
Photo to be viewed from left to right, top to bottom:
17.00m - 18.00m bgl

Image 23. :
Photo to be viewed from left to right, top to bottom:
31.50m - 32.25m bgl
32.25m - 33.00m bgl

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Sonic Borehole Log

ver. 1.3

Borehole No. **BH05**

Project Name:	Hayes	Co-ords:	510527E - 179366N	Project No. 3249
		Level (m AOD):	31.25	
Location:	London	Date:	27/01/2020	Logged By AJ
Client:	Paragon Building Consultancy Ltd.	Weather:	Cold and dry	Checked By AL

Sample Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
					Dark brown SAND and GRAVEL. Gravel is angular to subangular of fine to coarse red brick (20%), concrete (20%) and mixed lithologies (60%). MADE GROUND
			0.80	30.45	Dark grey to black, clayey SAND and GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			1.00	30.25	CONCRETE cobble. MADE GROUND
1.20	SPT(C)	N=9 (1,2/2,2,2,3)	1.20	30.05	Soft to firm, dark grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			1.50	29.75	No recovery, suspected to be dark grey to black, gravelly SAND (ash). Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			3.00	28.25	Dark grey to black, gravelly SAND. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
			3.30	27.95	Firm, orangish brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			3.90	27.35	Greyish brown, mottled orangish brown, slightly sandy, very clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			4.50	26.75	Damp to wet, grey, sandy, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			5.00	26.25	Orangish brown, slightly clayey SAND and GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies LYNCH HILL GRAVEL MEMBER
6.00	SPT(C)	N=14 (2,3/3,3,4,4)			
			6.60	24.65	Firm, orangish brown, slightly sandy, silty CLAY with occasional thin laminations of orangish brown sand. LYNCH HILL GRAVEL MEMBER
7.00 - 7.45	UT				
7.10		HVP=84			
7.30		HVP=81			
7.40		HVP=89			
			7.50	23.75	Orangish brown, sandy, clayey GRAVEL. Gravel is angular to well rounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			8.00	23.25	Firm to stiff, brown mottled grey, slightly sandy, silty CLAY. LYNCH HILL GRAVEL MEMBER
8.20		HVP=99			
8.40		HVP=117			
8.60		HVP=120	8.60	22.65	Brown, sandy, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
			8.90	22.35	Orangish brown and greyish brown mottled, sandy, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER

Water strike at 1.50 m.

Remarks:

Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
1.50	Fast ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Borehole No. **BH05**

Project Name: Hayes	Co-ords: 510527E - 179366N	Project No. 3249
Location: London	Level (m AOD): 31.25	Logged By AJ
	Date: 27/01/2020	
Client: Paragon Building Consultancy Ltd.	Weather: Cold and dry	Checked By AL

Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
10.10		HVP=104	10.20	21.05	Orangish brown and greyish brown mottled, sandy, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
10.30		HVP=105			Stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
10.50	SPT	N=24 (4,5/5,6,6,7)			
10.70		HVP=107			
10.90		HVP=111			
11.10		HVP=120			*Becoming stiff from 11.00m bgl.*
11.30		HVP=120			
11.50		HVP=120			
11.70		HVP=120			
11.90		HVP=120			
12.00 - 12.45	UT				
12.10		HVP=120			
12.30		HVP=120			
12.50		HVP=120			
12.80		HVP=120			
13.10		HVP=120			
13.40		HVP=120			
13.60		HVP=110			
13.90		HVP=120			
14.10		HVP=120			
14.30		HVP=68			
14.50		HVP=120			
14.70		HVP=120			
14.90		HVP=120			
15.00	SPT	N=29 (5,5/6,7,8,8)	15.00	16.25	Window Sample terminated at 15.00m.

Depth scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:

Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
1.50	Fast ingress

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

Rotary Core Photos

BH05

Hayes

Image 1. :
Photo to be viewed from right to left, top to bottom:
0.70m - 1.50m bgl

Image 2. :
Photo to be viewed from right to left, top to bottom:
4.50m - 4.80m bgl
4.80m - 6.00m bgl

Image 3. :
Photo to be viewed from right to left, top to bottom:
6.00m - 6.50m bgl
6.50m - 7.00m bgl

Rotary Core Photos

BH05

Hayes

Image 4. :
Photo to be viewed from right to left, top to bottom:
9.00m - 9.60m bgl
9.60m - 10.50m bgl

Image 5. :
Photo to be viewed from right to left, top to bottom:
10.50m - 11.00m bgl
11.00m - 12.50m bgl

Image 6. :
Photo to be viewed from right to left, top to bottom:
13.50m - 14.30m bgl
14.30m - 15.00m bgl

Rotary Core Photos

BH05

Hayes

Image 7. :
Photo to be viewed from right to left, top to bottom:
1.50m - 1.80m bgl
3.00m - 4.00m bgl
(No recovery in made ground between 1.80m and 3.00m bgl)

Image 8. :
Photo to be viewed from right to left, top to bottom:
7.50m - 8.00m
8.00m - 9.00m

Image 9. :
Photo to be viewed from right to left, top to bottom:
12.50m - 12.80m bgl
12.80m - 13.50m bgl

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Sonic Borehole Log

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Borehole No. **BH06**

Project Name:	Hayes	Co-ords:	510483E - 179189N	Project No.	3249
Location:	London	Level (m AOD):	29.90	Logged By	AJ
Client:	Paragon Building Consultancy Ltd.	Date:	22/01/2020	Checked By	AL
		Weather:	Cold and dry		

Sample and In Situ Testing

Depth(m)	Type	Results
3.00	SPT	N=1 (1,0/0,1,0,0)
4.80		HVP=93
5.00		HVP=108
5.20		HVP=108
5.40		HVP=102
5.60		HVP=102
6.00 - 6.45	UT	
6.00		HVP=92
6.20		HVP=76
6.40		HVP=84
6.60		HVP=88
6.80		HVP=92
7.00		HVP=99
7.30		HVP=101
7.50		HVP=103
7.80		HVP=107
8.10		HVP=100
8.50		HVP=99
8.70		HVP=88
9.00	SPT	N=13 (2,3/3,3,3,4)
9.10		HVP=93
9.90		HVP=95

Water strike at 6.00 m.

Stratum Description

Depth (m)	Level (m AOD)	Stratum Description
0.05	29.85	TARMACADAM. MADE GROUND
0.30	29.60	Grey, sandy GRAVEL. Gravel is angular to subangular of fine to coarse mixed lithologies. SUB-BASE
1.80	28.10	Dark brown to black SAND and GRAVEL with occasional brick fragments and pottery / ceramic fragments. Gravel is angular to subrounded of fine to coarse red brick (20%), glass (10%), suspected clinker (10%), concrete (10%), ceramic (10%) and mixed lithologies (40%). MADE GROUND
3.00	26.90	Very soft to soft, brown mottled orangish brown and reddish brown, slightly gravelly, slightly sandy CLAY. Gravel is angular to subangular of fine to coarse red brick (30%) and mixed lithologies (70%). MADE GROUND
4.75	25.15	Very soft to soft, grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subangular of fine to coarse red brick (10%) and mixed lithologies (90%). MADE GROUND
		Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
		With rare well rounded cobble and recovered as occasional thin bands (<5cm) of clayey gravel between 7.50m and 8.00m bgl. Gravel is angular to subrounded of fine to coarse stiff clay.

Depth scale: 1 2 3 4 5 6 7 8 9 10

Remarks:

Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
6.00	`

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Project Name:	Hayes	Co-ords:	510483E - 179189N	Project No. 3249
Location:	London	Level (m AOD):	29.90	Logged By AJ
		Date:	22/01/2020	
Client:	Paragon Building Consultancy Ltd.	Weather:	Cold and dry	Checked By AL

Well / Backfill	Water Strikes	Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		10.10		HVP=101				Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
		10.30		HVP=108				
		10.50		HVP=98				
		10.80		HVP=105				
		11.00		HVP=100				
		11.40		HVP=118				
		11.60		HVP=119				
		11.80		HVP=113				
		12.00		HVP=120				*Becoming firm to stiff between 12.00m and 13.50m bgl*
		12.00	SPT	N=28 (4,5/6,6,7,9)				
		12.30		HVP=118				
		12.50		HVP=120				
		13.20		HVP=120				
		13.40		HVP=120				
		13.60		HVP=120				*No recovery between 13.50m and 15.00m bgl - suspected to be stiff, brownish grey, slightly sandy, silty CLAY.*
		14.00		HVP=120				
		14.30		HVP=120				
					15.00	14.90		Window Sample terminated at 15.00m.

Depth scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:

Borehole terminated at 15.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)

Water Strike

Depth Strike (m)	Remarks
6.00	`

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

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Rotary Core Photos

BH06

Hayes

Image 1. :
Photo to be viewed from left to right, top to bottom:
1.20m - 1.50m bgl
1.50m - 3.00m bgl
3.00m - 4.50m bgl
4.50m - 6.00m bgl
6.50m - 7.50m bgl
7.50m - 9.00m bgl
9.00m - 10.50m bgl
10.50m - 12.00m bgl
12.00m - 13.50m bgl

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Sonic Borehole Log

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Borehole No. **BH07**

Project Name:	Hayes	Co-ords:	510537E - 179279N	Project No. 3249
Location:	London	Level (m AOD):	30.85	Logged By AJ
Client:	Paragon Building Consultancy Ltd.	Date:	20/01/2020	Checked By AL
		Weather:	Cold and dry	

Sample Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
			0.05	30.80	TARMACADAM. MADE GROUND
					Grey to dark grey SAND and GRAVEL with occasional half bricks. Gravel is angular to subangular of fine to coarse red brick (20%), tarmacadam (10%), glass (5%) and mixed lithologies (65%). MADE GROUND. *Becoming slightly clayey from 0.60m bgl.*
0.80 - 1.30	ES		0.80	30.05	Soft to firm, greyish brown, slightly sandy, silty CLAY with occasional gravel and timber fragments. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
0.90	PID	0.00ppm			
			1.30	29.55	Soft, greyish brown, mottled orangish brown, gravelly CLAY. Gravel is angular to subangular of fine to coarse concrete (10%) and mixed lithologies (90%). MADE GROUND
			1.50	29.35	No recovery, suspected soft, greyish brown, mottled orangish brown, gravelly CLAY. Gravel is angular to subangular of fine to coarse concrete (10%) and mixed lithologies (90%). MADE GROUND
			2.00	28.85	Soft, greyish brown, slightly sandy, silty CLAY with occasional gravel. Gravel is angular to subangular of fine to coarse mixed lithologies. MADE GROUND
2.55 - 3.00	ES		2.55	28.30	Soft, dark grey to black, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of fine to coarse mixed lithologies. Slight hydrocarbon odour. MADE GROUND
2.80	PID	0.10ppm			
			3.00	27.85	Soft to firm, brownish grey, slightly sandy, silty CLAY with occasional gravel. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			3.50	27.35	Firm, dark grey to black, slightly sandy, silty CLAY with occasional gravel. Gravel is subangular to subrounded of fine to coarse mixed lithologies. MADE GROUND. *With frequent gravel between 4.00m and 4.30m bgl.*
3.70	PID	0.30ppm			
4.10	PID	0.00ppm			
			4.50	26.35	Very soft to soft, brownish grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
5.25	PID	0.40ppm	5.20	25.65	Dark grey to black, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. Hydrocarbon odour and staining. MADE GROUND
5.30	PID	0.10ppm	5.30	25.55	Firm, grey to dark grey, sandy CLAY with rare to occasional gravel. Gravel is angular to well rounded of fine to coarse mixed lithologies. MADE GROUND
5.80 - 6.00	ES		5.80	25.05	Firm, brown, slightly sandy, silty CLAY with occasional gravel and rare cobbles. Cobbles are subangular of mixed lithologies. Gravel is subangular to subrounded of fine to coarse mixed lithologies. Slight hydrocarbon odour. LONDON CLAY
			6.00	24.85	Firm to stiff, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
6.10		HVP=88			
6.30		HVP=90			
6.50		HVP=85			
6.70		HVP=80			
7.10		HVP=81			
7.30		HVP=83			
7.50	ES				
7.50		HVP=94			
7.80		HVP=85			
8.00		HVP=91			
8.20		HVP=88			
8.40		HVP=101			
8.60		HVP=91			
8.80		HVP=99			
9.10		HVP=98			
9.30		HVP=80			
9.50		HVP=99			
9.70		HVP=101			
9.90		HVP=108			
			10.00	20.85	Window Sample terminated at 10.00m.

Remarks:

Borehole terminated at 10.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)
GL	1.50	200

Water Strike

Depth Strike (m)	Remarks
7.00	

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

Rotary Core Photos

BH07

Hayes

Image 1. :
Photo to be viewed from left to right, top to bottom:
0.70m - 1.50m bgl
1.50m - 3.00m bgl
3.00m - 4.50m bgl
4.50m - 6.00m bgl
6.00m - 7.50m bgl
7.50m - 9.00m bgl
9.00m - 10.00m bgl

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Borehole No. **BH08**

Project Name:	Hayes	Co-ords:	510547E - 179337N	Project No. 3249
Location:	London	Level (m AOD):	31.40	Logged By SJ
Client:	Paragon Building Consultancy Ltd.	Date:	21/01/2020	Checked By AL
		Weather:	Cold and dry	

Sample Depth(m)	Type	Results	Depth (m)	Level (m AOD)	Stratum Description
0.50 - 1.00	ES				Soft to firm, dark grey, slightly sandy, gravelly CLAY. Gravel is angular to subrounded of fine to coarse red brick (20%), concrete (10%) and mixed lithologies (70%). MADE GROUND
			1.20	30.20	Damp to wet, brown, slightly sandy, clayey GRAVEL. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			1.50	29.90	Soft to firm, damp, grey, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of fine to coarse mixed lithologies. MADE GROUND
			2.30	29.10	Soft, dark grey, slightly sandy, gravelly CLAY. Gravel is angular to subrounded of fine to coarse mixed lithologies. MADE GROUND
2.50 - 3.00	ES		2.50	28.90	Soft to firm, damp, grey to dark grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse mixed lithologies. Slight hydrocarbon odour. MADE GROUND
4.10	PID	0.60ppm			
4.50	PID	0.40ppm	4.50	26.90	Damp, grey, mottled greenish grey, clayey SAND and GRAVEL. Gravel is subangular to well rounded of mixed lithologies. Strong hydrocarbon odour and staining. LYNCH HILL GRAVEL MEMBER
			4.90	26.50	Firm, damp to wet, grey, slightly gravelly, slightly sandy CLAY. Gravel is subrounded to well rounded of fine to coarse mixed lithologies. LYNCH HILL GRAVEL MEMBER
5.00	PID	4.80ppm			
5.50 - 6.00	ES		5.50	25.90	Damp, greyish brown SAND and GRAVEL. Gravel is subangular to well rounded of fine to coarse mixed lithologies. Strong hydrocarbon odour and staining. LYNCH HILL GRAVEL MEMBER
5.50	PID	13.10ppm			
5.80	PID	28.70ppm			
			6.20	25.20	Firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is subrounded to well rounded of fine to coarse mixed lithologies. LONDON CLAY
6.30		HVP=59	6.40	25.00	Firm, brownish grey, slightly sandy, silty CLAY. LONDON CLAY
6.60		HVP=70			
6.80		HVP=72			
7.00		HVP=82			
7.20		HVP=98			
7.40		HVP=94			
7.60		HVP=84			
7.80		HVP=89			
8.10		HVP=100			
8.30		HVP=103			
8.50		HVP=87			
8.70		HVP=74			
8.90		HVP=80			
9.00 - 9.20	ES				
9.10		HVP=81			
9.30		HVP=100			
9.50		HVP=111			
9.70		HVP=111			
9.90		HVP=108			
			10.00	21.40	Window Sample terminated at 10.00m.

Remarks:

Borehole terminated at 10.00m bgl at target depth.
Where hand shear vane results show 120kPa, shear strength exceeds 120kPa limit of hand shear vane.
Ground level derived from 1m DTM LiDAR Data.

Casing Details

Depth Top (m)	Depth Base (m)	Diameter (mm)
GL	1.50	200

Water Strike

Depth Strike (m)	Remarks
6.00	

Sample Sleeve Runs

Depth Top (m)	Depth Base (m)	Diameter (mm)

Rotary Core Photos

BH08

Hayes

Image 1. :
Photo to be viewed from left to right, top to bottom:
1.00m - 1.50m bgl
1.50m - 2.25m bgl
2.25m - 3.00m bgl
3.00m - 3.50m bgl
3.50m - 4.50m bgl

Image 2. :
Photo to be viewed from left to right, top to bottom:
4.50m - 5.50m bgl
5.50m - 6.00m bgl
6.00m - 6.50m bgl
6.50m - 7.50m bgl
7.50m - 8.00m bgl
8.00m - 9.00m bgl
9.00m - 10.00m bgl

YourGeotechnical WS03

Borehole Log

Project Name: Hayes	Project No. YE7331	Co-ords:	Borehole No. **WS03** Sheet 1 of 1
Location: North Hyde Gardens, UB3 4QT.		Level:	Hole Type WLS
Client: Paragon.		Dates: 25/06/2019	Scale 1:50
			Logged By RG

Well	Water Strikes	Sample Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.15	ES		0.20			TOPSOIL: Brown clayey, slighty gravelly SAND. Sand is fine to medium. Gravel is fine to medium of flint and brick.
					0.50			MADE GROUND: Sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse, angular to sub-rounded of flint and concrete.
		0.75	ES		1.00			MADE GROUND: Brown mottled black sandy, gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to sub-rounded of flint, brick and clinker. *PID Reading = 0.0*
		1.20	C	N=8 (3,3/1,2,2,3)				
		1.50 - 2.00	B					
		2.00	C	N=52 (1,1/52 for 265mm)	2.00			MADE GROUND: Brown/orange sandy, gravelly CLAY. Sand is medium. Gravel is fine to medium, angular to sub-rounded of flint, brick and clinker. *PID Reading = 0.0*

End of Borehole at 2.00m

Depth scale (m): 1 2 3 4 5 6 7 8 9 10

Remarks

Installation noted to 2.00m.
No groundwater encountered.
UXO clearance at 1.00m intervals.

AGS

YourGeotechnical WS04

Borehole Log

Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:50
Client: Paragon.		Dates: 27/06/2019	Logged By RG

Borehole No. **WS04**

Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.15	ES		0.25			TOPSOIL: Brown clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium, angular to sub-angular of flint, brick and clinker.
					0.75			MADE GROUND: Sandy GRAVEL. Sand is fine. Gravel is coarse, angular to sub-rounded of concrete. *PID Reading = 0.0*
		0.80	ES					
		1.20	C	N=13 (4,4/4,3,2,4)	1.60			MADE GROUND: Dark brown slightly clayey, sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-rounded of flint, brick, clinker and concrete. *PID Reading = 0.0*
		2.00	C	N=2 (1,1/1,0,0,1)				MADE GROUND: Brown clayey, sandy GRAVEL. Sand is fine. Gravel is fine to medium, angular to sub-rounded of brick, flint, clinker, glass and mixed lithology. Becoming less clayey at depth. Becoming black at 4.00m. *PID Reading = 0.0*
		2.50 - 3.00	B					
		3.00	C	N=1 (2,1/1,0,0,0)				*PID Reading = 0.0*
		4.00	ES		4.00			
		4.00	C	N=3 (1,2/0,0,1,2)				End of Borehole at 4.00m

Remarks

Installation to 2.50m due to borehole collapse.
No groundwater encountered.
UXO clearance at 1.00m intervals.

AGS

YourGeotechnical WS04A

Borehole Log

Borehole No.
WS04A
Sheet 1 of 1

Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:50
Client: Paragon.		Dates: 25/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.70			MADE GROUND: Concrete. Refusal due to maximum depth of concrete corer.
								End of Borehole at 0.70m

Remarks
No groundwater encountered.
UXO clearance at 1.00m intervals.
Cored to 0.70m.

AGS

YourGeotechnical WS05	Borehole Log		Borehole No. **WS05** Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:50
Client: Paragon.		Dates: 25/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.38			MADE GROUND: Concrete.
		0.50	ES		0.55			MADE GROUND: Brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-rounded of concrete, flint, clinker and mixed lithology. *PID Reading = 0.0*
		0.75	ES		0.75			
					0.90			MADE GROUND: Brown gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded of brick, concrete, flint and clinker.
		1.20	C	N=14 (6,4/4,4,3,3)	1.30			MADE GROUND: Black clayey, gravelly SAND. Sand is fine to medium. Gravel is fine to medium, angular to sub-rounded of flint, clinker and brick.
		1.50	ES		1.70			MADE GROUND: GRAVEL. Gravel is medium to coarse, angular to sub-rounded of concrete, clinker and brick. *PID Reading = 0.0*
		2.00	C	N=7 (3,1/1,2,2,2)	1.90			MADE GROUND: Black clayey, sandy GRAVEL. Sand is fine to medium. Gravel is fine to medium, angular to sub-rounded of clinker, flint, brick and tile. Becoming more clayey with depth.
		2.50	ES		2.20			MADEGROUND: Orange clayey, sandy GRAVEL. Sand is fine to medium. Gravel is fine to medium, angular to sub-angular of mixed lithology. Becoming more clayey with depth.
		3.00	C	N=7 (1,1/2,2,1,2)				MADE GROUND: Orange sandy, gravelly CLAY. Sand is fine to medium. Gravel is fine to medium, angular to sub-rounded of flint and mixed lithology. *PID Reading = 0.0*
		3.50	ES					MADE GROUND: Red becoming green/brown slightly gravelly CLAY. Gravel is fine to medium, angular to sub-rounded of brick, clinker and mixed lithology. Becoming black at depth. *PID Reading = 0.0*
		4.00	C	50 (8,12/50 for 245mm)	4.00			End of Borehole at 4.00m

Remarks
Installation noted to 4.00m.
No groundwater encountered.
UXO clearance at 1.00m intervals.
Cored to 0.38m.

AGS

YourGeotechnical WS06	Borehole Log	Borehole No. **WS06** Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:50
Client: Paragon.		Dates: 25/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Concrete.
					0.50			MADE GROUND: GRAVEL. Gravel is coarse, angular of brick and concrete. Refusal due to dense gravels.
					1.00			End of Borehole at 1.00m

Depth scale: 1 2 3 4 5 6 7 8 9 10

Remarks
No groundwater encountered.
UXO clearance at 1.00m.
Cored to 0.60m.

AGS

YourGeotechnical WS06A

Borehole Log

Borehole No. **WS06A** Sheet 1 of 1			
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:50
Client: Paragon.		Dates: 25/06/2019	Logged By RG

Sample Depth (m)	Type	Results	Depth (m)	Stratum Description
0.15	ES		0.30	TOPSOIL: Desnse brown clayey sligthy gravelly SAND. Sand is fine to medium. Gravel is fine to medium, angular to sub-rounded of mixed lithology. Concrete layer at 0.3
0.80	ES		0.75	MADE GROUND: Yellow becoming brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-rounded of flint, brick, concrete and mixed lithology. *PID Reading = 0.0*
			1.00	
1.20	C	N=2 (1,0/1,0,0,1)	1.20	MADE GROUND: Brown gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded of flint and brick. Black staining noted at 0.80m.
1.50 1.50 - 2.00	ES B			MADE GROUND: Yellow/brown gravelly sandy CLAY. Sand is fine. Gravel is fine, angular to sub-rounded of flint. *PID Reading = 0.0*
2.00	C	N=10 (2,2/2,3,2,3)	2.20	MADE GROUND: Brown sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium of mixed lithology. Becoming more gravelly at depth. *PID Reading = 0.0*
			2.50	MADE GROUND: Soft brown sandy, gravelly CLAY. Sand is fine. Gravel is fine, angular to sub-angular of mixed lithology.
3.00	C	N=16 (2,3/4,3,4,5)	3.30	MADE GROUND: Brown mottled black slightly gravelly CLAY. Gravel is fine, angular to sub-angular of brick and mixed lithology. *PID Reading = 0.0*
			3.50	MADE GROUND: Brown sandy, gravelly CLAY. Sand is fine. Gravel is fine, angular to sub-angular of mixed lithology.
3.75	ES			
4.00	C	N=16 (3,4/3,4,4,5)		MADE GROUND: Brown mottled black firm slightly gravelly CLAY. Gravel is fine, angular to sub-rounded of brick and mixed lithology. *PID Reading = 0.0*
4.50 - 5.00	B			
5.00	C	N=29 (5,7/6,8,7,8)	5.00	End of Borehole at 5.00m

Remarks
Installation noted to 5.00m.
No groundwater encountered.
UXO clearance at 1.00m intervals.

AGS

Borehole Log

YourGeotechnical WS07		Borehole No. WS07 Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.	Level:	Scale 1:50
Client: Paragon.	Dates: 26/06/2019	Logged By RG

Well	Water Strikes	Sample Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.15			MADE GROUND: Concrete.
					0.35			MADE GROUND: Grey clayey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded of concrete, brick and flint.
		0.50	ES					MADE GROUND: Brown sandy, gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded of flint, brick, chalk and clinker.
		1.00	ES					*PID Reading = 0.1*
		1.20	C	N=7 (2,2/1,2,2,2)				*PID Reading = 0.0*
					1.65			MADE GROUND: Black gravelly CLAY. Gravel is fine, angular to sub-rounded to coarse of clinker, brick, flint, tile and concrete.
					1.85			MADE GROUND: Brown gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded of flint, brick and concrete. Darker layer noted at 2.5m.
		2.00	C	N=10 (2,2/2,2,3,3)				
		2.50	ES					*PID Reading = 0.0*
		3.00	C	N=10 (2,3/3,2,3,2)				*PID Reading = 0.0*
		4.00	C	N=1 (0,0/0,0,0,1)				*PID Reading = 0.0*
		4.50 - 5.00	B					
		5.00	C	N=9 (1,1/2,2,3,2)	5.00			End of Borehole at 5.00m

Remarks

Installation noted to 5.00m. No groundwater encountered.
UXO clearance at 1.00m intervals.
Cored to 0.15m.

AGS

YourGeotechnical WS08	# Borehole Log	Borehole No. **WS08** Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type WLS
Location: North Hyde Gardens, UB3 4QT.	Level:	Scale 1:50
Client: Paragon.	Dates: 27/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.15			MADE GROUND: Concrete.
		0.30	ES		0.50			MADE GROUND: Brown sandy, gravelly CLAY. Sand is fine to medium. Gravel is fine to medium, angular to sub-rounded of flint, brick, clinker, glass and slate.
					0.60			MADE GROUND: Gravelly SAND. Sand is fine to medium. Gravel is fine to coarse, angular to sub-rounded of flint, concrete, plastic and mixed lithology.
					1.00			*PID Reading = 0.0*
		1.20	C	N=7 (1,2/2,2,1,2)				MADE GROUND: Dark brown gravelly CLAY. Gravel is fine to medium, angular to sub-rounded of brick, flint, clinker and concrete.
		1.50	ES		1.40			MADE GROUND: Dark brown gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded of brick and flint.
		2.00	C	N=9 (5,3/2,2,2,3)				*PID Reading = 0.0*
		2.50 - 3.00	B					MADE GROUND: Dark brown gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded of brick, clinker, mixed lithology, wood and concrete. *PID Reading = 0.0*
		3.00	C	N=9 (2,2/1,2,3,3)				*PID Reading = 0.0*
		4.00	C	N=10 (0,0/1,2,3,4)				*PID Reading = 0.0*
		4.50 - 5.00	B					
		5.00	C	N=20 (3,4/5,4,5,6)	5.00			End of Borehole at 5.00m

Scale (m): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Remarks
Installation noted to 5.00m.
No groundwater encountered.
UXO clearance at 1.00m intervals.
Cored to 0.15m

AGS

APPENDIX 5: TRIAL PIT LOGS

YourGeotechnical HP04	**Borehole Log**		Borehole No. **HP04** Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:10
Client: Paragon.		Dates: 26/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40	ES		0.40			MADE GORUND: Dense brown clayey, gravelly SAND. Gravel is angular to sub-angular of mixed lithology. Sand is fine to medium.	
								End of Borehole at 0.40m	1
									2

Remarks

YourGeotechnical HP05

Borehole Log

Borehole No.
HP05
Sheet 1 of 1

Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:10
Client: Paragon.		Dates: 26/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.30	ES		0.40			MADE GROUND: Dense brown clayey, gravelly SAND. Sand is fine. Gravel is fine to medium angular to sub-angular of mixed lithology.
		0.50	ES		0.60			MADE GROUND: Dense orangish brown clayey, gravelly SAND. Gravel is angular to sub-rounded of mixed lithology. Sand is fine to medium.
								End of Borehole at 0.60m

Depth scale: 1, 2

Remarks

AGS

YourGeotechnical HP06

Borehole Log

Borehole No.	**HP06**
Sheet 1 of 1	

Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:10
Client: Paragon.		Dates: 26/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			MADE GROUND: Dense brown clayey, gravelly SAND. Gravel is angular to sub-angular of mixed lithology. Sand is fine to medium. Rootlets noted.
		0.20	ES					
		0.50	ES		0.50			MADE GROUND: Dense brown clayey, gravelly SAND. Sand is fine to medium. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
								End of Borehole at 0.50m

1

2

Remarks

AGS

YourGeotechnical HP07

Borehole Log

Borehole No.	**HP07**
Sheet 1 of 1	

Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type: TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale: 1:10
Client: Paragon.		Dates: 25/06/2019	Logged By: NH

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								TOPSOIL: Dense brown SAND. Sand is medium.
		0.20	ES		0.20			MADE GROUND: Dense brown gravelly SAND. Sand is medium. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
		0.50	ES		0.50			MADE GROUND: Concrete.
					0.50			End of Borehole at 0.50m

1

2

Remarks

AGS

YourGeotechnical HP08

Borehole Log

Borehole No.	**HP08**
Sheet 1 of 1	
Project Name:	Hayes
Project No.	YE7331
Co-ords:	
Hole Type	TP
Location:	North Hyde Gardens, UB3 4QT.
Level:	
Scale	1:10
Client:	Paragon.
Dates:	25/06/2019
Logged By	NH

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.25	ES		0.30			MADE GROUND: Dense brown gravelly SAND. Sand is medium to coarse. Gravel is fine to medium angular to sub-angular of mixed lithology.
		1.30	ES		1.30			MADE GROUND: Loose light brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
								End of Borehole at 1.30m

Depth scale: 1, 2

Remarks

Previously-excavated pit.

AGS

YourGeotechnical HP09		Borehole Log		Borehole No. **HP09** Sheet 1 of 1
Project Name:	Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location:	North Hyde Gardens, UB3 4QT.		Level:	Scale 1:10
Client:	Paragon.		Dates: 25/06/2019	Logged By RG

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.15	ES					MADE GROUND: Loose brown clayey, gravelly SAND. Sand is fine. Gravel is fine to medium angular to subangular of mixed lithology.
		0.50	ES		0.50			
								End of Borehole at 0.50m

1

2

Remarks

AGS

YourGeotechnical HP10

Borehole Log

Borehole No.
HP10
Sheet 1 of 1

Project Name:	Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location:	North Hyde Gardens, UB3 4QT.		Level:	Scale 1:10
Client:	Paragon.		Dates: 25/06/2019	Logged By NH

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.15			MADE GROUND: Dense brown SAND. Sand is medium.
					0.50			MADE GROUND: Loose brown sandy GRAVEL. Sand is medium. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
								End of Borehole at 0.50m

1

2

Remarks

AGS

YourGeotechnical TP01	Borehole Log		Borehole No. TP01 Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:25
Client: Paragon.		Dates: 25/06/2019	Logged By NH

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			MADE GROUND: Dense brown gravelly SAND. Sand is medium. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
		0.40	ES					
		1.30	ES		1.30			MADE GROUND: Loose orangish brown gravelly SAND. Sand is medium to coarse. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
								End of Borehole at 1.30m

1
2
3
4
5

Remarks

Previously-excavated pit.

AGS

YourGeotechnical TP02	Borehole Log		Borehole No. **TP02** Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:25
Client: Paragon.		Dates: 25/06/2019	Logged By NH

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.15			BITUMINOUS MATERIAL: Asphalt.
		0.60	ES		0.75			MADE GROUND: Loose light brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
					1.15			Loose orange SAND. Sand is medium.
	▼	2.75	ES		2.75			Loose grey/black sandy GRAVEL. Sand is medium. Gravel is medium angular to sub-rounded of mixed lithology.
								End of Borehole at 2.75m

Remarks

Groundwater encountered at 2.40m.

AGS

YourGeotechnical TP03

Borehole Log

Borehole No.	**TP03**
Sheet 1 of 1	

Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:25
Client: Paragon.		Dates: 25/06/2019	Logged By NH

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.15			BITUMINOUS MATERIAL: Asphalt.
		0.70	ES		1.70			MADE GROUND: Loose light brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
	▼	2.75	ES		2.75			Black peat and CLAY.
								End of Borehole at 2.75m

1
2
3
4
5

Remarks

Groundwater encountered at 2.70m.

AGS

YourGeotechnical TP04	# Borehole Log		Borehole No. **TP04** Sheet 1 of 1
Project Name: Hayes	Project No. YE7331	Co-ords:	Hole Type TP
Location: North Hyde Gardens, UB3 4QT.		Level:	Scale 1:25
Client: Paragon.		Dates: 25/06/2019	Logged By NH

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								MADE GROUND: Concrete and rebar.
					0.20			MADE GROUND: Loose orange sandy GRAVEL. Sand is medium. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
		0.80	ES		0.65			MADE GROUND: Loos black GRAVEL. Gravel is fine to medium, angular of bituminous material and mixed lithology.
					0.95			Firm orangish brown gravelly CLAY. Gravel is fine to coarse angular to sub-angular of mixed lithology.
	▼	2.60	ES		2.60			End of Borehole at 2.60m

Depth scale: 1, 2, 3, 4, 5

Remarks

Groundwater encountered at 2.60m.

AGS

YourGeotechnical TP05

Borehole Log

Borehole No.	TP05
Sheet	1 of 1

Project Name: Hayes	Project No. YE7331	Co-ords:		Hole Type: TP
Location: North Hyde Gardens, UB3 4QT.		Level:		Scale: 1:25
Client: Paragon.		Dates: 25/06/2019		Logged By: NH

Well	Water Strikes	Sample Depth (m)	Sample Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			MADE GROUND: Concrete with rebar mesh.
					1.30			MADE GROUND: Loose light brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
	▼ (1.30)	1.40	ES		1.80			Firm black gravelly CLAY. Gravel is fine to medium angular to sub-angular of mixed lithology.
	▼ (2.50)	2.50	ES		2.50			Firm brown and black CLAY.
								End of Borehole at 2.50m

Scale: 1, 2, 3, 4, 5

Remarks

Pocketed water from 1.30m and table at 2.50m.

AGS

YourGeotechnical TP06

Borehole Log

Project Name: Hayes	Project No. YE7331	Co-ords:	Borehole No. **TP06** Sheet 1 of 1
Location: North Hyde Gardens, UB3 4QT.		Level:	Hole Type TP
Client: Paragon.		Dates: 25/06/2019	Scale 1:25
			Logged By NH

Well	Water Strikes	Sample Depth (m)	Sample Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								MADE GROUND: Concrete with rebar
					0.30			MADE GROUND: Loose light brown sandy GRAVEL. Sand is fine. Gravel is fine to coarse, angular to sub-angular of brick and mixed lithology.
		1.00	ES					
					1.60			Firm brown CLAY.
					2.00			Dense orangish brown gravelly SAND. Sand is coarse. Gravel is angular to sub-rounded of mixed lithology.
	▼ (2.80)							
		3.00	ES		3.00			End of Borehole at 3.00m

Depth scale: 1, 2, 3, 4, 5

Remarks

Groundwater encountered at 2.80m.

AGS

IGE consulting
Suite 4, 14-32 Hewitt St
Manchester, M15 4GB
email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk

Trial Pit Log

ver. 1.1

Trial Pit No.	TP201	Sheet 1 of 1	
Project Name: Hayes	**Level (mAOD):**	**Date:** 23/07/2019	**Project No.** 3249
Location: London	**Weather:** Sunny and dry		**Logged By** AJ
Client: Paragon Building Consultancy	**Co-ords:** 510328E - 179335N		**Checked By** MB

Water Strike	Samples & In Situ Testing Depth (m)	Type	Results	Depth (mbgl)	Level (mAOD)	Legend	Stratum Description
				0.20			CONCRETE slab. MADE GROUND
	0.30 0.30 0.50	B PID PID	5kg 0ppm 0ppm				Dark brownish grey SAND and GRAVEL with frequent cobbles and occasional whole and half bricks. Cobbles are subrounded of mixed lithologies. Gravel is angular to subrounded of fine to coarse concrete (20%), plastic (20%), red brick (10%) and mixed lithologies (50%). MADE GROUND *Concrete slab across east end of pit from 0.55m to 0.75m bgl.*
▼	2.10 2.10	B PID	5kg 0ppm	2.10			Trial Pit terminated at 2.10m.

Depth scale: 1, 2, 3, 4, 5

Water Strike

Depth Strike (mbgl)	Remarks
2.10	Moderate Ingress

Stability:
Frequent collapses from 0.20m bgl

Remarks:
Trial pit terminated at 2.10m bgl due to frequent collapses and water ingress.

Trial Pit Photos	**TP201**
	Hayes

Image 1.

Image 2.

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Trial Pit Log

ver. 1.1

Trial Pit No.	TP204	Sheet 1 of 1	
Project Name: Hayes	**Level (mAOD):**	**Date:** 23/07/2019	**Project No.** 3249
Location: London	**Weather:** Sunny and dry		**Logged By** AJ
Client: Paragon Building Consultancy	**Co-ords:** 510374E - 179307N		**Checked By** MB

Water Strike	Samples & In Situ Testing Depth (m)	Type	Results	Depth (mbgl)	Level (mAOD)	Legend	Stratum Description
				0.20			CONCRETE slab. MADE GROUND
	0.60 0.60	B PID	5kg 0ppm	1.60			Greyish brown SAND and GRAVEL with frequent whole and half bricks and occasional cobbles. Cobbles are subangular to subrounded of concrete (50%) and mixed lithologies (50%). Gravel is angular to subrounded of fine to coarse red brick (50%), concrete (10%) and mixed lithologies (40%) MADE GROUND
	1.60 1.60	B PID	5kg 0ppm				Trial Pit terminated at 1.60m.

Depth scale: 1 2 3 4 5

Water Strike

Depth Strike (mbgl)	Remarks
	Dry

Stability:
Stable

Remarks:
Trial pit terminated at 1.60m bgl due to hard ground - unable to dig further, possible obstruction / very dense made ground.

Trial Pit Photos

TP204

Hayes

Image 1.

Image 2.

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web: www.igeconsulting.co.uk

Trial Pit Log

ver. 1.1

Trial Pit No.	TP205	Sheet 1 of 1	
Project Name: Hayes	**Level (mAOD):**	**Date:** 23/07/2019	**Project No.** 3249
Location: London	**Weather:** Sunny and dry		**Logged By** AJ
Client: Paragon Building Consultancy	**Co-ords:** 510405E - 179344N		**Checked By** MB

Water Strike	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbgl)	Level (mAOD)	Stratum Description
				0.10		TARMACADAM. MADE GROUND
	0.50 0.50	B PID	5kg 0ppm			Brown, very gravelly SAND with occasional whole and half bricks and cobbles. Cobbles are subrounded of concrete (50%) and mixed lithologies (50%). Gravel is angular to subrounded of fine to coarse red brick (30%), concrete (20%) and mixed lithologies (50%). MADE GROUND *Frequent thick metal bars (suspected rebar) across pit from 1.30m bgl*
	1.50 1.50	B PID	5kg 0ppm	1.50		Trial Pit terminated at 1.50m.

1
2
3
4
5

Water Strike

Depth Strike (mbgl)	Remarks
	Dry

Stability:
Stable

Remarks:
Trial pit terminated at 1.50m bgl due to rebar obstruction.

Trial Pit Photos	**TP205**
	Hayes

Image 1.

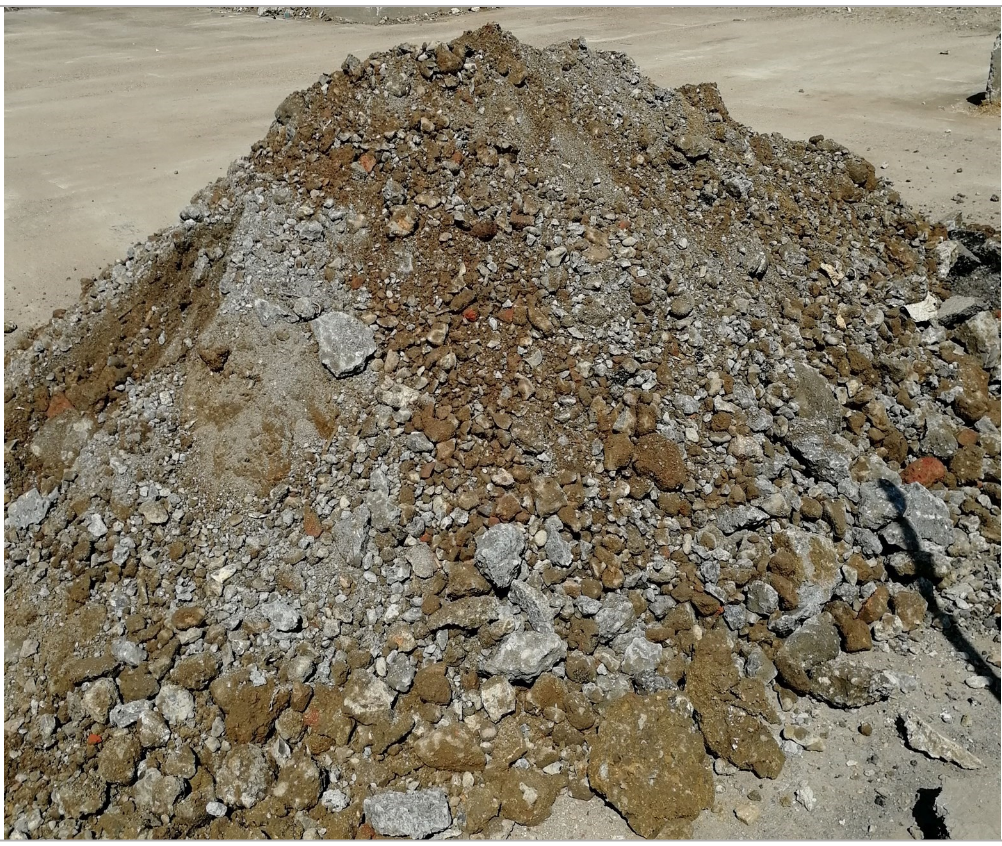


Image 2.

Suite 4, 14-32 Hewitt St
Manchester, M15 4GB
email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk

Trial Pit Log

ver. 1.1

Trial Pit No.	TP208	Sheet 1 of 1	
Project Name: Hayes	**Level (mAOD):**	**Date:** 23/07/2019	**Project No.** 3249
Location: London	**Weather:**		**Logged By**
Client: Paragon Building Consultancy	**Co-ords:** 510435E - 179307N		**Checked By** MB

Water Strike	Samples & In Situ Testing Depth (m)	Type	Results	Depth (mbgl)	Level (mAOD)	Stratum Description
				0.20		CONCRETE slab. MADE GROUND
	0.20	PID	0ppm			
	0.40	B	5kg	0.50		Brown SAND and GRAVEL. Gravel is angular to subrounded of fine to coarse concrete (30%) and mixed lithologies (70%). MADE GROUND
				0.70		CONCRETE slab. MADE GROUND
	2.00	B	5kg			
	2.00	PID	4ppm	2.30		Dark grey, slightly clayey SAND and GRAVEL with occasional whole and half bricks and cobble to boulder sized pockets of firm, grey, slightly gravelly, slightly sandy clay and rare cast iron pipe (300mm diameter). Gravel is angular to well rounded of fine to coarse suspected slag (30%), red brick (20%) and mixed lithologies (50%). Slight hydrocarbon odour. MADE GROUND
						Trial Pit terminated at 2.30m.

1
2
3
4
5

Water Strike

Depth Strike (mbgl)	Remarks
	Dry

Stability:

Remarks:

Trial pit terminated at 2.30m bgl due to hard ground / possible obstruction and frequent collapses.

Trial Pit Photos	**TP208**
	Hayes

Image 1.

Image 2.

APPENDIX 6: CBR TEST RESULTS

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

UKAS TESTING 4041

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

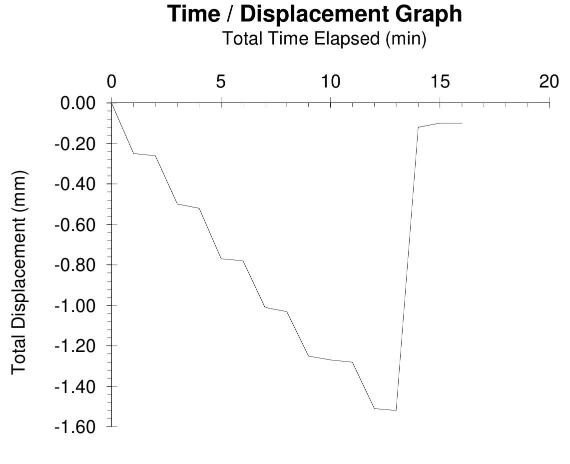
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street	Job Number:	20-81418_10
	Manchester		
	M15 4GB	Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

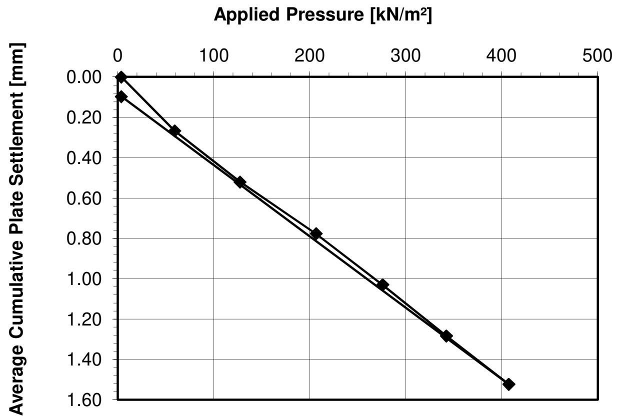
Laboratory Reference:	PL 10	Depth Top (mm):	-250
Test Reference:	10	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Cloudy
Test Location:	CBR 10	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
4.20	59	0.27
9.00	127	0.52
14.60	207	0.78
19.50	276	1.03
24.20	342	1.28
28.80	407	1.52
0.25	3	0.10
End of Test		

Time / Displacement Graph



Applied Pressure vs Settlement



Pressure at 1.25mm Settlement:	**334 kN/m²**
Modulus of Subgrade Reaction:	**118 MN/m²/m**
Equivalent CBR By Plate Loading:	**38 %**
Moisture Content:	**N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

4041

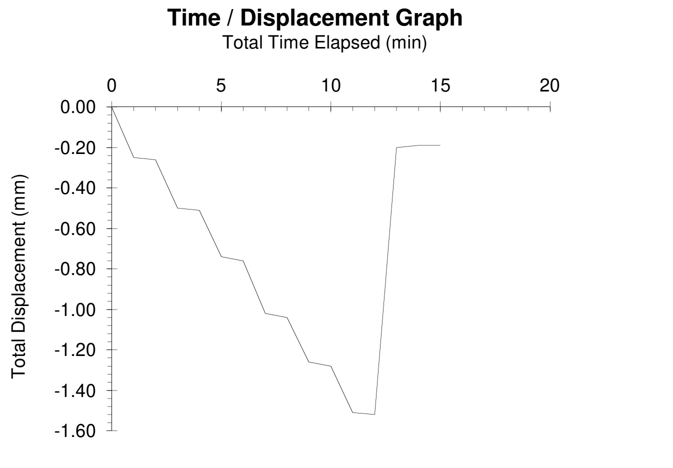
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

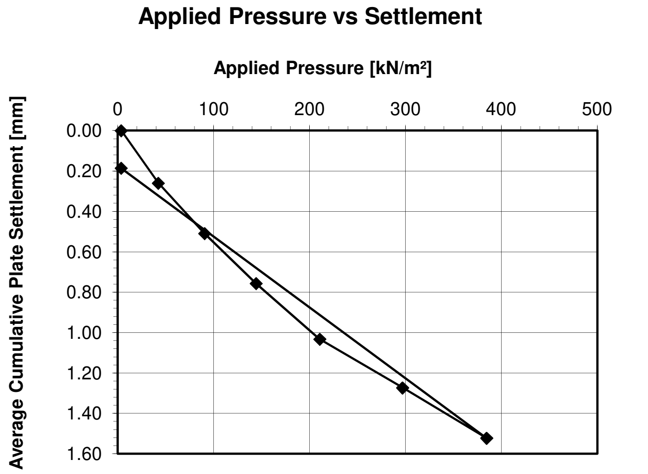
Client:	IGE Consulting Ltd
Client Address:	14-32 Hewitt Street Manchester M15 4GB
Contact:	Angharad Jones
Site:	North Hyde Gardens, Hayes
Client Reference:	170120/01
Job Number:	20-81418_9
Date Tested:	28.01.20
Tested By:	RF

Test Results

Laboratory Reference:	PL 9
Test Reference:	9
Material Description:	Type 1
Test Location:	CBR 6
Depth Top (mm):	-250
Layer Thickness (mm):	N/A
Weather Conditions:	Cloudy
Kentledge Type:	8 T 360
Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
3.00	42	0.26
6.40	91	0.51
10.20	144	0.76
14.90	211	1.03
21.00	297	1.27
27.20	385	1.52
0.25	3	0.19
End of Test		





Pressure at 1.25mm Settlement:	**289 kN/m²**
Modulus of Subgrade Reaction:	**102 MN/m²/m**
Equivalent CBR By Plate Loading:	**29 %**
Moisture Content:	**N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

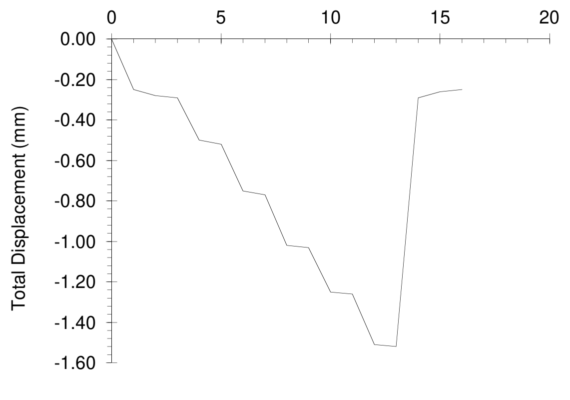
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

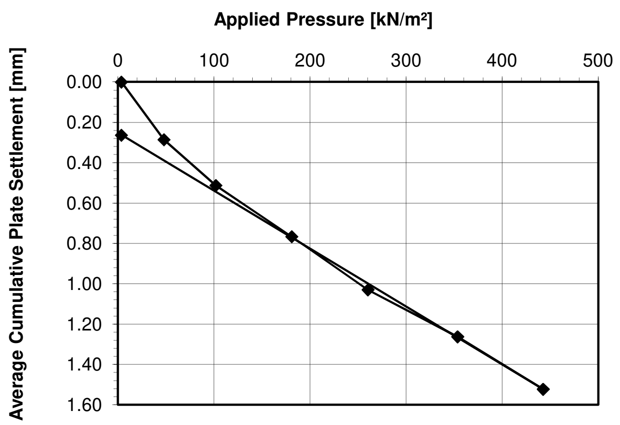
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street Manchester M15 4GB	Job Number:	20-81418_8
		Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

Laboratory Reference:	PL 8	Depth Top (mm):	-200
Test Reference:	8	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Clear
Test Location:	CBR 5	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
3.40	48	0.29
7.20	102	0.51
12.80	181	0.77
18.40	260	1.03
25.00	354	1.26
31.30	443	1.52
0.25	3	0.26
End of Test		





Pressure at 1.25mm Settlement: **348 kN/m²**

Modulus of Subgrade Reaction: **123 MN/m²/m**

Equivalent CBR By Plate Loading: **40 %**

Moisture Content: **N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

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All assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.
The analysis was carried out at site mentioned above. Moisture Content was carried out at i2 Analytical Limited, Unit 8, 8 Harrowden Road, Brackmills Industrial Estate, Northampton, NN4 7EB"

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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

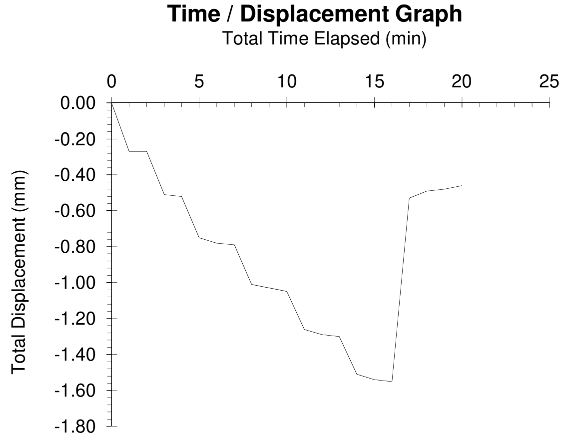
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street	Job Number:	20-81418_7
	Manchester		
	M15 4GB	Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

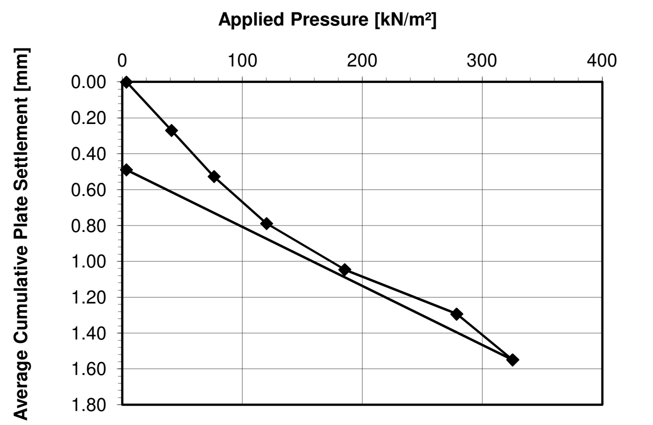
Laboratory Reference:	PL 7	Depth Top (mm):	-250
Test Reference:	7	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Clear
Test Location:	CBR 4	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
2.90	41	0.27
5.40	76	0.53
8.50	120	0.79
13.10	185	1.05
19.70	279	1.29
23.00	325	1.55
0.25	3	0.49
End of Test		

Time / Displacement Graph



Applied Pressure vs Settlement



Pressure at 1.25mm Settlement:	**262 kN/m²**
Modulus of Subgrade Reaction:	**93 MN/m²/m**
Equivalent CBR By Plate Loading:	**25 %**
Moisture Content:	**N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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

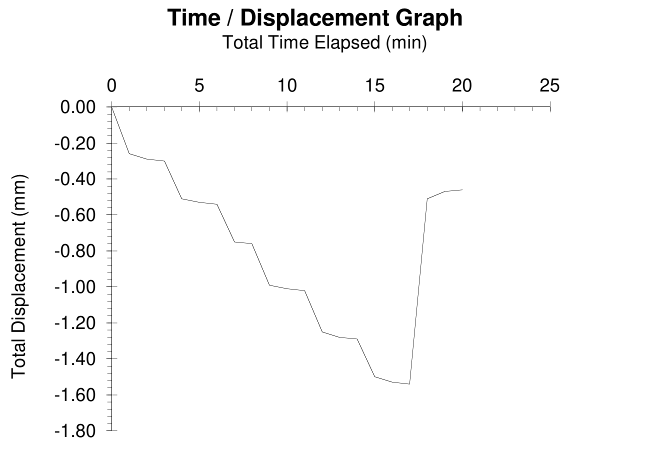
UKAS TESTING 4041

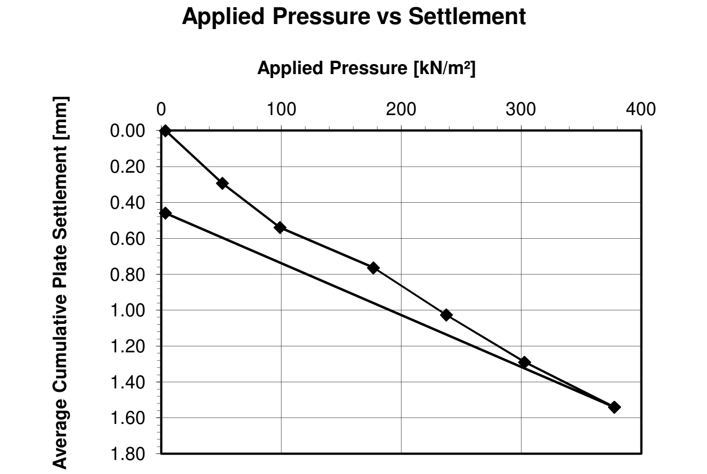
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street	Job Number:	20-81418_6
	Manchester		
	M15 4GB	Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

Laboratory Reference:	PL 6	Depth Top (mm):	-200
Test Reference:	6	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Cloudy
Test Location:	CBR 3	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
3.60	51	0.29
7.00	99	0.54
12.50	177	0.76
16.80	238	1.03
21.40	303	1.29
26.70	378	1.54
0.25	3	0.46
	End of Test	





Pressure at 1.25mm Settlement:	**293 kN/m²**
Modulus of Subgrade Reaction:	**103 MN/m²/m**
Equivalent CBR By Plate Loading:	**30 %**
Moisture Content:	**N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

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All assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.
The analysis was carried out at site mentioned above. Moisture Content was carried out at i2 Analytical Limited, Unit 8, 8 Harrowden Road, Brackmills Industrial Estate, Northampton, NN4 7EB"

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

UKAS TESTING 4041

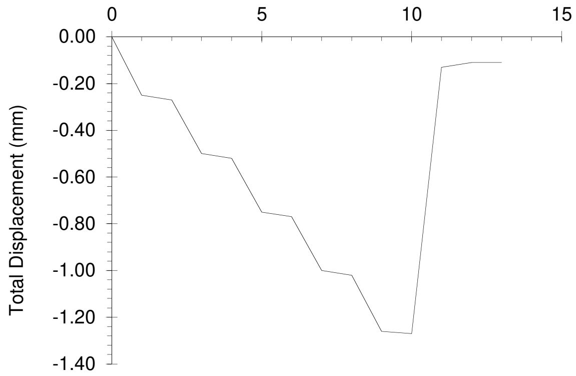
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

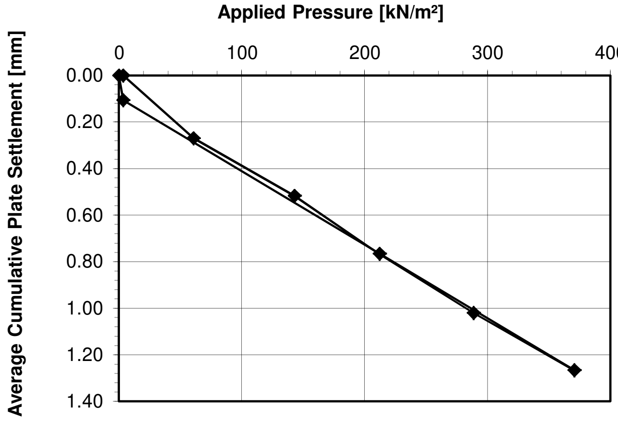
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street	Job Number:	20-81418_5
	Manchester		
	M15 4GB	Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

Laboratory Reference:	PL 5	Depth Top (mm):	-200
Test Reference:	5	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Clear
Test Location:	CBR 2	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
4.30	61	0.27
10.10	143	0.52
15.00	212	0.77
20.40	289	1.02
26.20	371	1.27
0.25	3	0.11
End of Test		





Pressure at 1.25mm Settlement:	**365 kN/m²**
Modulus of Subgrade Reaction:	**129 MN/m²/m**
Equivalent CBR By Plate Loading:	**44 %**
Moisture Content:	**N/A**
Remarks:	Machine lifted at 26 kN.

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

UKAS TESTING 4041

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

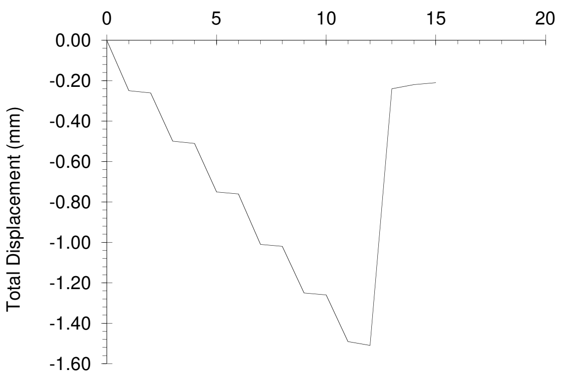
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

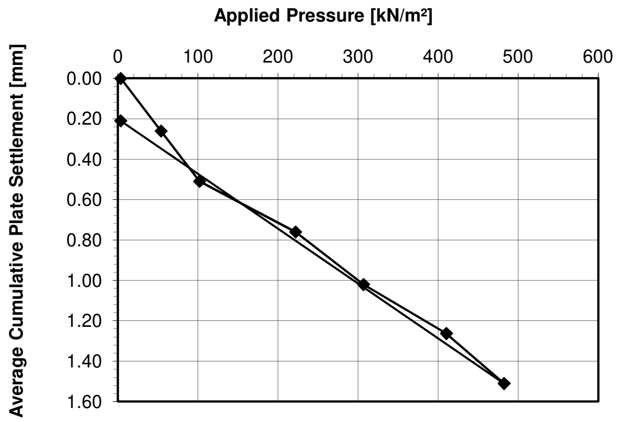
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street	Job Number:	20-81418_4
	Manchester		
	M15 4GB	Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

Laboratory Reference:	PL 4	Depth Top (mm):	-200
Test Reference:	4	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Clear
Test Location:	CBR 1	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
3.80	54	0.26
7.20	102	0.51
15.70	222	0.76
21.70	307	1.02
29.00	410	1.26
34.10	482	1.51
0.25	3	0.21
End of Test		





Pressure at 1.25mm Settlement:	**405 kN/m²**
Modulus of Subgrade Reaction:	**143 MN/m²/m**
Equivalent CBR By Plate Loading:	**52 %**
Moisture Content:	**N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

UKAS TESTING 4041

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

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

Analytical i2 Environmental Science

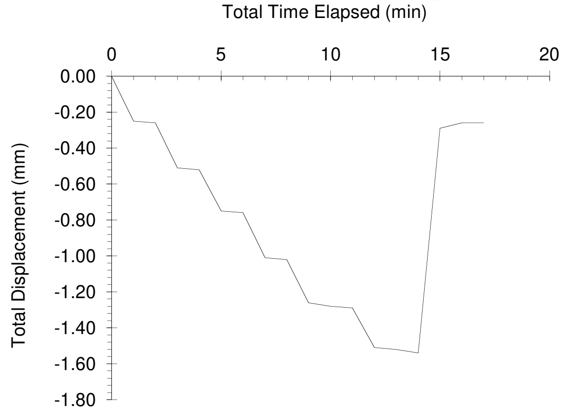
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street Manchester M15 4GB	Job Number:	20-81418_3
		Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

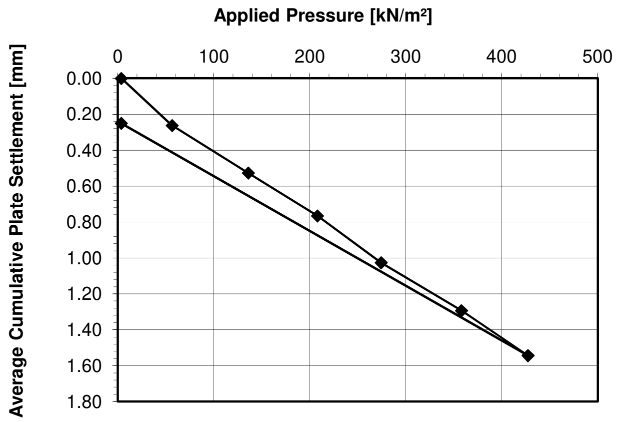
Laboratory Reference:	PL 3	Depth Top (mm):	-100
Test Reference:	3	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Clear
Test Location:	CBR 9	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
4.00	57	0.26
9.60	136	0.53
14.70	208	0.77
19.40	274	1.03
25.30	358	1.29
30.20	427	1.54
0.25	3	0.25
End of Test		

Time / Displacement Graph



Applied Pressure vs Settlement



Pressure at 1.25mm Settlement:	**344 kN/m²**
Modulus of Subgrade Reaction:	**122 MN/m²/m**
Equivalent CBR By Plate Loading:	**40 %**
Moisture Content:	**N/A**

Remarks:

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

UKAS TESTING 4041

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

Environmental Science

Client: IGE Consulting Ltd
Client Address: 14-32 Hewitt Street
Manchester
M15 4GB

Contact: Angharad Jones
Site: North Hyde Gardens, Hayes

Client Reference: 170120/01
Job Number: 20-81418_2

Date Tested: 28.01.20
Tested By: RF

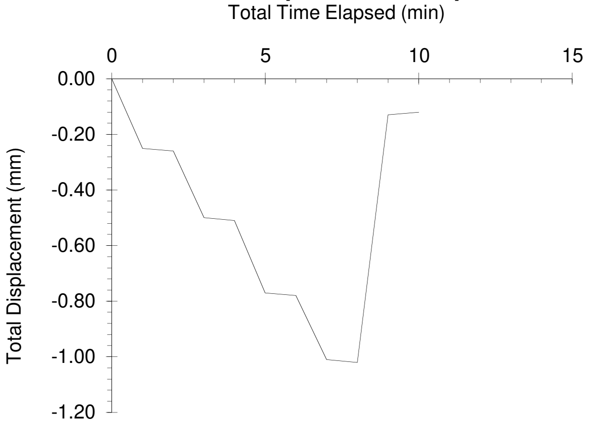
Test Results

Laboratory Reference: PL 2
Test Reference: 2
Material Description: Type 1
Test Location: CBR 8

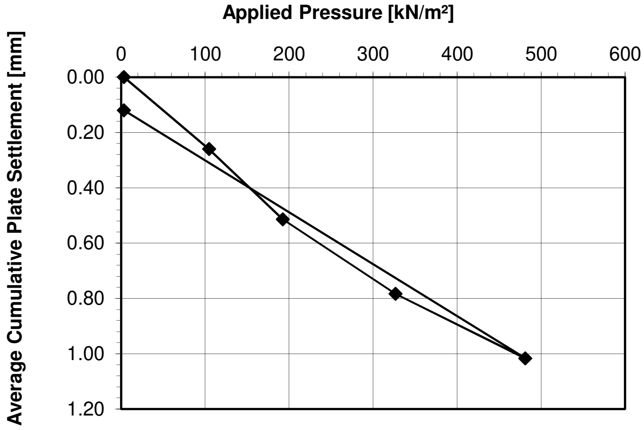
Depth Top (mm): -150
Layer Thickness (mm): N/A
Weather Conditions: Clear
Kentledge Type: 8 T 360
Plate Diameter [m]: 0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
7.40	105	0.26
13.60	192	0.51
23.10	327	0.78
34.00	481	1.02
0.25	3	0.12
End of Test		

Time / Displacement Graph



Applied Pressure vs Settlement



Pressure at 1.25mm Settlement: **550 kN/m²**

Modulus of Subgrade Reaction: **194 MN/m²/m**

Equivalent CBR By Plate Loading: **89 %**

Moisture Content: **N/A**

Remarks: Machine lifted at 34 kN.

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

<u>**Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9**</u>

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

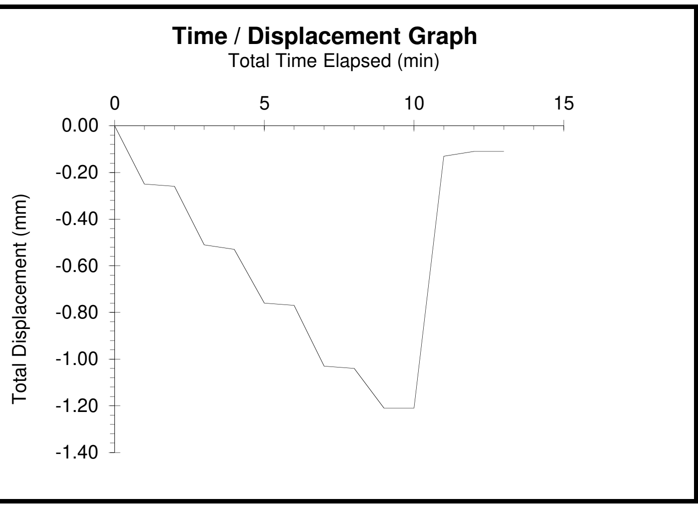
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

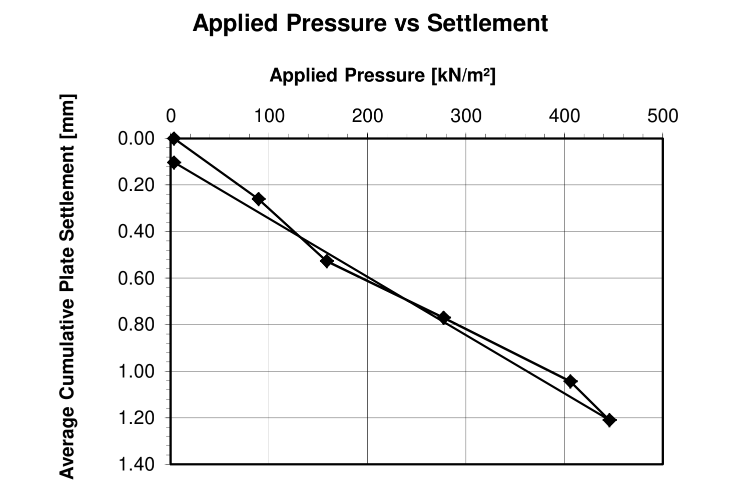
Client:	IGE Consulting Ltd	Client Reference:	170120/01
Client Address:	14-32 Hewitt Street	Job Number:	20-81418_1
	Manchester		
	M15 4GB	Date Tested:	28.01.20
		Tested By:	RF
Contact:	Angharad Jones		
Site:	North Hyde Gardens, Hayes		

Test Results

Laboratory Reference:	PL 1	Depth Top (mm):	-170
Test Reference:	1	Layer Thickness (mm):	N/A
Material Description:	Type 1	Weather Conditions:	Clear
Test Location:	CBR 7	Kentledge Type:	8 T 360
		Plate Diameter [m]:	0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.25	3	0.00
6.30	89	0.26
11.20	158	0.53
19.60	277	0.77
28.70	406	1.04
31.50	446	1.21
0.25	3	0.10
End of Test		





Pressure at 1.25mm Settlement:	**460 kN/m²**
Modulus of Subgrade Reaction:	**163 MN/m²/m**
Equivalent CBR By Plate Loading:	**65 %**
Moisture Content:	**N/A**
Remarks:	Machine lifted at 31.5 kN.

Signed:

Hayden Fountain
Site Service Coordinator

Date Reported: 31/01/2020

Page: 1 of 1

for and on behalf of i2 Analytical Ltd

APPENDIX 7: ENVIRONMENTAL LABORATORY TESTING

Made Ground Soil Analysis
Bulls Bridge, Hayes

			TP / BH No	WS3	WS4	WS5	WS5	WS6A	WS7	WS8	TP4	TP6	TP201	TP205	TP208	BH02	BH07	BH08
			Depth (m)	0.75	0.8	0.5	3.5	0.8	2.5	0.3	0.8	1	0.3	0.5	0.4	1.5	2.55-3.00	2.50-3.00
			Date Sampled	25/06/2019	27/06/2019	25/06/2019	25/06/2019	25/06/2019	26/06/2019	27/06/2019	25/06/2019	25/06/2019	24/07/2019	24/07/2019	24/07/2019	29/01/2020	24/01/2020	24/01/2020
			Report No:	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-51434	19-51435	19-51436	20-83728	20-82909	20-82909
			Sample No	418783	418784	418785	418786	418787	418788	418789	418792	418793	1275531	1275532	1275533	1425657	1421299	1421301
Determinand	**Unit**	**LOD**	**GAC**															
Asbestos Screen (S)	N/a	N/a	Detection	Detected	Not Detected	Not Detected	Not Detected	Detected	Not Detected	Detected	Not Detected	Detected	Detected			Detected		
Sample Matrix (S)	Material Type	N/A	Detection	Bundle of Chrysotile fibres				Bundle of Chrysotile fibres		Bundle of Chrysotile fibres		Bundle of Chrysotile fibres	Chrysotile-Loose Fibres			Chrysotile Loose Fibrous Debris		
Asbestos Type (S)	PLM Result	N/A	Detection	Chrysotile				Chrysotile		Chrysotile		Chrysotile				Chrysotile		
Quantification	%	<0.001	Detection	0.004				0.004		0.002		0.005				0.019		
pH	pH Units	N/A	N/A	8	8.4	9.9	7.1	9.1	7.5	10.4	7.8	8.1	11.4	10.4	10.8	7.3	7.7	8.8
Total Cyanide	mg/kg	< 2	LOD	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1
W/S Sulphate as SO4 (2:1)	mg/l	< 10	N/A	148	200	585	198	224	605	601	191	55	1440	734	326	698	195	955
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	N/A	0.15	0.2	0.58	0.2	0.22	0.6	0.6	0.19	0.05	1.4	0.73	0.33	0.7	0.19	0.96
Organic Matter	%	< 0.1	N/A	3.6	3.3	2.7	1.5	1.7	3.1	2.2	4.4	1.2	4.4	1.5	0.8	5.8	3.4	2.1
Arsenic (As)	mg/kg	< 2	640	19	34	12	7	15	22	14	317	13	9.4	14	12	18	18	15
Cadmium (Cd)	mg/kg	< 0.2	410	0.2	0.2	< 0.2	< 0.2	< 0.2	0.4	< 0.2	5.8	0.3	< 0.2	< 0.2	0.9	0.4	0.3	0.9
Chromium (Cr)	mg/kg	< 2	8600	23	89	24	17	26	32	22	18	11	23	21	24	42	42	47
Chromium (hexavalent)	mg/kg	< 2	49	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Copper (Cu)	mg/kg	< 4	68000	76	113	24	12	35	62	46	75	31	31	37	43	360	200	100
Lead (Pb)	mg/kg	< 3	2330	381	67	58	25	102	307	843	52	60	47	74	120	230	350	180
Mercury (Hg)	mg/kg	< 1	1100	1.1	< 1	< 1	< 1	< 1	1.7	< 1	< 1	< 1	< 0.3	< 0.3	< 0.3	< 0.3	2.2	< 0.3
Nickel (Ni)	mg/kg	< 3	980	22	56	13	8	25	22	16	32	11	14	23	15	41	37	34
Selenium (Se)	mg/kg	< 3	12000	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (Zn)	mg/kg	< 3	730000	211	116	146	34	114	285	124	48	73	58	86	110	270	72	70
Total Phenols (monohydric)	mg/kg	< 2	N/A	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				< 1.0	230	390
Naphthalene	mg/kg	< 0.1	460	0.85	< 0.1	< 0.1	0.13	4.65	0.81	0.35	0.12	1.82	< 0.05	< 0.05	< 0.05	1.6	0.92	1.3
Acenaphthylene	mg/kg	< 0.1	97000	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.15	< 0.1	< 0.1	0.18	0.8	< 0.05	< 0.05	1.1	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.1	97000	0.13	< 0.1	< 0.1	0.17	9.79	1.73	0.16	< 0.1	0.57	1.6	< 0.05	< 0.05	79	1.5	0.5
Fluorene	mg/kg	< 0.1	68000	0.18	< 0.1	< 0.1	< 0.1	8.6	2.1	0.16	< 0.1	0.41	1.4	< 0.05	< 0.05	62	1.1	0.45
Phenanthrene	mg/kg	< 0.1	22000	1.22	0.33	0.74	0.33	33.7	11.3	1.56	0.33	3.77	13	1.4	0.64	70	3.8	1.8
Anthracene	mg/kg	< 0.1	540000	0.31	< 0.1	0.2	< 0.1	7.27	6.42	0.32	< 0.1	2.23	3.3	0.56	0.4	83	1.4	0.47
Fluoranthene	mg/kg	< 0.1	23000	1.96	0.32	0.73	0.46	20.6	22.1	2.84	0.2	8.03	23	4	1.8	95	7.2	2.4
Pyrene	mg/kg	< 0.1	22000	1.7	0.28	0.54	0.35	15	15.4	2.54	0.16	6.05	19	4.9	1.6	64	6.1	2
Benzo(a)anthracene	mg/kg	< 0.1	N/A	0.76	0.41	0.22	0.18	3.05	7.68	1.34	< 0.1	2.53	12	2.7	1.1	14	3	1.4
Chrysene	mg/kg	< 0.1	N/A	1.04	0.56	0.29	0.29	2.94	6.35	1.42	0.17	2.98	8.1	1.9	0.89	9.9	2.1	0.98
Benzo(b)fluoranthene	mg/kg	< 0.1	N/A	1.13	1.27	0.3	0.32	2.45	6.17	1.71	0.12	2.95	11	2.1	1	8.4	2	1
Benzo(k)fluoranthene	mg/kg	< 0.1	N/A	0.32	0.31	< 0.1	< 0.1	0.74	2.08	0.53	< 0.1	0.89	5.2	1.5	0.6	2.1	1.3	0.79
Benzo(a)pyrene	mg/kg	< 0.1	76	0.63	0.33	0.16	0.17	1.55	4.42	1.23	< 0.1	1.49	11	2.1	0.98	4.1	1.9	1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	N/A	0.43	0.37	0.11	0.13	0.73	1.79	0.8	< 0.1	0.94	5.5	1.1	0.57	1.5	0.65	0.42
Dibenz(a,h)anthracene	mg/kg	< 0.1	N/A	< 0.1	< 0.1	< 0.1	< 0.1	0.15	0.44	0.14	< 0.1	0.2	1.6	0.33	0.21	0.43	0.26	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.1	N/A	0.35	0.3	0.12	< 0.1	0.6	1.29	0.67	< 0.1	0.72	7	1.5	0.86	1.7	0.91	0.55
Total EPA-16 PAHs	mg/kg	< 1.6	N/A	11	4.5	3.4	2.5	112	90.3	15.8	< 1.6	35.8	123	23.9	10.6	499	34.1	15.1
Aliphatic >C5 - C6	mg/kg	< 0.01	3200	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01				< 0.001	< 0.001	
Aliphatic >C6 - C8	mg/kg	< 0.05	7800	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05				< 0.001	< 0.001	
Aliphatic >C8 - C10	mg/kg	< 2	2000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				< 0.001	< 0.001	
Aliphatic >C10 - C12	mg/kg	< 2	9700	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				13	7.6	
Aliphatic >C12 - C16	mg/kg	< 3	59000	< 3	< 3	4	< 3	10	< 3	5	< 3	< 3				250	120	
Aliphatic >C16 - C21	mg/kg	< 3	1600000	< 3	< 3	23	< 3	8	< 3	8	< 3	3				340	1500	
Aliphatic >C21 - C34	mg/kg	< 10	1600000	< 10	< 10	285	< 10	< 10	< 10	23	< 10	21				260	520	
Aliphatic (C5 - C34)	mg/kg	< 21	N/A	< 21	< 21	312	< 21	< 21	< 21	36	< 21	25					-	
Aromatic >C5 - C7	mg/kg	< 0.01	26000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01				< 0.001	< 0.001	
Aromatic >C7 - C8	mg/kg	< 0.05	56000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05				< 0.001	< 0.001	
Aromatic >C8 - C10	mg/kg	< 2	3500	< 2	< 2	< 2	< 2	6	< 2	< 2	< 2	< 2				< 0.001	< 0.001	
Aromatic >C10 - C12	mg/kg	< 2	16000	< 2	< 2	< 2	< 2	11	3	< 2	< 2	3				10	1.7	
Aromatic >C12 - C16	mg/kg	< 2	36000	4	< 2	< 2	< 2	96	22	6	< 2	11				200	78	
Aromatic >C16 - C21	mg/kg	< 3	28000	14	< 3	9	< 3	193	125	20	< 3	47				490	560	
Aromatic >C21 - C35	mg/kg	< 10	28000	22	< 10	79	< 10	164	240	75	< 10	112				210	370	
Aromatic (C5 - C35)	mg/kg	< 21	N/A	40	< 21	88	< 21	470	391	102	< 21	174				900	-	
Total >C5 - C35	mg/kg	< 42	N/A	< 42	< 42	400	< 42	488	391	138	< 42	198	950	110		1770	3100	
Petroleum Range Organics (C6 - C10)	mg/kg	0.1															< 0.1	< 0.1
TPH C10 - C40	mg/kg	10															2800	98
TPH2 (C6 - C10)	mg/kg	0.1															< 0.1	< 0.1
TPH C6 - C40	mg/kg	10															2800	98
TPH (C10 - C25)	mg/kg	10															2600	82
TPH (C25 - C40)	mg/kg	10															550	< 10
Benzene	ug/kg	< 2	98	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				< 1.0	< 1.0	
Toluene	ug/kg	< 5	110000	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5				< 1.0	< 1.0	
Ethylbenzene	ug/kg	< 2	13000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				< 1.0	< 1.0	
p & m-xylene	ug/kg	< 2	14000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				< 1.0	< 1.0	
o-xylene	ug/kg	< 2	15000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2				< 1.0	< 1.0	
MTBE	ug/kg	< 5	N/A	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5				< 1.0	< 1.0	

building & project consultants

			TP / BH No	WS3	WS4	WS5	WS5	WS6A	WS7	WS8	TP4	TP6	TP201	TP205	TP208	BH02	BH07	BH08
			Depth (m)	0.75	0.8	0.5	3.5	0.8	2.5	0.3	0.8	1	0.3	0.5	0.4	1.5	2.55-3.00	2.50-3.00
			Date Sampled	25/06/2019	27/06/2019	25/06/2019	25/06/2019	25/06/2019	26/06/2019	27/06/2019	25/06/2019	25/06/2019	24/07/2019	24/07/2019	24/07/2019	29/01/2020	24/01/2020	24/01/2020
			Report No:	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-51434	19-51435	19-51436	20-83728	20-82909	20-82909
			Sample No	418783	418784	418785	418786	418787	418788	418789	418792	418793	1275531	1275532	1275533	1425657	1421299	1421301
Determinand	**Unit**	**LOD**	**GAC**															
Dichlorodifluoromethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Vinyl Chloride	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Chloromethane	ug/kg	< 10	LOD		< 10	< 10					< 10	< 10						
Chloroethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Bromomethane	ug/kg	< 10	LOD		< 10	< 10					< 10	< 10						
Trichlorofluoromethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1-Dichloroethene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
MTBE	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
trans-1,2-Dichloroethene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1-Dichloroethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
cis-1,2-Dichloroethene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
2,2-Dichloropropane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Chloroform	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Bromochloromethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1,1-Trichloroethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1-Dichloropropene	ug/kg	< 10	LOD		< 10	< 10					< 10	< 10						
Carbon Tetrachloride	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,2-Dichloroethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Benzene	ug/kg	< 2	LOD		< 2	< 2					< 2	< 2						
1,2-Dichloropropane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Trichloroethene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Bromodichloromethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Dibromomethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
TAME	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
cis-1,3-Dichloropropene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Toluene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
trans-1,3-Dichloropropene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1,2-Trichloroethane	ug/kg	< 10	LOD		< 10	< 10					< 10	< 10						
1,3-Dichloropropane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Tetrachloroethene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Dibromochloromethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,2-Dibromoethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Chlorobenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1,1,2-Tetrachloroethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Ethyl Benzene	ug/kg	< 2	LOD		< 2	< 2					< 2	< 2						
m,p-Xylene	ug/kg	< 2	LOD		< 2	< 2					< 2	< 2						
o-Xylene	ug/kg	< 2	LOD		< 2	< 2					< 2	< 2						
Styrene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Bromoform	ug/kg	< 10	LOD		< 10	< 10					< 10	< 10						
Isopropylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,1,2,2-Tetrachloroethane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,2,3-Trichloropropane	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
n-Propylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
Bromobenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
2-Chlorotoluene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,3,5-Trimethylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
4-Chlorotoluene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
tert-Butylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,2,4-Trimethylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
sec-Butylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
p-Isopropyltoluene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,3-Dichlorobenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,4-Dichlorobenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
n-Butylbenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,2-Dichlorobenzene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						
1,2-Dibromo-3-chloropropane	ug/kg	< 10	LOD		< 10	< 10					< 10	< 10						
Hexachlorobutadiene	ug/kg	< 5	LOD		< 5	< 5					< 5	< 5						

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			TP / BH No	WS3	WS4	WS5	WS5	WS6A	WS7	WS8	TP4	TP6	TP201	TP205	TP208	BH02	BH07	BH08
			Depth (m)	0.75	0.8	0.5	3.5	0.8	2.5	0.3	0.8	1	0.3	0.5	0.4	1.5	2.55-3.00	2.50-3.00
			Date Sampled	25/06/2019	27/06/2019	25/06/2019	25/06/2019	25/06/2019	26/06/2019	27/06/2019	25/06/2019	25/06/2019	24/07/2019	24/07/2019	24/07/2019	29/01/2020	24/01/2020	24/01/2020
			Report No:	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-09356	19-51434	19-51435	19-51436	20-83728	20-82909	20-82909
			Sample No	418783	418784	418785	418786	418787	418788	418789	418792	418793	1275531	1275532	1275533	1425657	1421299	1421301
Determinand	**Unit**	**LOD**	**GAC**															
Chloromethane	µg/kg	1	LOD													< 1.0		
Chloroethane	µg/kg	1	LOD													< 1.0		
Bromomethane	µg/kg	1	LOD													< 1.0		
Vinyl Chloride	µg/kg	1	LOD													< 1.0		
Trichlorofluoromethane	µg/kg	1	LOD													< 1.0		
1,1-Dichloroethene	µg/kg	1	LOD													< 1.0		
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	LOD													< 1.0		
Cis-1,2-dichloroethene	µg/kg	1	LOD													< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	LOD													< 1.0		
1,1-Dichloroethane	µg/kg	1	LOD													< 1.0		
2,2-Dichloropropane	µg/kg	1	LOD													< 1.0		
Trichloromethane	µg/kg	1	LOD													< 1.0		
1,1,1-Trichloroethane	µg/kg	1	LOD													< 1.0		
1,2-Dichloroethane	µg/kg	1	LOD													< 1.0		
1,1-Dichloropropene	µg/kg	1	LOD													< 1.0		
Trans-1,2-dichloroethene	µg/kg	1	LOD													< 1.0		
Benzene	µg/kg	1	LOD													< 1.0		
Tetrachloromethane	µg/kg	1	LOD													< 1.0		
1,2-Dichloropropane	µg/kg	1	LOD													< 1.0		
Trichloroethene	µg/kg	1	LOD													< 1.0		
Dibromomethane	µg/kg	1	LOD													< 1.0		
Bromodichloromethane	µg/kg	1	LOD													< 1.0		
Cis-1,3-dichloropropene	µg/kg	1	LOD													< 1.0		
Trans-1,3-dichloropropene	µg/kg	1	LOD													< 1.0		
Toluene	µg/kg	1	LOD													< 1.0		
1,1,2-Trichloroethane	µg/kg	1	LOD													< 1.0		
1,3-Dichloropropane	µg/kg	1	LOD													< 1.0		
Dibromochloromethane	µg/kg	1	LOD													< 1.0		
Tetrachloroethene	µg/kg	1	LOD													< 1.0		
1,2-Dibromoethane	µg/kg	1	LOD													< 1.0		
Chlorobenzene	µg/kg	1	LOD													< 1.0		
1,1,1,2-Tetrachloroethane	µg/kg	1	LOD													< 1.0		
Ethylbenzene	µg/kg	1	LOD													< 1.0		
p & m-Xylene	µg/kg	1	LOD													< 1.0		
Styrene	µg/kg	1	LOD													< 1.0		
Tribromomethane	µg/kg	1	LOD													< 1.0		
o-Xylene	µg/kg	1	LOD													< 1.0		
1,1,2,2-Tetrachloroethane	µg/kg	1	LOD													< 1.0		
Isopropylbenzene	µg/kg	1	LOD													< 1.0		
Bromobenzene	µg/kg	1	LOD													< 1.0		
n-Propylbenzene	µg/kg	1	LOD													< 1.0		
2-Chlorotoluene	µg/kg	1	LOD													< 1.0		
4-Chlorotoluene	µg/kg	1	LOD													< 1.0		
1,3,5-Trimethylbenzene	µg/kg	1	LOD													< 1.0		
tert-Butylbenzene	µg/kg	1	LOD													< 1.0		
1,2,4-Trimethylbenzene	µg/kg	1	LOD													< 1.0		
sec-Butylbenzene	µg/kg	1	LOD													< 1.0		
1,3-Dichlorobenzene	µg/kg	1	LOD													< 1.0		
p-Isopropyltoluene	µg/kg	1	LOD													< 1.0		
1,2-Dichlorobenzene	µg/kg	1	LOD													< 1.0		
1,4-Dichlorobenzene	µg/kg	1	LOD													< 1.0		
Butylbenzene	µg/kg	1	LOD													< 1.0		
1,2-Dibromo-3-chloropropane	µg/kg	1	LOD													< 1.0		
1,2,4-Trichlorobenzene	µg/kg	1	LOD													< 1.0		
Hexachlorobutadiene	µg/kg	1	LOD													< 1.0		
1,2,3-Trichlorobenzene	µg/kg	1	LOD													< 1.0		

Natural Soil Analysis
Bulls Bridge, Hayes

Determinand	Unit	LOD	GAC (Commercial Use)	BH03	BH07	BH08
TP / BH No				BH03	BH07	BH08
Depth (m)				3.8	5.80-6.00	5.50-6.00
Date Sampled				29/01/2020	24/01/2020	24/01/2020
Report No:				20-83728	20-82909	20-82909
Sample No				1425656	1421300	1421302
Asbestos Screen (S)	N/a	N/a	Detection	Not Detected	Not Detected	Not Detected
Sample Matrix (S)	Material Type	N/A	Detection			
Asbestos Type (S)	PLM Result	N/A	Detection			
Quantification	%	<0.001	Detection			
pH	pH Units	N/A	N/A	7.2	8.1	7.9
Total Cyanide	mg/kg	< 2	LOD	< 1	< 1	< 1
W/S Sulphate as SO4 (2:1)	mg/l	< 10	N/A	509	27.5	29
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	N/A	0.51	0.028	0.029
Organic Matter	%	< 0.1	N/A	2.5	0.5	0.4
Arsenic (As)	mg/kg	< 2	640	22	13	8.4
Cadmium (Cd)	mg/kg	< 0.2	410	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	8600	30	27	23
Chromium (hexavalent)	mg/kg	< 2	49	< 1.2	< 1.2	< 1.2
Copper (Cu)	mg/kg	< 4	68000	14	12	8.7
Lead (Pb)	mg/kg	< 3	2330	11	14	4.7
Mercury (Hg)	mg/kg	< 1	1100	< 0.3	< 0.3	< 0.3
Nickel (Ni)	mg/kg	< 3	980	33	26	21
Selenium (Se)	mg/kg	< 3	12000	< 1.0	< 1.0	< 1.0
Zinc (Zn)	mg/kg	< 3	730000	40	43	26
Total Phenols (monohydric)	mg/kg	< 2	N/A	< 1.0	38	58
Naphthalene	mg/kg	< 0.1	460	3.9	65	79
Acenaphthylene	mg/kg	< 0.1	97000	3.4	3	< 0.05
Acenaphthene	mg/kg	< 0.1	97000	100	72	42
Fluorene	mg/kg	< 0.1	68000	270	73	37
Phenanthrene	mg/kg	< 0.1	22000	32	200	100
Anthracene	mg/kg	< 0.1	540000	76	25	18
Fluoranthene	mg/kg	< 0.1	23000	380	93	37
Pyrene	mg/kg	< 0.1	22000	230	63	24
Benzo(a)anthracene	mg/kg	< 0.1	N/A	61	19	5.9
Chrysene	mg/kg	< 0.1	N/A	44	11	3.4
Benzo(b)fluoranthene	mg/kg	< 0.1	N/A	20	4.5	1.6
Benzo(k)fluoranthene	mg/kg	< 0.1	N/A	8.1	3.6	1.1
Benzo(a)pyrene	mg/kg	< 0.1	76	11	3	1.2
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	N/A	2.2	0.85	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.1	N/A	0.95	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.1	N/A	2.1	0.54	< 0.05
Total EPA-16 PAHs	mg/kg	< 1.6	N/A	1250	641	354
Aliphatic >C5 - C6	mg/kg	< 0.01	5900	< 0.001	< 0.001	< 0.001
Aliphatic >C6 - C8	mg/kg	< 0.05	17000	< 0.001	< 0.001	< 0.001
Aliphatic >C8 - C10	mg/kg	< 2	4800	< 0.001	< 0.001	< 0.001
Aliphatic >C10 - C12	mg/kg	< 2	23000	8.7	9.5	9.2
Aliphatic >C12 - C16	mg/kg	< 3	82000 (24)	41	39	30
Aliphatic >C16 - C21	mg/kg	< 3	1700000	27	27	32
Aliphatic >C21 - C34	mg/kg	< 10	1700000	< 8.0	17	23
Aliphatic (C5 - C34)	mg/kg	< 21	N/A		94	95
Aromatic >C5 - C7	mg/kg	< 0.01	46000	< 0.001	< 0.001	< 0.001
Aromatic >C7 - C8	mg/kg	< 0.05	110000	< 0.001	< 0.001	< 0.001
Aromatic >C8 - C10	mg/kg	< 2	8100	< 0.001	< 0.001	< 0.001
Aromatic >C10 - C12	mg/kg	< 2	28000	22	70	110
Aromatic >C12 - C16	mg/kg	< 2	37000 (169)	930	300	380
Aromatic >C16 - C21	mg/kg	< 3	28000	1900	390	410
Aromatic >C21 - C35	mg/kg	< 10	28000	480	140	44
Aromatic (C5 - C35)	mg/kg	< 21	N/A	3300	900	940
Total >C5 - C35	mg/kg	< 42	N/A	3377	994	1035
Benzene	ug/kg	< 2	98	< 1.0	< 1.0	< 1.0
Toluene	ug/kg	< 5	110000	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/kg	< 2	13000	< 1.0	< 1.0	< 1.0
p & m-xylene	ug/kg	< 2	14000	< 1.0	< 1.0	< 1.0
o-xylene	ug/kg	< 2	15000	< 1.0	< 1.0	< 1.0
MTBE	ug/kg	< 5	N/A	< 1.0	< 1.0	< 1.0

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Determinand	Unit	LOD	TP / BH No	BH03	BH07	BH08
			Depth (m)	3.8	5.80-6.00	5.50-6.00
			Date Sampled	29/01/2020	24/01/2020	24/01/2020
			Report No:	20-83728	20-82909	20-82909
			Sample No	1425656	1421300	1421302
Determinand	**Unit**	**LOD**	**GAC (Commercial Use)**			
Chloromethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	LOD	< 1.0	< 1.0	< 1.0

Leachate Analysis
Bulls Bridge, Hayes

Determinand	Unit	LOD	Freshwater EQS	TP204	TP208	BH07	BH08
			TP / BH No	**TP204**	**TP208**	**BH07**	**BH08**
			Depth (m)	0.6	2	5.80-6.00	5.50-6.00
			Date Sampled	24/07/2019	24/07/2019	24/01/2020	24/01/2020
			Report No:	19-51430	19-51431	20-83394	20-83394
			Sample No	1275534	1275535	1424098	1424099
Determinand	**Unit**	**LOD**	**Freshwater EQS**				
pH	pH Units	N/A	6.0-9.0	10.1	7.8	7.7	7.3
Electrical Conductivity	µS/cm	10		400	290	99	39
Free Cyanide	µg/l	10	1	< 10	< 10	< 10	< 10
Sulphate as SO_4	mg/l	0.1		147	114	12.3	3.8
Nitrate as N	mg/l	0.01		1.55	0.84	0.02	0.08
Hardness - Total	mgCaCO3/l	1		219	137	38.4	14.3
Calcium (dissolved)	mg/l	0.012		87	48	11	3.8
Magnesium (dissolved)	mg/l	0.005		0.32	3.9	2.8	1.2
Arsenic (dissolved)	µg/l	1.1	50	6.5	3.7	< 1.1	< 1.1
Barium (dissolved)	µg/l	0.05		22	49	17	8.6
Beryllium (dissolved)	µg/l	0.2	15	< 0.2	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10		27	130	45	20
Cadmium (dissolved)	µg/l	0.08	0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	4.7	18	2.5	0.8	2.1
Copper (dissolved)	µg/l	0.7	1	14	8.7	3.3	2.8
Lead (dissolved)	µg/l	1	4	3.8	14	< 1.0	< 1.0
Mercury (dissolved)	µg/l	0.5	0.07	< 0.5	1	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	4	0.5	1.8	< 0.3	1
Selenium (dissolved)	µg/l	4		< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7		40	10	2.4	7.1
Zinc (dissolved)	µg/l	0.4	10.9	3.4	10	7.3	9.4
Naphthalene	µg/l	0.01	2	< 0.01	0.61	250	4700
Acenaphthylene	µg/l	0.01		0.02	0.66	4.7	9
Acenaphthene	µg/l	0.01		< 0.01	7.5	81	170
Fluorene	µg/l	0.01		< 0.01	1.6	52	64
Phenanthrene	µg/l	0.01		< 0.01	< 0.01	41	41
Anthracene	µg/l	0.01	0.1	0.01	< 0.01	3	5.8
Fluoranthene	µg/l	0.01	0.1	0.03	0.75	2.1	4.8
Pyrene	µg/l	0.01		0.02	0.5	1.3	4.1
Benzo(a)anthracene	µg/l	0.01		0.02	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01		0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01		0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01		0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	0.02	0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01		0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01		< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01		0.01	< 0.01	< 0.01	< 0.01
Total EPA-16 PAHs	µg/l	0.2	LOD	< 0.2	12	430	5000
Benzene	µg/l	1	10	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	74	< 1.0	< 1.0	< 1.0	1.7
Ethylbenzene	µg/l	1		< 1.0	< 1.0	< 1.0	16
p & m-xylene	µg/l	1		< 1.0	< 1.0	< 1.0	29
o-xylene	µg/l	1		< 1.0	< 1.0	< 1.0	18
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1		< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1		< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1		< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1		< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1		< 1.0	< 1.0	< 1.0	1.7
TPH-CWG - Aromatic >C8 - C10	µg/l	1		< 1.0	< 1.0	< 1.0	88
TPH-CWG - Aromatic >C10 - C12	µg/l	10		< 10	< 10	370	5600
TPH-CWG - Aromatic >C12 - C16	µg/l	10		< 10	< 10	600	2000
TPH-CWG - Aromatic >C16 - C21	µg/l	10		< 10	120	100	1000
TPH-CWG - Aromatic >C21 - C35	µg/l	10		< 10	58	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10		< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10		< 10	180	1100	8700
TPH-CWG - Aromatic (C5 - C44)	µg/l	10		< 10	180	1100	8700
Total TPH (C5-C35)	µg/l	10	10	< 10	180	1100	8700

Water Analysis
Bulls Bridge, Hayes

Determinand	Unit	LOD	GAC Freshwater EQS (ug/l)	WS5	WS6	WS7	BH02	BH07	BH08
			TP / BH No	**WS5**	**WS6**	**WS7**	**BH02**	**BH07**	**BH08**
			Depth (m)	2.88	3.86	3.25	2.8	4.85	4.8
			Date Sampled	03/07/2019	03/07/2019	03/07/2019	29/01/2020	29/01/2020	29/01/2020
			Lab Report No:	19-09550	19-09550	19-09550	20-83728	20-83728	20-83728
			Lab Sample No	419616	419617	419618	1425653	1425654	1425655
pH	pH Units	N/a	6.0-9.0	7.1	7.4	6.6	7.5	7.5	7.3
Electrical Conductivity	uS/cm	< 5		1850	4840	2350	1600	1500	1300
Total Cyanide	ug/l	< 5		< 5	7	7			
Free Cyanide	µg/l	<10	1				< 10	< 10	< 10
Sulphate as SO4	mg/l	< 1		114	270	10	157	169	33.4
Total Organic Carbon (TOC)	mg/l	< 0.1		8.5	16.9	1.5			
Hardness - Total	mgCaCO3/l	< 1		1010	880	1330	626	618	813
Nitrate as N	mg/l	0.01					1.14	0.67	1.57
Chemical Oxygen Demand (Total)	mg/l	2					100	55	91
BOD (Biochemical Oxygen Demand	mg/l	1					18	6.1	31
Redox Potential	mV	-800					65.7	71.2	84.7
Arsenic (dissolved)	ug/l	< 5	50	21	< 5	12	1.95	1.39	2.96
Barium (dissolved)	ug/l	< 5		140	120	268	110	130	97
Beryllium (dissolved)	ug/l	< 3	15	< 3	< 3	< 3	< 0.1	< 0.1	< 0.1
Boron (dissolved)	ug/l	< 5		510	575	1300	420	370	220
Cadmium (dissolved)	ug/l	< 0.4	0.08	< 0.4	< 0.4	< 0.4	0.03	< 0.02	< 0.02
Calcium (dissolved)	mg/l	0.012					170	160	210
Chromium (dissolved)	ug/l	< 5	4.7	< 5	< 5	< 5	0.5	0.3	0.3
Copper (dissolved)	ug/l	< 5	1	< 5	< 5	< 5	1.6	2	0.6
Lead (dissolved)	ug/l	< 5	4	< 5	< 5	< 5	0.4	0.7	0.3
Magnesium (dissolved)	mg/l	0.005					48	55	68
Mercury (dissolved)	ug/l	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	ug/l	< 5	4	< 5	< 5	5	4.7	3.3	7.3
Selenium (dissolved)	ug/l	< 5		< 5	< 5	< 5	33	2.1	4.2
Vanadium (dissolved)	ug/l	< 5		< 5	< 5	< 5	0.5	0.3	< 0.2
Zinc (dissolved)	ug/l	< 2	10.9	7	4	7	2.4	9.3	8.8
Total Phenols (monohydric)	ug/l	< 10	7.7	< 10	< 10	< 10	280	< 10	190
Naphthalene	ug/l	< 0.01	2	< 0.01	< 0.01	0.06	0.27	0.1	585
Acenaphthylene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	0.29	0.29	0.87
Acenaphthene	ug/l	< 0.01		0.03	< 0.01	0.11	6.01	11.2	13.7
Fluorene	ug/l	< 0.01		< 0.01	< 0.01	0.03	2.59	2.76	5.13
Phenanthrene	ug/l	< 0.01		< 0.01	< 0.01	0.04	2.22	< 0.01	5.04
Anthracene	ug/l	< 0.01	0.1	< 0.01	0.03	0.02	0.55	0.4	0.79
Fluoranthene	ug/l	< 0.01	0.1	< 0.01	0.03	0.03	0.5	0.9	0.75
Pyrene	ug/l	< 0.01		< 0.01	0.02	0.03	0.3	0.51	0.57
Benzo(a)anthracene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	ug/l	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	ug/l	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	ug/l	< 0.008		< 0.008	< 0.008	< 0.008	< 0.01	< 0.01	< 0.01
Total EPA-16 PAHs	ug/l	< 0.01	LOD	0.03	0.08	0.32	12.7	16.1	612
Aliphatic >C5 - C6	ug/l	< 10		< 10	< 10	< 10	< 1.0	< 1.0	< 1.0
Aliphatic >C6 - C8	ug/l	< 10		< 10	< 10	< 10	< 1.0	< 1.0	< 1.0
Aliphatic >C8 - C10	ug/l	< 10		< 10	< 10	< 10	< 1.0	< 1.0	< 1.0
Aliphatic >C10 - C12	ug/l	< 10		< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic >C12 - C16	ug/l	< 10		< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic >C16 - C21	ug/l	< 10		< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic >C21 - C34	ug/l	< 10		< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	ug/l	< 70		< 70	< 70	< 70	< 10	< 10	< 10
Aromatic >C5 - C7	ug/l	< 10		< 10	< 10	< 10	3.5	< 1.0	2.9
Aromatic >C7 - C8	ug/l	< 10		< 10	< 10	< 10	< 1.0	< 1.0	6.9
Aromatic >C8 - C10	ug/l	< 10		< 10	< 10	< 10	6.8	< 1.0	390
Aromatic >C10 - C12	ug/l	< 10		< 10	< 10	< 10	< 10	70	1500
Aromatic >C12 - C16	ug/l	< 10		< 10	< 10	< 10	820	150	1000
Aromatic >C16 - C21	ug/l	< 10		< 10	< 10	< 10	400	70	500
Aromatic >C21 - C35	ug/l	< 10		< 10	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	ug/l	< 70		< 70	< 70	< 70	1200	290	3400
Total >C5 - C35	ug/l	< 140	10	< 140	< 140	< 140	1200	290	3400
Benzene	ug/l	< 1	10	< 1	< 1	< 1	3.5	< 1.0	2.9
Toluene	ug/l	< 5	74	< 5	< 5	< 5	< 1.0	< 1.0	6.9
Ethylbenzene	ug/l	< 5		< 5	< 5	< 5	2	< 1.0	81.1
p & m-xylene	ug/l	< 10		< 10	< 10	< 10	< 1.0	< 1.0	170
o-xylene	ug/l	< 5		< 5	< 5	< 5	3	< 1.0	76.7
MTBE	ug/l	< 10		< 10	< 10	< 10	< 1.0	< 1.0	< 1.0

building & project consultants

paragon

			TP / BH No	WS5	WS6	WS7	BH02	BH07	BH08
			Depth (m)	2.88	3.86	3.25	2.8	4.85	4.8
			Date Sampled	03/07/2019	03/07/2019	03/07/2019	29/01/2020	29/01/2020	29/01/2020
			Lab Report No:	19-09550	19-09550	19-09550	20-83728	20-83728	20-83728
			Lab Sample No	419616	419617	419618	1425653	1425654	1425655
Determinand	**Unit**	**LOD**	**GAC (LOD)**						
Chloromethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethar	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	LOD				3.5	< 1.0	2.9
Tetrachloromethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	LOD				< 1.0	< 1.0	6.9
1,1,2-Trichloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	LOD				2	< 1.0	81.1
p & m-Xylene	µg/l	1	LOD				< 1.0	< 1.0	170
Styrene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
o-Xylene	µg/l	1	LOD				3	< 1.0	76.7
1,1,2,2-Tetrachloroethane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	LOD				< 1.0	< 1.0	4.4
Bromobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	LOD				< 1.0	< 1.0	19.1
tert-Butylbenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	LOD				1.8	< 1.0	41.9
sec-Butylbenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	LOD				< 1.0	< 1.0	< 1.0

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Analytical Report Number : 20-83728

Project / Site name:	Hayes	**Samples received on:**	29/01/2020
Your job number:	3249	**Samples instructed on:**	29/01/2020
Your order number:		**Analysis completed by:**	06/02/2020
Report Issue Number:	1	**Report issued on:**	06/02/2020
Samples Analysed:	2 soil samples - 3 water samples		

Signed: ______________________

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425656	1425657			
Sample Reference				BH03	BH02			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	1.50			
Date Sampled				29/01/2020	29/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	10	19			
Total mass of sample received	kg	0.001	NONE	2.0	1.1			
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	0.019			
Asbestos Quantification Total	%	0.001	ISO 17025	-	0.019			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.2	7.3			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1000	1400			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.51	0.70			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	509	698			
Organic Matter	%	0.1	MCERTS	2.5	5.8			
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	3.7	4.9			
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	3.9	1.6			
Acenaphthylene	mg/kg	0.05	MCERTS	3.4	1.1			
Acenaphthene	mg/kg	0.05	MCERTS	100	79			
Fluorene	mg/kg	0.05	MCERTS	270	62			
Phenanthrene	mg/kg	0.05	MCERTS	32	70			
Anthracene	mg/kg	0.05	MCERTS	76	83			
Fluoranthene	mg/kg	0.05	MCERTS	380	95			
Pyrene	mg/kg	0.05	MCERTS	230	64			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	61	14			
Chrysene	mg/kg	0.05	MCERTS	44	9.9			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	20	8.4			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	8.1	2.1			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	11	4.1			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.2	1.5			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.95	0.43			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.1	1.7			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1250	499			

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425656	1425657			
Sample Reference				BH03	BH02			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	1.50			
Date Sampled				29/01/2020	29/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	22	18			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	50	380			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.7			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	5.7			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	42			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	360			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	230			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33	41			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	67			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40	270			
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	8.7	13			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	41	250			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	27	340			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	260			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	77	870			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	77	870			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	22	10			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	930	200			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	1900	490			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	480	210			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	3300	900			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	3300	900			

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425656	1425657			
Sample Reference				BH03	BH02			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	1.50			
Date Sampled				29/01/2020	29/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0			
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0			
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0			
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0			
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			

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Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1425657	BH02	1.50	144	Loose Fibrous Debris	**Chrysotile**	0.019	**0.019**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425653	1425654	1425655		
Sample Reference				BH02	BH07	BH08		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.80	4.85	4.80		
Date Sampled				29/01/2020	29/01/2020	29/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.5	7.5	7.3		
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1600	1500	1300		
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Sulphate as SO_4	µg/l	45	ISO 17025	157000	169000	33400		
Sulphate as SO_4	mg/l	0.045	ISO 17025	157	169	33.4		
Nitrate as N	mg/l	0.01	ISO 17025	1.14	0.67	1.57		
Chemical Oxygen Demand (Total)	mg/l	2	ISO 17025	100	55	91		
BOD (Biochemical Oxygen Demand) (Total) - PL	mg/l	1	ISO 17025	18	6.1	31		
Hardness - Total	mgCaCO3/l	1	ISO 17025	626	618	813		
Redox Potential	mV	-800	NONE	65.70	71.20	84.70		
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	280	< 10	190		
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	0.27	0.10	585		
Acenaphthylene	µg/l	0.01	ISO 17025	0.29	0.29	0.87		
Acenaphthene	µg/l	0.01	ISO 17025	6.01	11.2	13.7		
Fluorene	µg/l	0.01	ISO 17025	2.59	2.76	5.13		
Phenanthrene	µg/l	0.01	ISO 17025	2.22	< 0.01	5.04		
Anthracene	µg/l	0.01	ISO 17025	0.55	0.40	0.79		
Fluoranthene	µg/l	0.01	ISO 17025	0.50	0.90	0.75		
Pyrene	µg/l	0.01	ISO 17025	0.30	0.51	0.57		
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	12.7	16.1	612		
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.95	1.39	2.96		
Barium (dissolved)	µg/l	0.06	ISO 17025	110	130	97		
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1		
Boron (dissolved)	µg/l	10	ISO 17025	420	370	220		
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	< 0.02	< 0.02		
Calcium (dissolved)	mg/l	0.012	ISO 17025	170	160	210		
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.5	0.3	0.3		
Copper (dissolved)	µg/l	0.5	ISO 17025	1.6	2.0	0.6		
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	0.7	0.3		
Magnesium (dissolved)	mg/l	0.005	ISO 17025	48	55	68		
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05		
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.7	3.3	7.3		
Selenium (dissolved)	µg/l	0.6	ISO 17025	33	2.1	4.2		
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5	0.3	< 0.2		
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.4	9.3	8.8		

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Lab Sample Number				1425653	1425654	1425655		
Sample Reference				BH02	BH07	BH08		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.80	4.85	4.80		
Date Sampled				29/01/2020	29/01/2020	29/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	3.5	< 1.0	2.9		
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	6.9		
Ethylbenzene	µg/l	1	ISO 17025	2.0	< 1.0	81.1		
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	170		
o-xylene	µg/l	1	ISO 17025	3.0	< 1.0	76.7		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	3.5	< 1.0	2.9		
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	6.9		
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	6.8	< 1.0	390		
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	70	1500		
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	820	150	1000		
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	400	70	500		
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	1200	290	3400		
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	1200	290	3400		

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Lab Sample Number				1425653	1425654	1425655		
Sample Reference				BH02	BH07	BH08		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.80	4.85	4.80		
Date Sampled				29/01/2020	29/01/2020	29/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0		
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0		
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Benzene	µg/l	1	ISO 17025	3.5	< 1.0	2.9		
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	6.9		
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/l	1	ISO 17025	2.0	< 1.0	81.1		
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	170		
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
o-Xylene	µg/l	1	ISO 17025	3.0	< 1.0	76.7		
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	4.4		
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	19.1		
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	1.8	< 1.0	41.9		
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		

U/S = Unsuitable Sample I/S = Insufficient Sample

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1425656	BH03	None Supplied	3.00	Brown clay and sand with gravel and tar.
1425657	BH02	None Supplied	1.50	Brown clay and sand with gravel.

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Biological oxygen demand (total) of water	Determination of biochemical oxygen demand in water (5 days). Accredited matrices: SW, PW, GW.	In-house method based on standard method 5210B.	L086-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Chemical Oxygen Demand in Water (Total)	Determination of total COD in water by reflux oxidation with acidified K2Cr2O7 followed by colorimetry. Accredited matrices: SW, PW, GW.	HACH DR/890 Colorimeter Procedures Manual (48470-22) (Ref 0170.2)	L065-PL	W	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE

Analytical Report Number : 20-83728

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Redox Potential of waters	Determination of conductivity of water by conductivity meter	In house method.	L084-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

Analytical Report Number : 20-83728

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Preliminary Report Number : 20-83728

Project / Site name:	Hayes	**Samples received on:**	29/01/2020
Your job number:	3249	**Samples instructed on:**	29/01/2020
Your order number:		**Analysis completed by:**	05/02/2020
Report Issue Number:	0	**Report issued on:**	05/02/2020
Samples Analysed:	2 soil samples - 3 water samples		

Signed: Karolina Marek

Karolina Marek
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

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

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425656	1425657			
Sample Reference				BH03	BH02			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	1.50			
Date Sampled				29/01/2020	29/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	10	19			
Total mass of sample received	kg	0.001	NONE	2.0	1.1			
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	0.019			
Asbestos Quantification Total	%	0.001	ISO 17025	-	0.019			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.2	7.3			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1000	1400			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.51	0.70			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	509	698			
Organic Matter	%	0.1	MCERTS	2.5	5.8			
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	3.7	4.9			
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	To follow	To follow			
Acenaphthylene	mg/kg	0.05	MCERTS	To follow	To follow			
Acenaphthene	mg/kg	0.05	MCERTS	To follow	To follow			
Fluorene	mg/kg	0.05	MCERTS	To follow	To follow			
Phenanthrene	mg/kg	0.05	MCERTS	To follow	To follow			
Anthracene	mg/kg	0.05	MCERTS	To follow	To follow			
Fluoranthene	mg/kg	0.05	MCERTS	To follow	To follow			
Pyrene	mg/kg	0.05	MCERTS	To follow	To follow			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	To follow	To follow			
Chrysene	mg/kg	0.05	MCERTS	To follow	To follow			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	To follow	To follow			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	To follow	To follow			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	To follow	To follow			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	To follow	To follow			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	To follow	To follow			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	To follow	To follow			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	To follow	To follow			

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425656	1425657			
Sample Reference				BH03	BH02			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	1.50			
Date Sampled				29/01/2020	29/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	22	18			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	50	380			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.7			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	5.7			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	42			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	360			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	230			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33	41			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	67			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40	270			
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	To follow	To follow			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	To follow	To follow			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	To follow	To follow			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	To follow	To follow			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	To follow	To follow			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	To follow	To follow			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	To follow	To follow			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	To follow	To follow			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	To follow	To follow			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	To follow	To follow			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	To follow	To follow			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	To follow	To follow			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	To follow	To follow			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	To follow	To follow			

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425656	1425657			
Sample Reference				BH03	BH02			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	1.50			
Date Sampled				29/01/2020	29/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0			
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0			
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0			
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0			
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			

Analytical Report Number: 20-83728
Project / Site name: Hayes
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1425657	BH02	1.50	144	Loose Fibrous Debris	**Chrysotile**	0.019	**0.019**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425653	1425654	1425655		
Sample Reference				BH02	BH07	BH08		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.80	4.85	4.80		
Date Sampled				29/01/2020	29/01/2020	29/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.5	7.5	7.3		
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1600	1500	1300		
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Sulphate as SO_4	mg/l	0.045	ISO 17025	157	169	33.4		
Nitrate as N	mg/l	0.01	ISO 17025	1.14	0.67	1.57		
Chemical Oxygen Demand (Total)	mg/l	2	ISO 17025	100	55	91		
BOD (Biochemical Oxygen Demand) (Total) - PL	mg/l	1	ISO 17025	18	6.1	31		
Hardness - Total	mgCaCO3/l	1	ISO 17025	626	618	813		
Redox Potential	mV	-800	NONE	65.70	71.20	84.70		

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	280	< 10	190		

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	0.27	0.10	585		
Acenaphthylene	µg/l	0.01	ISO 17025	0.29	0.29	0.87		
Acenaphthene	µg/l	0.01	ISO 17025	6.01	11.2	13.7		
Fluorene	µg/l	0.01	ISO 17025	2.59	2.76	5.13		
Phenanthrene	µg/l	0.01	ISO 17025	2.22	< 0.01	5.04		
Anthracene	µg/l	0.01	ISO 17025	0.55	0.40	0.79		
Fluoranthene	µg/l	0.01	ISO 17025	0.50	0.90	0.75		
Pyrene	µg/l	0.01	ISO 17025	0.30	0.51	0.57		
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	12.7	16.1	612		

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.95	1.39	2.96		
Barium (dissolved)	µg/l	0.06	ISO 17025	110	130	97		
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1		
Boron (dissolved)	µg/l	10	ISO 17025	420	370	220		
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	< 0.02	< 0.02		
Calcium (dissolved)	mg/l	0.012	ISO 17025	170	160	210		
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.5	0.3	0.3		
Copper (dissolved)	µg/l	0.5	ISO 17025	1.6	2.0	0.6		
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	0.7	0.3		
Magnesium (dissolved)	mg/l	0.005	ISO 17025	48	55	68		
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05		
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.7	3.3	7.3		
Selenium (dissolved)	µg/l	0.6	ISO 17025	33	2.1	4.2		
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5	0.3	< 0.2		
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.4	9.3	8.8		

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425653	1425654	1425655		
Sample Reference				BH02	BH07	BH08		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.80	4.85	4.80		
Date Sampled				29/01/2020	29/01/2020	29/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	3.5	< 1.0	2.9		
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	6.9		
Ethylbenzene	µg/l	1	ISO 17025	2.0	< 1.0	81.1		
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	170		
o-xylene	µg/l	1	ISO 17025	3.0	< 1.0	76.7		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	3.5	< 1.0	2.9		
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	6.9		
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	6.8	< 1.0	390		
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	70	1500		
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	820	150	1000		
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	400	70	500		
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	1200	290	3400		
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	1200	290	3400		

Analytical Report Number: 20-83728

Project / Site name: Hayes

Lab Sample Number				1425653	1425654	1425655		
Sample Reference				BH02	BH07	BH08		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.80	4.85	4.80		
Date Sampled				29/01/2020	29/01/2020	29/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0		
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0		
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Benzene	µg/l	1	ISO 17025	3.5	< 1.0	2.9		
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	6.9		
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/l	1	ISO 17025	2.0	< 1.0	81.1		
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	170		
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
o-Xylene	µg/l	1	ISO 17025	3.0	< 1.0	76.7		
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	4.4		
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	19.1		
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	1.8	< 1.0	41.9		
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		

U/S = Unsuitable Sample   I/S = Insufficient Sample

Preliminary Report Number : 20-83728

Project / Site name: Hayes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1425656	BH03	None Supplied	3.00	Brown clay and sand with gravel and tar.
1425657	BH02	None Supplied	1.50	Brown clay and sand with gravel.

Preliminary Report Number : 20-83728

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Biological oxygen demand (total) of water	Determination of biochemical oxygen demand in water (5 days). Accredited matrices: SW, PW, GW.	In-house method based on standard method 5210B.	L086-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Chemical Oxygen Demand in Water (Total)	Determination of total COD in water by reflux oxidation with acidified K2Cr2O7 followed by colorimetry. Accredited matrices: SW, PW, GW.	HACH DR/890 Colorimeter Procedures Manual (48470-22) (Ref 0170.2)	L065-PL	W	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE

Preliminary Report Number : 20-83728

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Redox Potential of waters	Determination of conductivity of water by conductivity meter	In house method.	L084-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

Preliminary Report Number : 20-83728

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-83394

Project / Site name:	Hayes	**Samples received on:**	24/01/2020
Your job number:	3249	**Samples instructed on:**	28/01/2020
Your order number:		**Analysis completed by:**	03/02/2020
Report Issue Number:	1	**Report issued on:**	03/02/2020
Samples Analysed:	2 leachate samples		

Signed:

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 20-83394

Project / Site name: Hayes

Lab Sample Number				1424098	1424099			
Sample Reference				BH07	BH08			
Sample Number				None Supplied	None Supplied			
Depth (m)				5.80-6.00	5.50-6.00			
Date Sampled				24/01/2020	24/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.7	7.3			
Electrical Conductivity	µS/cm	10	ISO 17025	99	39			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO_4	mg/l	0.1	ISO 17025	12.3	3.8			
Nitrate as N	mg/l	0.01	NONE	0.02	0.08			
Hardness - Total	mgCaCO3/l	1	NONE	38.4	14.3			
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	250	4700			
Acenaphthylene	µg/l	0.01	ISO 17025	4.7	9.0			
Acenaphthene	µg/l	0.01	ISO 17025	81	170			
Fluorene	µg/l	0.01	ISO 17025	52	64			
Phenanthrene	µg/l	0.01	ISO 17025	41	41			
Anthracene	µg/l	0.01	ISO 17025	3.0	5.8			
Fluoranthene	µg/l	0.01	ISO 17025	2.1	4.8			
Pyrene	µg/l	0.01	ISO 17025	1.3	4.1			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	430	5000			
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1			
Barium (dissolved)	µg/l	0.05	ISO 17025	17	8.6			
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Boron (dissolved)	µg/l	10	ISO 17025	45	20			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.8	2.1			
Copper (dissolved)	µg/l	0.7	ISO 17025	3.3	2.8			
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	1.0			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Vanadium (dissolved)	µg/l	1.7	ISO 17025	2.4	7.1			
Zinc (dissolved)	µg/l	0.4	ISO 17025	7.3	9.4			
Calcium (dissolved)	mg/l	0.012	ISO 17025	11	3.8			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	2.8	1.2			

Analytical Report Number: 20-83394

Project / Site name: Hayes

Lab Sample Number				1424098	1424099			
Sample Reference				BH07	BH08			
Sample Number				None Supplied	None Supplied			
Depth (m)				5.80-6.00	5.50-6.00			
Date Sampled				24/01/2020	24/01/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	1.7			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	16			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	29			
o-xylene	µg/l	1	ISO 17025	< 1.0	18			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	1.7			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	88			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	370	5600			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	600	2000			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	100	1000			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	1100	8700			
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	1100	8700			

Analytical Report Number : 20-83394

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Electrical conductivity at 20oC of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Nitrate as N in leachate	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total Hardness of leachates	Determination of hardness in leachates by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
TPH in (Leachate)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method, TPH with carbon banding.	L070-PL	W	NONE
TPH7 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-82909

Replaces Analytical Report Number : 20-82909, issue no. 1

Project / Site name:	Hayes	**Samples received on:**	24/01/2020
Your job number:	3249	**Samples instructed on:**	24/01/2020
Your order number:		**Analysis completed by:**	10/02/2020
Report Issue Number:	2	**Report issued on:**	10/02/2020
Samples Analysed:	4 soil samples		

Signed:

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	19	8.3	15	12	
Total mass of sample received	kg	0.001	NONE	2.0	1.9	1.6	2.0	
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.7	8.1	8.8	7.9	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	390	55	1900	58	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.19	0.028	0.96	0.029	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	195	27.5	955	29.0	
Organic Matter	%	0.1	MCERTS	3.4	0.5	2.1	0.4	
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	3.2	< 2.0	2.6	< 2.0	
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	1.3	-	2.2	
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.92	65	1.3	79	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	3.0	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	1.5	72	0.50	42	
Fluorene	mg/kg	0.05	MCERTS	1.1	73	0.45	37	
Phenanthrene	mg/kg	0.05	MCERTS	3.8	200	1.8	100	
Anthracene	mg/kg	0.05	MCERTS	1.4	25	0.47	18	
Fluoranthene	mg/kg	0.05	MCERTS	7.2	93	2.4	37	
Pyrene	mg/kg	0.05	MCERTS	6.1	63	2.0	24	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.0	19	1.4	5.9	
Chrysene	mg/kg	0.05	MCERTS	2.1	11	0.98	3.4	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.0	4.5	1.0	1.6	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.3	3.6	0.79	1.1	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	3.0	1.0	1.2	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.65	0.85	0.42	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.91	0.54	0.55	< 0.05	
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	34.1	641	15.1	354	
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	13	15	8.4	
Barium (aqua regia extractable)	mg/kg	1	MCERTS	210	35	170	15	
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.5	0.74	1.4	0.46	
Boron (water soluble)	mg/kg	0.2	MCERTS	4.3	1.2	4.0	0.6	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.9	< 0.2	
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	42	27	47	23	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	200	12	100	8.7	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	350	14	180	4.7	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.2	< 0.3	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	37	26	34	21	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	72	43	70	26	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	230	38	390	58	

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	
TPH C10 - C40	mg/kg	10	MCERTS	2800	-	98	-	
TPH2 (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	
TPH C6 - C40	mg/kg	10	NONE	2800	-	98	-	
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	7.6	9.5	-	9.2	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	120	39	-	30	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	1500	27	-	32	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	520	17	-	23	
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	2100	94	-	95	
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	94	-	95	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	1.7	70	-	110	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	78	300	-	380	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	560	390	-	410	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	370	140	-	44	
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	1000	900	-	940	
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	900	-	940	
TPH (C10 - C25)	mg/kg	10	MCERTS	2600	-	82	-	
TPH (C25 - C40)	mg/kg	10	MCERTS	550	-	< 10	-	

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	

Analytical Report Number : 20-82909

Project / Site name: Hayes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1421299	BH07	None Supplied	2.55-3.00	Grey clay with gravel.
1421300	BH07	None Supplied	5.80-6.00	Brown clay with gravel.
1421301	BH08	None Supplied	2.50-3.00	Grey clay with gravel.
1421302	BH08	None Supplied	5.50-6.00	Grey sandy gravel.**

**Non MCERTS matrix.

Analytical Report Number : 20-82909

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS

Analytical Report Number : 20-82909

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method.	L076-PL	W	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPH Oils (Soils)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-82909

Project / Site name:	Hayes	**Samples received on:**	
Your job number:	3249	**Samples instructed on:**	24/01/2020
Your order number:		**Analysis completed by:**	03/02/2020
Report Issue Number:	1	**Report issued on:**	03/02/2020
Samples Analysed:	4 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	19	8.3	15	12	
Total mass of sample received	kg	0.001	NONE	2.0	1.9	1.6	2.0	
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.7	8.1	8.8	7.9	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	390	55	1900	58	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.19	0.028	0.96	0.029	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	195	27.5	955	29.0	
Organic Matter	%	0.1	MCERTS	3.4	0.5	2.1	0.4	
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	3.2	< 2.0	2.6	< 2.0	
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	1.3	-	2.2	
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.92	65	1.3	79	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	3.0	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	1.5	72	0.50	42	
Fluorene	mg/kg	0.05	MCERTS	1.1	73	0.45	37	
Phenanthrene	mg/kg	0.05	MCERTS	3.8	200	1.8	100	
Anthracene	mg/kg	0.05	MCERTS	1.4	25	0.47	18	
Fluoranthene	mg/kg	0.05	MCERTS	7.2	93	2.4	37	
Pyrene	mg/kg	0.05	MCERTS	6.1	63	2.0	24	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.0	19	1.4	5.9	
Chrysene	mg/kg	0.05	MCERTS	2.1	11	0.98	3.4	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.0	4.5	1.0	1.6	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.3	3.6	0.79	1.1	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	3.0	1.0	1.2	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.65	0.85	0.42	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.91	0.54	0.55	< 0.05	
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	34.1	641	15.1	354	

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	13	15	8.4	
Barium (aqua regia extractable)	mg/kg	1	MCERTS	210	35	170	15	
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.5	0.74	1.4	0.46	
Boron (water soluble)	mg/kg	0.2	MCERTS	4.3	1.2	4.0	0.6	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.9	< 0.2	
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	42	27	47	23	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	200	12	100	8.7	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	350	14	180	4.7	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.2	< 0.3	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	37	26	34	21	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	72	43	70	26	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	230	38	390	58	
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	
TPH C10 - C40	mg/kg	10	MCERTS	2800	-	98	-	
TPH2 (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	
TPH C6 - C40	mg/kg	10	NONE	2800	-	98	-	
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	9.5	-	9.2	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	39	-	30	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	27	-	32	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	17	-	23	
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	94	-	95	
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	94	-	95	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	70	-	110	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	300	-	380	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	390	-	410	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	140	-	44	
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	900	-	940	
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	900	-	940	
TPH (C10 - C25)	mg/kg	10	MCERTS	2600	-	82	-	
TPH (C25 - C40)	mg/kg	10	MCERTS	550	-	< 10	-	

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					

Analytical Report Number: 20-82909

Project / Site name: Hayes

Lab Sample Number				1421299	1421300	1421301	1421302	
Sample Reference				BH07	BH07	BH08	BH08	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.55-3.00	5.80-6.00	2.50-3.00	5.50-6.00	
Date Sampled				24/01/2020	24/01/2020	24/01/2020	24/01/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	

Analytical Report Number : 20-82909

Project / Site name: Hayes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1421299	BH07	None Supplied	2.55-3.00	Grey clay with gravel.
1421300	BH07	None Supplied	5.80-6.00	Brown clay with gravel.
1421301	BH08	None Supplied	2.50-3.00	Grey clay with gravel.
1421302	BH08	None Supplied	5.50-6.00	Grey sandy gravel.**

** Non MCERTS Matrix

Analytical Report Number : 20-82909

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS

Analytical Report Number : 20-82909

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method.	L076-PL	W	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPH Oils (Soils)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Rachael Giles
Your Environment
Chilgrove Business Centre
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DETS Ltd
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t: 01622 850410

DETS Report No: 19-09356

Site Reference:	Bulls Bridge Industrial Estate, Hayes
Project / Job Ref:	YE7331
Order No:	None Supplied
Sample Receipt Date:	02/07/2019
Sample Scheduled Date:	02/07/2019
Report Issue Number:	1
Reporting Date:	08/07/2019

Authorised by:

Dave Ashworth
Deputy Quality Manager

DETS Ltd
Unit 1, Rose Lane Industrial Estate
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Maidstone
Kent ME17 2JN
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Soil Analysis Certificate						
DETS Report No: 19-09356	**Date Sampled**	27/06/19	27/06/19	25/06/19	27/06/19	25/06/19
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.75	0.50	0.75	0.80	0.50
Reporting Date: 08/07/2019	**DETS Sample No**	418781	418782	418783	418784	418785

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Not Detected	Detected	Not Detected	Not Detected
Sample Matrix (S)	Material Type	N/a	NONE			bundle of Chrysotile fibres		
Asbestos Type (S)	PLM Result	N/a	**ISO17025**			Chrysotile		
pH	pH Units	N/a	**MCERTS**	7.5	7.5	8.0	8.4	9.9
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	153	152	148	200	585
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.15	0.15	0.15	0.20	0.58
Organic Matter	%	< 0.1	**MCERTS**	5.7	3.2	3.6	3.3	2.7
Arsenic (As)	mg/kg	< 2	**MCERTS**	32	20	19	34	12
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.2	0.4	0.2	0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	**MCERTS**	16	26	23	89	24
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	105	87	76	113	24
Lead (Pb)	mg/kg	< 3	**MCERTS**	28	146	381	67	58
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	1.1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	41	24	22	56	13
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	**MCERTS**	54	210	211	116	146
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than $30^{O}C$

Subcontracted analysis (S)

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate						
DETS Report No: 19-09356	**Date Sampled**	25/06/19	25/06/19	26/06/19	27/06/19	26/06/19
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS5	WS6A	WS7	WS8	WS9
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	3.50	0.80	2.50	0.30	2.00
Reporting Date: 08/07/2019	**DETS Sample No**	418786	418787	418788	418789	418790

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Detected	Not Detected	Detected	Not Detected
Sample Matrix (S)	Material Type	N/a	NONE		bundles of Chrysotile fibres		bundles of Chrysotile fibres	
Asbestos Type (S)	PLM Result	N/a	**ISO17025**		Chrysotile		Chrysotile	
pH	pH Units	N/a	**MCERTS**	7.1	9.1	7.5	10.4	9.2
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	198	224	605	601	246
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.20	0.22	0.60	0.60	0.25
Organic Matter	%	< 0.1	**MCERTS**	1.5	1.7	3.1	2.2	2.4
Arsenic (As)	mg/kg	< 2	**MCERTS**	7	15	22	14	12
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2	< 0.2	0.4	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	**MCERTS**	17	26	32	22	143
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	12	35	62	46	76
Lead (Pb)	mg/kg	< 3	**MCERTS**	25	102	307	843	77
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	1.7	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	8	25	22	16	19
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	**MCERTS**	34	114	285	124	86
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than $30^{O}C$
Subcontracted analysis (S)

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4480

Soil Analysis Certificate						
DETS Report No: 19-09356	**Date Sampled**	26/06/19	25/06/19	25/06/19		
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS10	TP4	TP6		
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.50	0.80	1.00		
Reporting Date: 08/07/2019	**DETS Sample No**	418791	418792	418793		

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Not Detected	Detected		
Sample Matrix (S)	Material Type	N/a	NONE			bundles of Chrysotile fibres		
Asbestos Type (S)	PLM Result	N/a	**ISO17025**			Chrysotile		
pH	pH Units	N/a	**MCERTS**	8.3	7.8	8.1		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	55	191	55		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.05	0.19	0.05		
Organic Matter	%	< 0.1	**MCERTS**	6.7	4.4	1.2		
Arsenic (As)	mg/kg	< 2	**MCERTS**	6	317	13		
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2	5.8	0.3		
Chromium (Cr)	mg/kg	< 2	**MCERTS**	13	18	11		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	**MCERTS**	13	75	31		
Lead (Pb)	mg/kg	< 3	**MCERTS**	27	52	60		
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	**MCERTS**	11	32	11		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Zinc (Zn)	mg/kg	< 3	**MCERTS**	32	48	73		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-09356	**Date Sampled**	27/06/19	27/06/19	25/06/19	27/06/19	25/06/19
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.75	0.50	0.75	0.80	0.50
Reporting Date: 08/07/2019	**DETS Sample No**	418781	418782	418783	418784	418785

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
Naphthalene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.41	0.85	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.25	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	0.13	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.14	0.18	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	**MCERTS**	0.23	0.85	1.22	0.33	0.74
Anthracene	mg/kg	< 0.1	**MCERTS**	0.15	0.48	0.31	< 0.1	0.20
Fluoranthene	mg/kg	< 0.1	**MCERTS**	0.25	2.35	1.96	0.32	0.73
Pyrene	mg/kg	< 0.1	**MCERTS**	0.24	2.22	1.70	0.28	0.54
Benzo(a)anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	1.66	0.76	0.41	0.22
Chrysene	mg/kg	< 0.1	**MCERTS**	< 0.1	1.47	1.04	0.56	0.29
Benzo(b)fluoranthene	mg/kg	< 0.1	**MCERTS**	0.37	1.94	1.13	1.27	0.30
Benzo(k)fluoranthene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.58	0.32	0.31	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	1.28	0.63	0.33	0.16
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	1.09	0.43	0.37	0.11
Dibenz(a,h)anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.11	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.81	0.35	0.30	0.12
Total EPA-16 PAHs	mg/kg	< 1.6	**MCERTS**	< 1.6	15.6	11	4.5	3.4

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than $30^{O}C$
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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4480

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-09356	Date Sampled	25/06/19	25/06/19	26/06/19	27/06/19	26/06/19
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS5	WS6A	WS7	WS8	WS9
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	3.50	0.80	2.50	0.30	2.00
Reporting Date: 08/07/2019	DETS Sample No	418786	418787	418788	418789	418790

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	0.13	4.65	0.81	0.35	0.57
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	0.20	0.15	< 0.1	0.33
Acenaphthene	mg/kg	< 0.1	MCERTS	0.17	9.79	1.73	0.16	0.12
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	8.60	2.10	0.16	1.22
Phenanthrene	mg/kg	< 0.1	MCERTS	0.33	33.70	11.30	1.56	14.20
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	7.27	6.42	0.32	4.22
Fluoranthene	mg/kg	< 0.1	MCERTS	0.46	20.60	22.10	2.84	23.80
Pyrene	mg/kg	< 0.1	MCERTS	0.35	15	15.40	2.54	17.50
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.18	3.05	7.68	1.34	7.92
Chrysene	mg/kg	< 0.1	MCERTS	0.29	2.94	6.35	1.42	7.78
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.32	2.45	6.17	1.71	7.83
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.74	2.08	0.53	2.54
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.17	1.55	4.42	1.23	4.81
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.13	0.73	1.79	0.80	2.31
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.15	0.44	0.14	0.69
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	0.60	1.29	0.67	1.85
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	2.5	112	90.3	15.8	97.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-09356	Date Sampled	26/06/19	25/06/19	25/06/19		
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS10	TP4	TP6		
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.50	0.80	1.00		
Reporting Date: 08/07/2019	DETS Sample No	418791	418792	418793		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	0.12	1.82		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.18		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.57		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.41		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.33	3.77		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	2.23		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.20	8.03		
Pyrene	mg/kg	< 0.1	MCERTS	0.13	0.16	6.05		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	2.53		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	0.17	2.98		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.12	2.95		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.89		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.49		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.94		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.20		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.72		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	35.8		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 19-09356	Date Sampled	27/06/19	27/06/19	25/06/19	27/06/19	25/06/19
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.75	0.50	0.75	0.80	0.50
Reporting Date: 08/07/2019	DETS Sample No	418781	418782	418783	418784	418785

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	4
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	23
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	285
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	312
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	3	4	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	4	10	14	< 3	9
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	25	36	22	< 10	79
Aromatic (C5 - C35)	mg/kg	< 21	NONE	29	49	40	< 21	88
Total >C5 - C35	mg/kg	< 42	NONE	< 42	49	< 42	< 42	400

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 19-09356	Date Sampled	25/06/19	25/06/19	26/06/19	27/06/19	26/06/19
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS5	WS6A	WS7	WS8	WS9
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	3.50	0.80	2.50	0.30	2.00
Reporting Date: 08/07/2019	DETS Sample No	418786	418787	418788	418789	418790

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	10	< 3	5	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	8	< 3	8	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	23	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	36	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	6	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	11	3	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	96	22	6	14
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	193	125	20	116
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	164	240	75	270
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	470	391	102	400
Total >C5 - C35	mg/kg	< 42	NONE	< 42	488	391	138	400

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 19-09356	Date Sampled	26/06/19	25/06/19	25/06/19		
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS10	TP4	TP6		
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.50	0.80	1.00		
Reporting Date: 08/07/2019	DETS Sample No	418791	418792	418793		

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	25	< 3	< 3		
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	126	< 3	3		
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	754	< 10	21		
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	905	< 21	25		
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	3		
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	6	< 2	11		
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	151	< 3	47		
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	1584	< 10	112		
Aromatic (C5 - C35)	mg/kg	< 21	NONE	1741	< 21	174		
Total >C5 - C35	mg/kg	< 42	NONE	2646	< 42	198		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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4480

Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 19-09356			Date Sampled	27/06/19	27/06/19	25/06/19	27/06/19	25/06/19
Your Environment			Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes			TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: YE7331			Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied			Depth (m)	0.75	0.50	0.75	0.80	0.50
Reporting Date: 08/07/2019			DETS Sample No	418781	418782	418783	418784	418785

Determinand	Unit	RL	Accreditation	(n)				
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-09356	Date Sampled	25/06/19	25/06/19	26/06/19	27/06/19	26/06/19
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS5	WS6A	WS7	WS8	WS9
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	3.50	0.80	2.50	0.30	2.00
Reporting Date: 08/07/2019	DETS Sample No	418786	418787	418788	418789	418790

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	12
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	13
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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MCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING 4480

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-09356	Date Sampled	26/06/19	25/06/19	25/06/19		
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS10	TP4	TP6		
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.50	0.80	1.00		
Reporting Date: 08/07/2019	DETS Sample No	418791	418792	418793		

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

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Soil Analysis Certificate - Volatile Organic Compounds (VOC)						
DETS Report No: 19-09356	**Date Sampled**	27/06/19	25/06/19	25/06/19	25/06/19	
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS4	WS5	TP4	TP6	
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	**Depth (m)**	0.80	0.50	0.80	1.00	
Reporting Date: 08/07/2019	**DETS Sample No**	418784	418785	418792	418793	

Determinand	**Unit**	**RL**	**Accreditation**					
Dichlorodifluoromethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Vinyl Chloride	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Chloromethane	ug/kg	< 10	**MCERTS**	< 10	< 10	< 10	< 10	
Chloroethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Bromomethane	ug/kg	< 10	**MCERTS**	< 10	< 10	< 10	< 10	
Trichlorofluoromethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1-Dichloroethene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
MTBE	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
trans-1,2-Dichloroethene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1-Dichloroethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
cis-1,2-Dichloroethene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
2,2-Dichloropropane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Chloroform	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Bromochloromethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1,1-Trichloroethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1-Dichloropropene	ug/kg	< 10	**MCERTS**	< 10	< 10	< 10	< 10	
Carbon Tetrachloride	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,2-Dichloroethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Benzene	ug/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	
1,2-Dichloropropane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Trichloroethene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Bromodichloromethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Dibromomethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
TAME	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
cis-1,3-Dichloropropene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Toluene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
trans-1,3-Dichloropropene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1,2-Trichloroethane	ug/kg	< 10	**MCERTS**	< 10	< 10	< 10	< 10	
1,3-Dichloropropane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Tetrachloroethene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Dibromochloromethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,2-Dibromoethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Chlorobenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1,1,2-Tetrachloroethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Ethyl Benzene	ug/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	
m,p-Xylene	ug/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	
o-Xylene	ug/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	
Styrene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Bromoform	ug/kg	< 10	**MCERTS**	< 10	< 10	< 10	< 10	
Isopropylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,1,2,2-Tetrachloroethane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,2,3-Trichloropropane	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
n-Propylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
Bromobenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
2-Chlorotoluene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,3,5-Trimethylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
4-Chlorotoluene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
tert-Butylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,2,4-Trimethylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
sec-Butylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
p-Isopropyltoluene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,3-Dichlorobenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,4-Dichlorobenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
n-Butylbenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
1,2-Dichlorobenzene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	
,2-Dibromo-3-chloropropane	ug/kg	< 10	**MCERTS**	< 10	< 10	< 10	< 10	
Hexachlorobutadiene	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 19-09356	
Your Environment	
Site Reference: Bulls Bridge Industrial Estate, Hayes	
Project / Job Ref: YE7331	
Order No: None Supplied	
Reporting Date: 08/07/2019	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
418781	WS1	None Supplied	0.75	16	Black silt with stones
418782	WS2	None Supplied	0.50	10.3	Brown loamy sand with brick and concrete
418783	WS3	None Supplied	0.75	12.3	Brown loamy sand with brick and concrete
418784	WS4	None Supplied	0.80	10.1	Black loamy sand with ash and stones
418785	WS5	None Supplied	0.50	10.9	Brown sandy gravel with stones and concrete
418786	WS5	None Supplied	3.50	16	Black loamy clay
418787	WS6A	None Supplied	0.80	10.7	Brown loamy sand with stones and brick
418788	WS7	None Supplied	2.50	18.6	Brown loamy sand
418789	WS8	None Supplied	0.30	13.3	Brown loamy sand with stones and concrete
418790	WS9	None Supplied	2.00	11.8	Black loamy sand with stones and concrete
418791	WS10	None Supplied	0.50	4.9	Black loamy sand with stones and concrete
418792	TP4	None Supplied	0.80	19	Black loamy sand with stones and concrete
418793	TP6	None Supplied	1.00	9.9	Brown sandy gravel with stones and brick

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 19-09356
Your Environment
Site Reference: Bulls Bridge Industrial Estate, Hayes
Project / Job Ref: YE7331
Order No: None Supplied
Reporting Date: 08/07/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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DETS Report No: 19-09883

Site Reference:	Bulls Bridge, Industrial Estate, Hayes
Project / Job Ref:	YE7331
Order No:	None Supplied
Sample Receipt Date:	02/07/2019
Sample Scheduled Date:	11/07/2019
Report Issue Number:	1
Reporting Date:	17/07/2019

Authorised by:

Dave Ashworth
Deputy Quality Manager

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4480

Soil Analysis Certificate						
DETS Report No: 19-09883	**Date Sampled**	25/06/19	25/06/19	27/06/19	25/06/19	
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Bulls Bridge, Industrial Estate, Hayes	**TP / BH No**	WS3	WS6A	WS8	TP6	
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	**Depth (m)**	0.75	0.80	0.30	1.00	
Reporting Date: 17/07/2019	**DETS Sample No**	420731	420732	420733	420734	

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Quantification (S)	%	< 0.001	**ISO17025**	0.004	0.004	0.002	0.005	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 19-09883
Your Environment
Site Reference: Bulls Bridge, Industrial Estate, Hayes
Project / Job Ref: YE7331
Order No: None Supplied
Reporting Date: 17/07/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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DETS Report No: 19-09550

Site Reference:	Bulls Bridge Industrial Estate, Hayes
Project / Job Ref:	YE7331
Order No:	None Supplied
Sample Receipt Date:	05/07/2019
Sample Scheduled Date:	05/07/2019
Report Issue Number:	1
Reporting Date:	09/07/2019

Authorised by:

Dave Ashworth
Deputy Quality Manager

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Water Analysis Certificate						
DETS Report No: 19-09550	Date Sampled	03/07/19	03/07/19	03/07/19	03/07/19	03/07/19
Your Environment	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	TP / BH No	WS2	WS5	WS6	WS7	WS10
Project / Job Ref: YE7331	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	1.97	2.88	3.86	3.25	3.15
Reporting Date: 09/07/2019	DETS Sample No	419615	419616	419617	419618	419619

Determinand	Unit	RL	Accreditation		(hs)	(hs)	(hs)	
pH	pH Units	N/a	ISO17025	7.5	7.1	7.4	6.6	6.6
Electrical Conductivity	uS/cm	< 5	NONE	947	1850	4840	2350	2020
Total Cyanide	ug/l	< 5	NONE	17	< 5	7	7	< 5
Sulphate as SO_4	mg/l	< 1	ISO17025	116	114	270	10	73
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	0.5	8.5	16.9	1.5	8.2
Hardness - Total	mgCaCO3/l	< 1	NONE	393	1010	880	1330	1130
Arsenic (dissolved)	ug/l	< 5	ISO17025	< 5	21	< 5	12	< 5
Barium (dissolved)	ug/l	< 5	ISO17025	127	140	120	268	183
Beryllium (dissolved)	ug/l	< 3	ISO17025	< 3	< 3	< 3	< 3	< 3
Boron (dissolved)	ug/l	< 5	ISO17025	141	510	575	1300	370
Cadmium (dissolved)	ug/l	< 0.4	ISO17025	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	< 5
Copper (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	< 5
Lead (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	< 5
Mercury (dissolved)	ug/l	< 0.05	ISO17025	0.24	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	5	7
Selenium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	< 5
Vanadium (dissolved)	ug/l	< 5	ISO17025	8	< 5	< 5	< 5	< 5
Zinc (dissolved)	ug/l	< 2	ISO17025	8	7	4	7	57
Total Phenols (monohydric)	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	146

Subcontracted analysis (S)
Insufficient sample I/S
Unsuitable Sample U/S
(hs) Please note deviating sample due to head space in container

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Water Analysis Certificate - Speciated PAH						
DETS Report No: 19-09550	**Date Sampled**	03/07/19	03/07/19	03/07/19	03/07/19	03/07/19
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS2	WS5	WS6	WS7	WS10
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	1.97	2.88	3.86	3.25	3.15
Reporting Date: 09/07/2019	**DETS Sample No**	419615	419616	419617	419618	419619

Determinand	**Unit**	**RL**	**Accreditation**		(hs)	(hs)	(hs)	
Naphthalene	ug/l	< 0.01	NONE	0.03	< 0.01	< 0.01	0.06	0.66
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Acenaphthene	ug/l	< 0.01	NONE	0.27	0.03	< 0.01	0.11	3.74
Fluorene	ug/l	< 0.01	NONE	0.02	< 0.01	< 0.01	0.03	1.25
Phenanthrene	ug/l	< 0.01	NONE	0.05	< 0.01	< 0.01	0.04	0.35
Anthracene	ug/l	< 0.01	NONE	0.01	< 0.01	0.03	0.02	0.09
Fluoranthene	ug/l	< 0.01	NONE	0.11	< 0.01	0.03	0.03	0.03
Pyrene	ug/l	< 0.01	NONE	0.10	< 0.01	0.02	0.03	0.02
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	ug/l	< 0.008	NONE	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Total EPA-16 PAHs	ug/l	< 0.01	NONE	0.59	0.03	0.08	0.32	6.21

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Water Analysis Certificate - TPH CWG Banded						
DETS Report No: 19-09550	**Date Sampled**	03/07/19	03/07/19	03/07/19	03/07/19	03/07/19
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS2	WS5	WS6	WS7	WS10
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	1.97	2.88	3.86	3.25	3.15
Reporting Date: 09/07/2019	**DETS Sample No**	419615	419616	419617	419618	419619

Determinand	**Unit**	**RL**	**Accreditation**		(hs)	(hs)	(hs)	
Aliphatic >C5 - C6	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic >C6 - C8	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic >C21 - C34	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	ug/l	< 70	NONE	< 70	< 70	< 70	< 70	< 70
Aromatic >C5 - C7	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic >C7 - C8	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	14
Aromatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	27
Aromatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	25
Aromatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic >C21 - C35	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	ug/l	< 70	NONE	< 70	< 70	< 70	< 70	< 70
Total >C5 - C35	ug/l	< 140	NONE	< 140	< 140	< 140	< 140	< 140

(hs) Please note deviating sample due to head space in container

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Water Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-09550	**Date Sampled**	03/07/19	03/07/19	03/07/19	03/07/19	03/07/19
Your Environment	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bulls Bridge Industrial Estate, Hayes	**TP / BH No**	WS2	WS5	WS6	WS7	WS10
Project / Job Ref: YE7331	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	1.97	2.88	3.86	3.25	3.15
Reporting Date: 09/07/2019	**DETS Sample No**	419615	419616	419617	419618	419619

Determinand	**Unit**	**RL**	**Accreditation**		(hs)	(hs)	(hs)	
Benzene	ug/l	< 1	**ISO17025**	< 1	< 1	< 1	< 1	6
Toluene	ug/l	< 5	**ISO17025**	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/l	< 5	**ISO17025**	< 5	< 5	< 5	< 5	< 5
p & m-xylene	ug/l	< 10	**ISO17025**	< 10	< 10	< 10	< 10	< 10
o-xylene	ug/l	< 5	**ISO17025**	< 5	< 5	< 5	< 5	< 5
MTBE	ug/l	< 10	**ISO17025**	< 10	< 10	< 10	< 10	< 10

(hs) Please note deviating sample due to head space in container

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Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 19-09550
Your Environment
Site Reference: Bulls Bridge Industrial Estate, Hayes
Project / Job Ref: YE7331
Order No: None Supplied
Reporting Date: 09/07/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by co	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detect	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

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Analytical Report Number : 19-51430

Project / Site name:	Hayes	**Samples received on:**	24/07/2019
Your job number:	3249	**Samples instructed on:**	24/07/2019
Your order number:		**Analysis completed by:**	29/07/2019
Report Issue Number:	1	**Report issued on:**	29/07/2019
Samples Analysed:	2 leachate samples - 7 soil samples		

Signed:

Rexona Rahman
Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275527	1275528	1275529	1275530	1275531
Sample Reference				WS202	WS202	WS203	WS203	TP201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.90	2.10-2.40	0.40-0.70	3.00	0.30
Date Sampled				24/07/2019	24/07/2019	24/07/2019	24/07/2019	24/07/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	6.7	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	5.8	17	6.8	23	4.1
Total mass of sample received	kg	0.001	NONE	2.0	2.0	1.9	1.8	2.0
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile- Loose Fibres	-	Chrysotile- Loose Fibres
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Detected	-	Detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.7	8.3	9.3	9.0	11.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	890	410	730	590	2900
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.45	0.20	0.37	0.29	1.4
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	446	204	367	294	1440
Organic Matter	%	0.1	MCERTS	2.7	0.6	4.3	1.5	4.4
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	29	3.7	4.6	2.5	5.6
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	15	< 5.0	< 5.0	< 5.0	< 5.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.33	< 0.05	0.80
Acenaphthene	mg/kg	0.05	MCERTS	0.24	< 0.05	1.0	< 0.05	1.6
Fluorene	mg/kg	0.05	MCERTS	0.23	< 0.05	1.1	< 0.05	1.4
Phenanthrene	mg/kg	0.05	MCERTS	2.2	< 0.05	3.6	0.73	13
Anthracene	mg/kg	0.05	MCERTS	0.77	< 0.05	2.2	0.25	3.3
Fluoranthene	mg/kg	0.05	MCERTS	5.7	< 0.05	5.2	1.5	23
Pyrene	mg/kg	0.05	MCERTS	5.1	< 0.05	4.8	1.3	19
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.4	< 0.05	2.6	0.67	12
Chrysene	mg/kg	0.05	MCERTS	2.5	< 0.05	1.9	0.54	8.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.9	< 0.05	2.5	0.61	11
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.8	< 0.05	1.4	0.32	5.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.1	< 0.05	2.1	0.48	11
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.8	< 0.05	1.1	0.31	5.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.47	< 0.05	0.39	< 0.05	1.6
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.4	< 0.05	1.5	0.35	7.0
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	32.5	< 0.80	31.5	7.06	123

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275527	1275528	1275529	1275530	1275531
Sample Reference				WS202	WS202	WS203	WS203	TP201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.90	2.10-2.40	0.40-0.70	3.00	0.30
Date Sampled				24/07/2019	24/07/2019	24/07/2019	24/07/2019	24/07/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.1	12	14	26	9.4
Barium (aqua regia extractable)	mg/kg	1	MCERTS	250	76	310	150	69
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.98	0.93	1.4	1.1	0.63
Boron (water soluble)	mg/kg	0.2	MCERTS	1.9	1.8	4.0	10	1.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.7	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	30	52	40	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	71	18	160	68	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	63	23	190	210	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	23	34	44	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	36	38	88	68	58
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	46	190	120	58

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275527	1275528	1275529	1275530	1275531
Sample Reference				WS202	WS202	WS203	WS203	TP201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.90	2.10-2.40	0.40-0.70	3.00	0.30
Date Sampled				24/07/2019	24/07/2019	24/07/2019	24/07/2019	24/07/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1	< 0.1
TPH C10 - C40	mg/kg	10	MCERTS	-	< 10	49	1100	160
TPH2 (C6 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1	< 0.1
TPH C6 - C40	mg/kg	10	NONE	-	< 10	49	1100	160
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	43	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	60	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	43	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	100	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	17	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	150	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	150	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	160	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	310	-	-	-	-
TPH (C10 - C25)	mg/kg	10	MCERTS	-	< 10	21	1100	78
TPH (C25 - C40)	mg/kg	10	MCERTS	-	< 10	130	1700	400

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275532	1275533			
Sample Reference				TP205	TP208			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.50	0.40			
Date Sampled				24/07/2019	24/07/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	13	14			
Moisture Content	%	N/A	NONE	8.6	1.4			
Total mass of sample received	kg	0.001	NONE	2.0	2.0			
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	10.4	10.8			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1500	650			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.73	0.33			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	734	326			
Organic Matter	%	0.1	MCERTS	1.5	0.8			
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	13	22			
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	6.6	11			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	1.4	0.64			
Anthracene	mg/kg	0.05	MCERTS	0.56	0.40			
Fluoranthene	mg/kg	0.05	MCERTS	4.0	1.8			
Pyrene	mg/kg	0.05	MCERTS	4.9	1.6			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.7	1.1			
Chrysene	mg/kg	0.05	MCERTS	1.9	0.89			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.1	1.0			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.5	0.60			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.1	0.98			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.1	0.57			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.33	0.21			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.5	0.86			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	23.9	10.6			

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275532	1275533			
Sample Reference				TP205	TP208			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.50	0.40			
Date Sampled				24/07/2019	24/07/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	12			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	94			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.73	0.66			
Boron (water soluble)	mg/kg	0.2	MCERTS	2.8	3.9			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.9			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	24			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	43			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	74	120			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	15			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	47	35			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	86	110			

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275532	1275533			
Sample Reference				TP205	TP208			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.50	0.40			
Date Sampled				24/07/2019	24/07/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-			
Toluene	µg/kg	1	MCERTS	-	-			
Ethylbenzene	µg/kg	1	MCERTS	-	-			
p & m-xylene	µg/kg	1	MCERTS	-	-			
o-xylene	µg/kg	1	MCERTS	-	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-			
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH C10 - C40	mg/kg	10	MCERTS	950	110			
TPH2 (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH C6 - C40	mg/kg	10	NONE	950	110			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	-			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	-			
TPH (C10 - C25)	mg/kg	10	MCERTS	950	110			
TPH (C25 - C40)	mg/kg	10	MCERTS	2400	220			

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275534	1275535			
Sample Reference				TP204	TP208			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.60	2.00			
Date Sampled				24/07/2019	24/07/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	10.1	7.8			
Electrical Conductivity	µS/cm	10	ISO 17025	400	290			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO_4	mg/l	0.1	ISO 17025	147	114			
Nitrate as N	mg/l	0.01	NONE	1.55	0.84			
Hardness - Total	mgCaCO3/l	1	NONE	219	137			
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	0.61			
Acenaphthylene	µg/l	0.01	ISO 17025	0.02	0.66			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	7.5			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	1.6			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	0.01	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	0.03	0.75			
Pyrene	µg/l	0.01	ISO 17025	0.02	0.50			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	0.02	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	0.01	< 0.01			
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	12			
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	1.1	ISO 17025	6.5	3.7			
Barium (dissolved)	µg/l	0.05	ISO 17025	22	49			
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Boron (dissolved)	µg/l	10	ISO 17025	27	130			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	18	2.5			
Copper (dissolved)	µg/l	0.7	ISO 17025	14	8.7			
Lead (dissolved)	µg/l	1	ISO 17025	3.8	14			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	1.0			
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.5	1.8			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Vanadium (dissolved)	µg/l	1.7	ISO 17025	40	10			
Zinc (dissolved)	µg/l	0.4	ISO 17025	3.4	10			
Calcium (dissolved)	mg/l	0.012	ISO 17025	87	48			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.32	3.9			

Analytical Report Number: 19-51430

Project / Site name: Hayes

Lab Sample Number				1275534	1275535			
Sample Reference				TP204	TP208			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.60	2.00			
Date Sampled				24/07/2019	24/07/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C44)	ug/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	120			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	58			
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	180			
TPH-CWG - Aromatic (C5 - C44)	ug/l	10	NONE	< 10	180			

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Project / Site name: Hayes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation.
The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1275527	WS202	None Supplied	0.60-0.90	Brown loam and sand with stones.
1275528	WS202	None Supplied	2.10-2.40	Brown clay.
1275529	WS203	None Supplied	0.40-0.70	Brown loam and clay with gravel.
1275530	WS203	None Supplied	3.00	Brown clay.
1275531	TP201	None Supplied	0.30	Brown loam and sand.
1275532	TP205	None Supplied	0.50	Brown loam and clay with stones.
1275533	TP208	None Supplied	0.40	Brown loam and sand with stones.

Analytical Report Number : 19-51430

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Electrical conductivity at 20oC of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Nitrate as N in leachate	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS

Analytical Report Number : 19-51430

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total Hardness of leachates	Determination of hardness in leachates by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method.	L076-PL	W	NONE
TPH in (Leachate)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method, TPH with carbon banding.	L070-PL	W	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPH Oils (Soils)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS
TPH7 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 19-51430

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX 8: MONITORING RESULTS

Groundwater Monitoring

Site:	Hayes	Date:	29.1.20	Weather:	Dry and cold
Job No.:	3249	Start time:	11:02	Recent weather:	Wet
Engineer:	AJ	End time:	11:45	Atm. Pressure:	988

Borehole: BH07 | Well Diameter: 0.05 m | Liquid Level: 4.01 m | Base Level: 5.63 m

Response zone (slotted): 1.00 - 6.00 m

Well vol = pi x r^2 x (base - liquid level) x 1000 = 3.18 l

Purge target vol = well vol x 3 = 9.54 l

Well water = pi x r^2 x 1000 = 1.96 l/m

Bails needed = purge target vol x well water = 19 bails

(Bailer vol assumed = 1l)

Time	NAPL Level (m)	Water Level (m)	pH	Electrical Conductivity (μS/cm)	Total Dissolved Solids (ppm)	Dissolved Oxygen (%)	Redox Potential (mV)	Water Temp. (°C)	Sampled (✔)	Comments (Colour? Turbidity? Odour? Etc.)
11:13		4.37		1561	801		111	12.1		Brown, opaque, slight hydrocarbon sheen to water
11:21		4.63		1498	816		113	11.6		
11:34		4.85		1524	832		116	11.6	✔	

Key: required input cells | autocalc cells

Groundwater Monitoring

Site:	Hayes	Date:	29.1.20	Weather:	Dry and cold
Job No.:	3249	Start time:	12:03	Recent weather:	Wet
Engineer:	AJ	End time:	12:58	Atm. Pressure:	988

Borehole: BH08 — Well Diameter: 0.05 m — Liquid Level: 3.37 m — Base Level: 6 m

Response zone (slotted): 1.00 - 6.00 m

Well vol = pi x r^2 x (base - liquid level) x 1000 = 5.16 l
Purge target vol = well vol x 3 = 15.49 l
Well water = pi x r^2 x 1000 = 1.96 l/m

Bails needed = purge target vol x well water = 30 bails
(Bailer vol assumed = 1l)

Time	NAPL Level (m)	Water Level (m)	pH	Electrical Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Dissolved Oxygen (%)	Redox Potential (mV)	Water Temp. (°C)	Sampled (✓)	Comments (Colour? Turbidity? Odour? Etc.)
12:03		3.37		1495	791		125	12.1		Brown, turbid, opaque, slight hydrocarbon odour and sheen to water
12:18		3.82		1491	747		119	12.1		
12:32		4.23		1508	748		117	12.1		
12:45		4.60		1505	749		117	12.1	✓	

Key: required input cells — autocalc cells

Groundwater Monitoring

Site:	Hayes	Date:	29.1.20	Weather:	Dry and cold
Job No.:	3249	Start time:	8:41	Recent weather:	Wet
Engineer:	AJ	End time:	9:39	Atm. Pressure:	988

IGE consulting

Borehole: BH08 Well Diameter: 0.05 m Liquid Level: 1.86 m Base Level: 5.8 m

Response zone (slotted): 1.00 - 6.00 m

Well vol = pi x r^2 x (base - liquid level) x 1000 = 7.74 l

Purge target vol = well vol x 3 = 23.21 l

Well water = pi x r^2 x 1000 = 1.96 l/m

Bails needed = purge target vol x well water = 46 bails

(Bailer vol assumed = 1l)

Time	NAPL Level (m)	Water Level (m)	pH	Electrical Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Dissolved Oxygen (%)	Redox Potential (mV)	Water Temp. (°C)	Sampled (✔)	Comments (Colour? Turbidity? Odour? Etc.)
8:41		2.02		1845	912		-8.7	10.8		Brown, turbid, opaque, slight hydrocarbon odour and sheen to water
8:56		2.38		1903	924		-9.2	11.3		
9:13		2.75		1932	951		-9.1	12.0		
9:29		2.83		1931	953		-9.1	12.0	✔	

Key: required input cells autocalc cells

Gas Monitoring

Site:	Hayes			Recent weather:	Cold and dry	Precipitation:	Light Rain
Job No.:	3249	Date:	1/22/2020	Air temperature:	6°	Ground condition:	Damp
Engineer:	AJ	Start time:	11:00	Cloud cover:	100%	Pressure trend:	Falling
Visit No.:	1	End time:	15:37	Wind velocity and direction:	2mph W	On-site activities (e.g.construction):	Site Investigation Works

Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH_4		LEL		CO_2		O_2			H_2S		Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)			(ppm)		(l/hr)	
						peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady
BH1- J	11:10	1.00 - 6.00	3.62	5.88	1030	0.0	0.0	0.0	0.0	0.2	0.2	21.7	20.6	10.8	0	0	0.0	0.0
BH3 - J	12:26	1.00 - 5.00	1.70	5.56	1028	0.0	0.0	0.0	0.0	0.6	0.6	21.2	19.1	19.1	0	0	0.0	0.0
WS7	15:37	1.00 - 5.00	3.08	4.93	1027	2.7	2.1	51.1	48.1	10.5	10.5	21.2	0.0	0.0	0	0	0.0	0.0

PID (ppm)		
Exploratory Hole	Peak	Steady
BH1 - J	0.0	0.0
BH3 - J	0.0	0.0
WS7	2.4	2.4

Comments: BH01 - J - No backfill around upper part of well, backfill anticiapted to have sunk due to age of well.

Gas Monitoring

Site:	Hayes			Recent weather:	Rain	Precipitation:	Light Rain
Job No.:	3249	Date:	1/29/2020	Air temperature:	3°	Ground condition:	Damp
Engineer:	AJ	Start time:	8:30	Cloud cover:	10%	Pressure trend:	Rising
Visit No.:	1	End time:	13:12	Wind velocity and direction:	4.8 mph SW	On-site activities (e.g.construction):	Site Investigation Works

Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH_4		LEL		CO_2		O_2			H_2S		Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)			(ppm)		(l/hr)	
						peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady
BH02	8:30	5.60 - 6.30	1.83	5.80	985	0.0	0.0	0.0	0.0	0.9	0.9	20.7	18.9	18.9	0.0	0.0	0.0	0.0
BH07	11:08	1.00 - 6.00	4.01	5.62	988	0.0	0.0	0.0	0.0	0.2	0.2	20.8	20.1	20.1	0.0	0.0	0.0	0.0
BH08	12:03	4.50 - 6.00	3.37	6.00	988	0.0	0.0	0.0	0.0	0.1	0.1	20.8	20.3	20.3	0.0	0.0	0.0	0.0
BH08	12:32	9.00 - 10.00	9.32	9.62	988	0.0	0.0	0.0	0.0	0.1	0.1	21.2	20.3	20.2	0.0	0.0	0.0	0.0
BH1-J	12:52	1.00 - 6.00	3.64	5.88	988	0.0	0.0	0.0	0.0	0.1	0.1	20.6	20.1	20.10	0.0	0.0	0.0	0.0
BH3-J	13:36	1.00 - 5.00	1.69	5.56	988	0.0	0.0	0.0	0.0	0.5	0.5	21.3	20.0	19.9	0.0	0.0	0.0	0.0
WS7	13:56	1.00 - 5.00	3.06	4.93	988	2.1	2.1	48.1	48	10.1	10.1	21.3	0.00	0.00	0.0	0.0	0.0	0.0

PID (ppm)		
Exploratory Hole	Peak	Steady
BH02	0.0	0.0
BH07	0.1	0.1
BH08 (S)	0.2	0.2
BH08 (D)	0.0	0.0
BH1-J	0.0	0.0
BH3 - J	0.0	0.0
WS7	1.9	1.9

Comments: BH08 (S) - Shallow Well. BH08 (D) - Deep Well.

BH01 - J - No backfill around upper part of well, backfill anticiapted to have sunk due to age of well.

Gas Monitoring

Site:	Hayes			Recent weather:	Storm	Precipitation:	None
Job No.:	3249	Date:	2/12/2020	Air temperature:	9	Ground condition:	Dry
Engineer:	MB	Start time:	14:00	Cloud cover:	50%	Pressure trend:	Steady
Visit No.:	3	End time:	16:35	Wind velocity and direction:	17mph WSW	On-site activities (e.g.construction):	None

Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH_4		LEL		CO_2		O_2			H_2S		Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)			(ppm)		(l/hr)	
						peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady
BH02	15:45	5.60 - 6.30	1.96	5.63	1000	0.0	0.0	0.0	0.0	0.3	0.1	20.9	19.8	19.8	0.0	0.0	0.0	0.0
BH07	15:12	1.00 - 6.00	4.20	5.65	999	0.0	0.0	0.0	0.0	0.1	0.1	20.7	13.5	13.5	0.0	0.0	0.0	0.0
BH08 (S)	14:48	4.50 - 6.00	3.12	6.00	1000	0.0	0.0	0.0	0.0	1.2	0.9	20.5	20.0	19.9	0.0	0.0	0.0	0.0
BH08 (D)	14:55	9.00 - 10.00	6.80	9.43	1000	0.0	0.0	0.0	0.0	0.1	0.0	20.9	20.3	20.3	0.0	0.0	18.4	0.0
BH1-J	15:32	1.00 - 6.00	3.66	5.88	1000	0.0	0.0	0.0	0.0	0.1	0.1	20.5	20.3	20	0.0	0.0	0.0	0.0
BH3-J	14:09	1.00 - 5.00	1.74	5.60	1001	0.0	0.0	0.0	0.0	0.3	0.3	20.9	20.5	20.4	0.0	0.0	0.0	0.0
WS7 - J	15:56	1.00 - 4.00	1.95	4.17	1000	0.0	0.0	0.0	0.0	0.0	0.0	19.0	18.8	18.8	0.0	0.0	0.0	0.0
WS2 - J	14:26	1.00 - 3.00	1.85	2.44	999	0.0	0.0	0.0	0.0	0.3	0.3	20.9	20.5	20.5	0.0	0.0	0.0	0.0
WS7	16:26	1.00 - 5.00	3.20	4.90	1000	1.4	1.4	33.9	33.9	9.8	9.8	20.1	0.0	0.0	0.0	0.0	0.0	0.0

PID (ppm)			PID (ppm)		
Exploratory Hole	Peak	Steady	Exploratory Hole	Peak	Steady
BH02	1.5	1.0	BH3 - J	0.0	0.0
BH07	0.7	0.6	WS7 - J	0.4	0.2
BH08 (S)	2.7	2.6	WS2 - J	0.4	0.0
BH08 (D)	4.0	1.0	WS7	0.1	0.0
BH1-J	0.2	0.0			

Comments: BH08 (S) - Shallow Well. BH08 (D) - Deep Well. BH08 (S) - Hydrocarbon odour. WS07 - J - New bung at 14:04, monitored after.

BH01 - J - No backfill around upper part of well, backfill anticiapted to have sunk due to age of well. Tap also open - monitored anyway.

Gas Monitoring

Site:	Hayes			Recent weather:	Storm	Precipitation:	Light
Job No.:	3249	Date:	19.02.20	Air temperature:	7	Ground condition:	Wet
Engineer:	Jake Townsend	Start time:	11:15	Cloud cover:	91%	Pressure trend:	Steady
Visit No.:	4	End time:	13:15	Wind velocity and direction:	12mph, WSW	On-site activities (e.g.construction):	None

Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH_4		LEL		CO_2		O_2			H_2S		Flow		CO	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)			(ppm)		(l/hr)		(ppm)	
						peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady	Peak	Steady
BH02	11:49	5.60 - 6.30	1.82	5.78	1022	0.1	0.1	2.0	2.0	1.2	0.7	20.9	20.2	20.0	ND	ND	0.0	0.0	15.0	13.0
BH07	12:00	1.00 - 6.00	4.16	5.78	1021	ND	ND	ND	ND	0.1	0.1	20.9	11.7	11.7	ND	ND	0.1	0.0	1.0	1.0
BH08 (S)	12:31	4.50 - 6.00	3.08	6.03	1021	ND	ND	ND	ND	1.9	1.9	20.9	20.0	20.0	ND	ND	0.1	0.1	5.0	5.0
BH08 (D)	12:26	9.00 - 10.00	6.05	9.58	1021	ND	ND	ND	ND	0.4	0.3	20.9	20.3	20.3	ND	ND	0.3	0.3	5.0	4.0
BH1-J	12:09	1.00 - 6.00	3.59	5.92	1021	ND	ND	ND	ND	0.1	0.1	20.9	21.1	20.7	ND	ND	0.0	0.0	ND	ND
BH3-J	13:05	1.00 - 5.00	1.70	5.65	1021	ND	ND	ND	ND	0.8	0.8	20.9	19.7	19.7	ND	ND	0.0	0.0	ND	ND
WS7 - J	11:35	1.00 - 4.00	1.88	4.26	1021	ND	ND	ND	ND	ND	ND	20.9	15.0	15.0	ND	ND	0.1	0.0	ND	ND
WS2 - J	12:56	1.00 - 3.00	1.75	2.50	1021	ND	ND	ND	ND	0.3	0.3	20.9	20.5	20.5	ND	ND	0.1	0.0	ND	ND
WS7	13:34	1.00 - 5.00	3.18	4.99	1021	1.4	1.4	28	28	9.3	9.3	0.9	0.6	0.6	ND	ND	0.0	0.0	1.0	1.0

PID (ppm)			PID (ppm)		
Exploratory Hole	Peak	Steady	Exploratory Hole	Peak	Steady
BH02	0.2	0.2	BH3 - J	ND	ND
BH07	ND	ND	WS7 - J	0.1	0.1
BH08 (S)	6.0	6.0	WS2 - J	ND	ND
BH08 (D)	4.1	2.8	WS7	ND	ND
BH1-J	ND	ND			

Comments:

BH01 - J - No backfill around upper part of well, backfill anticiapted to have sunk due to age of well.

CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 10-Jan-2019

Certificate Number: G505555_1/22280

Issued by: QED Environmental Systems Ltd.

Customer: **Your Environment Company Limited**
Unit 11 Chilgrove Business Centre Chilgrove Park Road Chilgrove
Chichester West Sussex PO18 9HU UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G505555

UKAS Accredited results:

Results after adjustment :

Methane (CH_4)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.8	0.41
15.0	14.8	0.64
49.9	49.5	0.94

Carbon Dioxide (CO_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.9	0.43
15.0	14.8	0.70
50.1	50.2	1.1

Oxygen (O_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
21.0	21.1	0.31

The inwards assessment was carried out 03-Jan-2019.
The maximum adjustment is larger than the inwards assessment uncertainty.
Inwards assessment data is available if requested.

All concentrations are molar.

CH_4, CO_2 readings recorded at : 31.3 °C ± 2.5 °C

O2 readings recorded at : 22.6 °C ± 2.5 °C

Barometric Pressure : 1020 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

Calibration Instance: 101 IGC Instance: 101

www.qedenv.com **+44 (0) 333 800 0088** **sales@qedenv.co.uk**

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

CERTIFICATION OF CALIBRATION

ilac-MRA

UKAS CALIBRATION 4533

QED

Date Of Calibration: 10-Jan-2019

Certificate Number: G505555_1/22280

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	**Instrument Reading**
1020	1020

Additional Gas Cells		
Gas	**Certified Gas (ppm)**	**Instrument Reading (ppm)**
CO	497	497
H_2S	257	257

Internal Flow	
Applied (l/hr)	**Instrument Reading (l/hr)**
5.0	5.1
10.0	10.1

Date of Issue : 11-Jan-2019 **Approved by Signatory** A. Tantoush

Abdul Tantoush

Laboratory Inspection

Calibration Instance: 101 IGC Instance: 101

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client:	Paragon	**Job No:**	YE7331		
Site:	Bulls Bridge Industrial Estate	**Visit No:**	1 **of** 3		
Date:	25.06.19	**Operator:**	RG	**Project Manager:**	

	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
BH1*	0.0	0.0			0.3	0.3	1	1	0	0	20.1	20.1			-0.5	-0.5			0	0.0015	3.67	3.98				
BH2*	0.0	0.0			0.1	0.1	2	1	0	0	20.3	20.3			-0.7	-0.7			0	0.0007	2.20	2.20				Gas tap had been left open
WS2*	0.0	0.0			0.3	0.3	3	1	0	0	20.1	20.1			-0.7	-0.7			0	0.0021	2.03	2.05				
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
Max	**0.0**	**0.0**	**ND**	**ND**	**0.3**	**0.3**	**3**	**1**	**0**	**0**	**20.3**	**20.3**	**ND**	**ND**	**-0.5**	**-0.5**	**ND**	**NA**	**0.0000**	**0.0021**	**3.67**	**3.98**	**NR**	**NR**		
Min	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**1**	**1**	**0**	**0**	**20.1**	**20.1**	**0.0**	**0.0**	**-0.7**	**-0.7**	**0.0**	**0**	**0.0000**	**0.0000**	**2.03**	**2.05**	**0.00**	**0.00**		

ND - Not detected
NR - Not recorded
NA - Non applicable

***Previous installs**

Worst-possible GSVs	
0	**0.0015**

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION: (Select correct box with X or enter data, as applicable)

State of ground:	x	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	x	Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy	x	Overcast		
Precipitation:	x	None		Slight		Moderate		Heavy		
Time monitoring performed:			15:45	Start			16:45	End		
Barometric pressure (mbar):			1016	Start			1017	End		
Pressure trend (Daily):				Falling	x	Steady		Rising		
Source:					timeanddate.com					
Air Temperature (Deg. C):			22	Before			21	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client:	Paragon	**Job No:**	YE7331	
Site:	Bulls Bridge Industrial Estate	**Visit No:**	2 **of** 3	
Date:	27.06.2019	**Operator:**	Nick Hammond	**Project Manager:**

	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS3	0.0	0.0	0.0	0.0	0.0	0.0	4	3	0	0	19.0	19.0			-0.9	-0.9			0	0						
WS5	0.0	0.0	0.0	0.0	4.2	4.2	10	2	0	0	13.8	13.8			-0.9	-0.9			0	0.0378						
WS6	0.4	0.4	0.0	0.0	0.4	0.4	11	11	0	0	14.7	14.7			-0.8	-0.8			0.0032	0.0032						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
Max	0.4	0.4	0.0	0.0	4.2	4.2	11	11	0	0	19.0	19.0	ND	ND	-0.8	-0.8	ND	NA	0.0032	0.0378	DRY	NR	NR	NR		
Min	0.0	0.0	0.0	0.0	0.0	0.0	4	2	0	0	13.8	13.8	0.0	0.0	-0.9	-0.9	0.0	0	0.0000	0.0000	0.00	0.00	0.00	0.00		

Worst-possible GSVs	
0.0032	0.0336

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION: (Select correct box with X or enter data, as applicable)

State of ground:	x	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm		Light	x	Moderate		Strong		
Cloud cover:	x	None		Slight		Cloudy		Overcast		
Precipitation:	x	None		Slight		Moderate		Heavy		
Time monitoring performed:			14:05	Start			14:30	End		
Barometric pressure (mbar):			1026	Start			1026	End		
Pressure trend (Daily):				Falling	x	Steady		Rising		
Source:					Wunderground					
Air Temperature (Deg. C):			23	Before			23	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client:	Paragon	**Job No:**	YE7331		
Site:	Bulls Bridge Industrial Estate	**Visit No:**	3 **of** 3		
Date:	03.07.2019	**Operator:**	NH	**Project Manager:**	

Monitoring Point	GAS CONCENTRATIONS: Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		VOLATILES: PID Peak (ppm)	Product thickness (mm)	FLOW DATA: Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Worst-credible GSVs: Methane (l/hr)	CO2 (l/hr)	WELL AND WATER DATA: Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	Comments
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
BH1*	0.0	0.0	0.0	0.0	0.2	0.1	2	2	0	0	20.0	20.8			-0.5	-0.5			0	0.0005	3.72	5.95				Sample taken
BH3*	0.0	0.0	0.0	0.0	0.7	0.7	3	2	0	0	19.5	19.5			-0.9	-0.9			0	0.0063	1.82	5.62				Sample taken
WS2*	0.0	0.0	0.0	0.0	0.3	0.3	4	2	0	0	20.0	20.4			-0.7	-0.7			0	0.0021	2.20	2.48				
WS2	0.0	0.0	0.0	0.0	2.2	2.2	26	4	0	0	17.4	17.4			-0.8	-0.8			0	0.0176	1.97	2.89				Sample taken
WS3	0.0	0.0	0.0	0.0	0.3	0.2	2	2	0	0	18.2	18.9			-0.7	-0.7			0	0.0014	1.67	1.87				
WS4	0.0	0.0	0.0	0.0	0.9	0.9	6	3	0	0	20.0	20.0			-0.8	-0.8			0	0.0072	1.80	2.39				
WS5	0.0	0.0	0.0	0.0	4.8	4.8	4	3	0	0	13.4	13.4			-0.6	0.6			0	0.0288	2.88	3.85				Sample taken
WS6	0.0	0.0	0.0	0.0	0.6	0.6	7	2	0	0	16.6	17.7			-0.4	-0.4			0	0.0024	3.86	4.95				Sample taken
WS7	0.0	0.0	0.0	0.0	8.6	8.6	4	4	0	0	5.5	5.5			-0.3	-0.3			0	0.0258	3.25	4.98				Sample taken
WS8	0.0	0.0	0.0	0.0	0.4	0.4	26	3	0	0	18.3	19.7			-0.3	-0.3			0	0.0012	4.90	4.95				
WS9	0.0	0.0	0.0	0.0	4.0	4.0	3	1	0	0	12.2	12.2			-0.1	-0.1			0	0.004	dry	1.41				
WS10	0.0	0.0	0.0	0.0	4.0	4.0	2	1	0	0	17.0	17.0			0.0	0.0			0	0	3.15	4.16				Sample taken
MW5	0.0	0.0	0.0	0.0	3.2	3.2	6	3	0	0	8.5	8.5			-0.9	-0.9			0	0.0288						No removable bung
MW6-3	0.0	0.0	0.0	0.0	2.4	2.4	125	3	0	0	14.6	14.6			-0.9	-0.9			0	0.0216						No removable bung
Max	**0.0**	**0.0**	**0.0**	**0.0**	**8.6**	**8.6**	**26**	**4**	**0**	**0**	**20.0**	**20.8**	**ND**	**ND**	**0.0**	**0.6**	**ND**	**NA**	**0.0000**	**0.0288**	**4.90**	**5.95**	**NR**	**NR**		
Min	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**0.1**	**2**	**1**	**0**	**0**	**5.5**	**5.5**	**0.0**	**0.0**	**-0.9**	**-0.9**	**0.0**	**0**	**0.0000**	**0.0000**	**DRY**	**1.41**	**0.00**	**0.00**		

ND - Not detected ***Previous installs**
NR - Not recorded
NA - Non applicable

Worst-possible GSVs

Methane	CO2
0	**0**

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION: (Select correct box with X or enter data, as applicable)

State of ground:	x Dry	Moist	Wet	Snow	Frozen
Wind:	Calm	x Light	Moderate	Strong	
Cloud cover:	x None	Slight	Cloudy	Overcast	
Precipitation:	x None	Slight	Moderate	Heavy	
Time monitoring performed:		09:20		12:10 End	
Barometric pressure (mbar):		1024 Start		1024 End	
Pressure trend (Daily):		Falling	x Steady	Rising	
Source:			Wunderground		
Air Temperature (Deg. C):		19 Before		21 After	

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Gas Monitoring

Site:	Hayes, London	Recent weather:	Hot and dry	Precipitation:	None
Job No.: 3249	Date: 23/07/2019	Air temperature:	33°	Ground condition:	Dry
Engineer: AJ	Start time: 17:03	Cloud cover:	5%	Pressure trend:	Steady
Visit No.: 1	End time: 17:26	Wind velocity and direction:	13 mph SE	On-site activities (e.g.construction):	Active Site

Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH_4		LEL		CO_2		O_2			H_2S		Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)			(ppm)		(l/hr)	
						peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady
WS202	17:03	1.00 - 4.00	Dry	3.98	1015	0.0	0.0	0.0	0.0	0.1	0.1	20.5	19.9	19.9	0.0	0.0	0.0	0.0
WS203	17:15	1.00 - 2.90	Dry	2.87	1015	0.0	0.0	0.0	0.0	0	0	20.5	20.1	20.1	0.0	0.0	0.0	0.0

Comments: PID = 0ppm

Ground gas monitoring undertaken 6 hours (WS202) and 3 hours (WS203) after installation

APPENDIX 9: GEOTECHNICAL LABORATORY TESTING

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: IGE Consulting
Client Address: 14-32 Hewitt Street, Manchester, M15 4GB
Contact: Angharad Jones
Site Address: Hayes

Client Reference: 3249
Job Number: 20-85305
Date Sampled: 06/02/2020
Date Received: 06/02/2020
Date Tested: 13/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

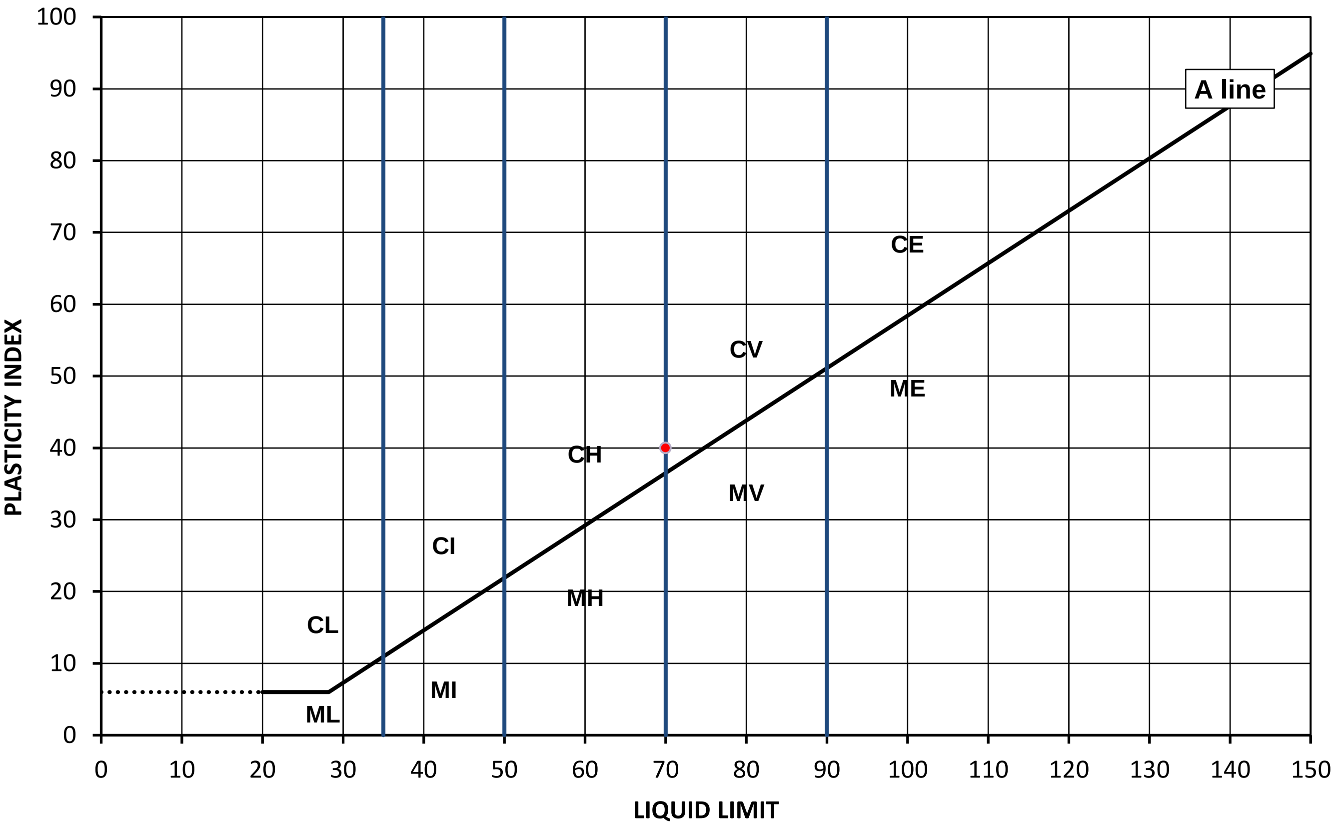
Test Results:

Laboratory Reference: 1434576
Hole No.: BH08
Sample Reference: Not Given
Soil Description: Dark brown sandy very gravelly CLAY

Depth Top [m]: 1.50
Depth Base [m]: 2.00
Sample Type: C

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
23	70	30	40	59



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. Any assessment of compliance with specifications based ttical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 232.7

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: IGE Consulting
Client Address: 14-32 Hewitt Street, Manchester, M15 4GB
Contact: Angharad Jones
Site Address: Hayes

Client Reference: 3249
Job Number: 20-85305
Date Sampled: 06/02/2020
Date Received: 06/02/2020
Date Tested: 13/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

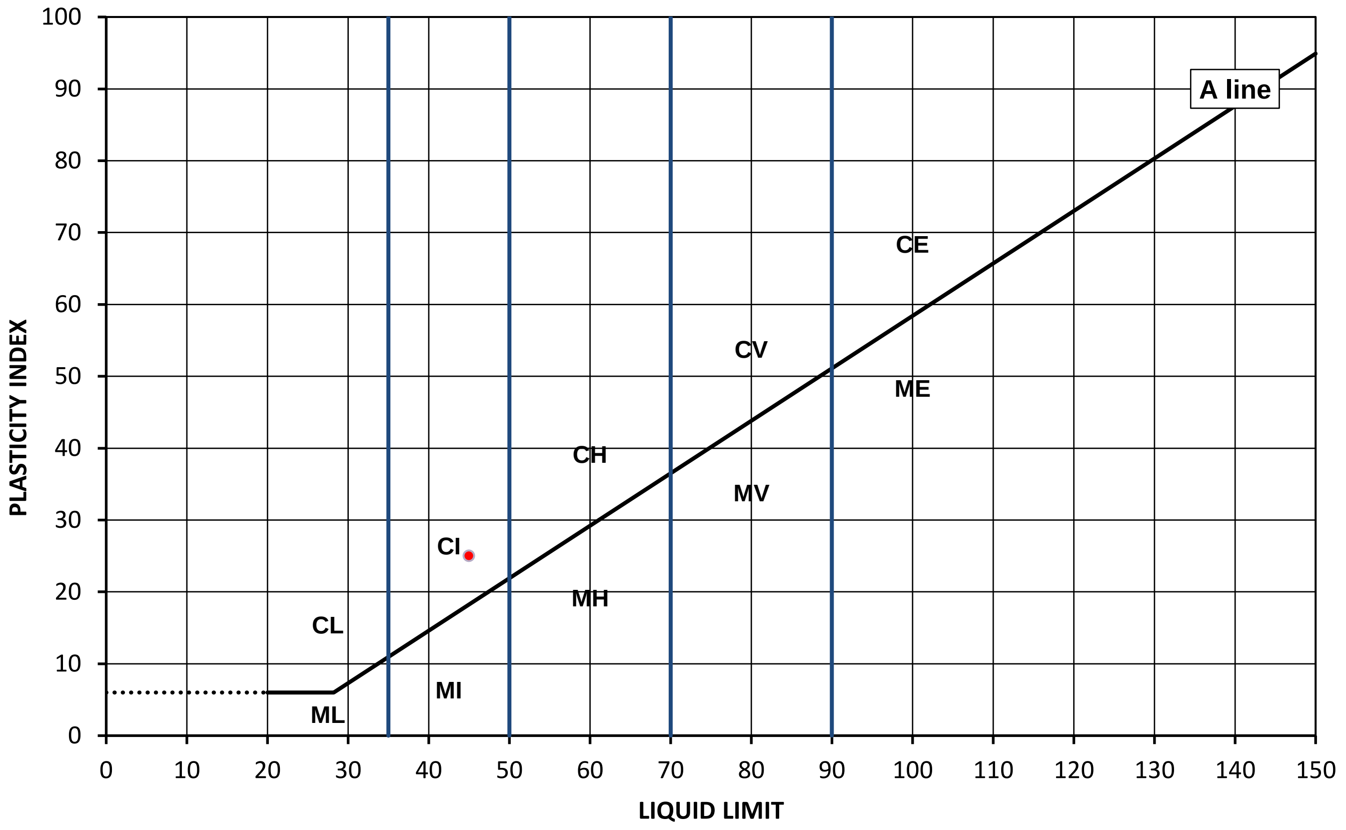
Test Results:

Laboratory Reference: 1434577
Hole No.: BH07
Sample Reference: Not Given
Soil Description: Brown gravelly sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.50
Sample Type: C

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
13**	45	20	25	66



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks: **Sample is dry

Signed:

Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 232.7

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	10/02/2020
Site Address:	Hayes	Sampled By:	Not Given

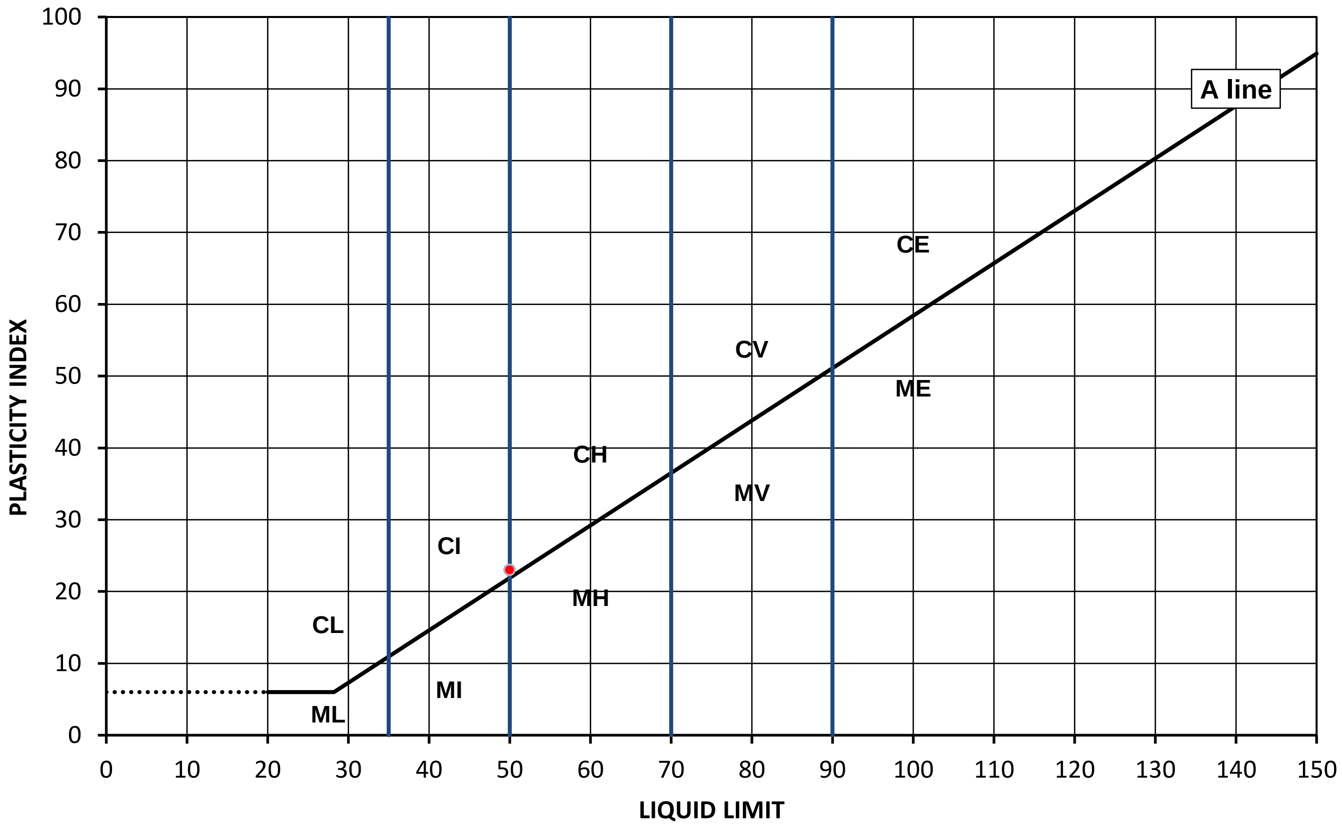
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1434578	Depth Top [m]:	1.50
Hole No.:	BH06	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark grey clayey sandy GRAVEL		

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26*	50	27	23	43



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks: *Sample is wet

Signed: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 232.7

SUMMARY REPORT

Summary of Classification Test Results

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990: Clause 8.2

Client: IGE Consulting
Client Address: 14-32 Hewitt Street, Manchester, M15 4GB
Contact: Angharad Jones
Site Address: Hayes

Client Reference: 3249
Job Number: 20-85305
Date Sampled: 06/02/2020
Date Received: 06/02/2020
Date Tested: 10/02 - 13/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample Reference	Sample Depth Top (m)	Sample Depth Base (m)	Sample Type	Description	Remarks	MC (%)	WC (%)	Atterberg % Passing 425um (%)	Atterberg LL (%)	Atterberg PL (%)	Atterberg PI (%)	Density bulk (Mg/m3)	Density dry (Mg/m3)	Density PD (Mg/m3)	Total Porosity# (%)		
1434578	BH06	Not Given	1.50	2.00	B	Dark grey clayey sandy GRAVEL	Atterberg 1 Point	26*		43	50	27	23						
1434577	BH07	Not Given	2.00	2.50	C	Brown gravelly sandy CLAY	Atterberg 1 Point	13**		66	45	20	25						
1434576	BH08	Not Given	1.50	2.00	C	Dark brown sandy very gravelly CLAY	Atterberg 1 Point	23		59	70	30	40						

Note: # Non accredited; NP - Non plastic

Comments: *Sample is wet
**Sample is dry

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 234.9

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

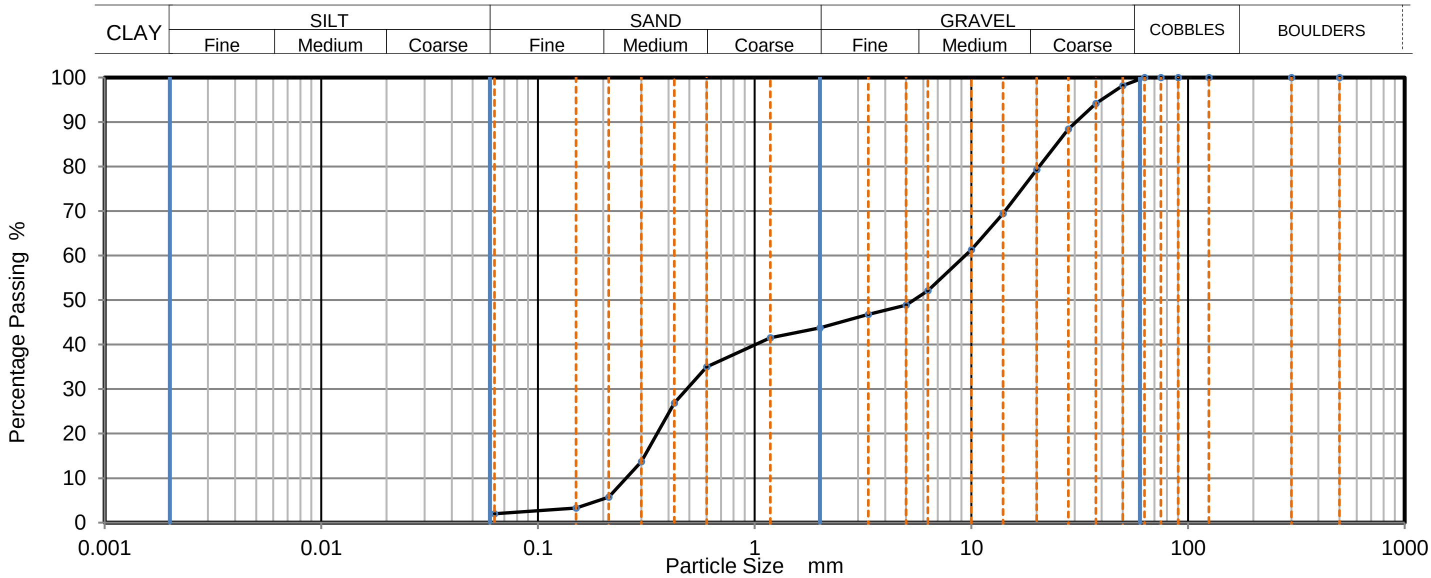
Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1434573	Depth Top [m]:	5.10
Hole No.:	BH04	Depth Base [m]:	6.00
Sample Reference:	Not Given	Sample Type:	C
Sample Description:	Brown very sandy GRAVEL		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	98		
37.5	94		
28	88		
20	79		
14	69		
10	61		
6.3	52		
5	49		
3.35	47		
2	44		
1.18	42		
0.6	35		
0.425	27		
0.3	14		
0.212	6		
0.15	3		
0.063	3		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	56.20
Sand	41.30
Fines <0.063mm	2.50

Grading Analysis		
D100	mm	63
D60	mm	9.35
D30	mm	0.486
D10	mm	0.255
Uniformity Coefficient		37
Curvature Coefficient		0.099

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

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

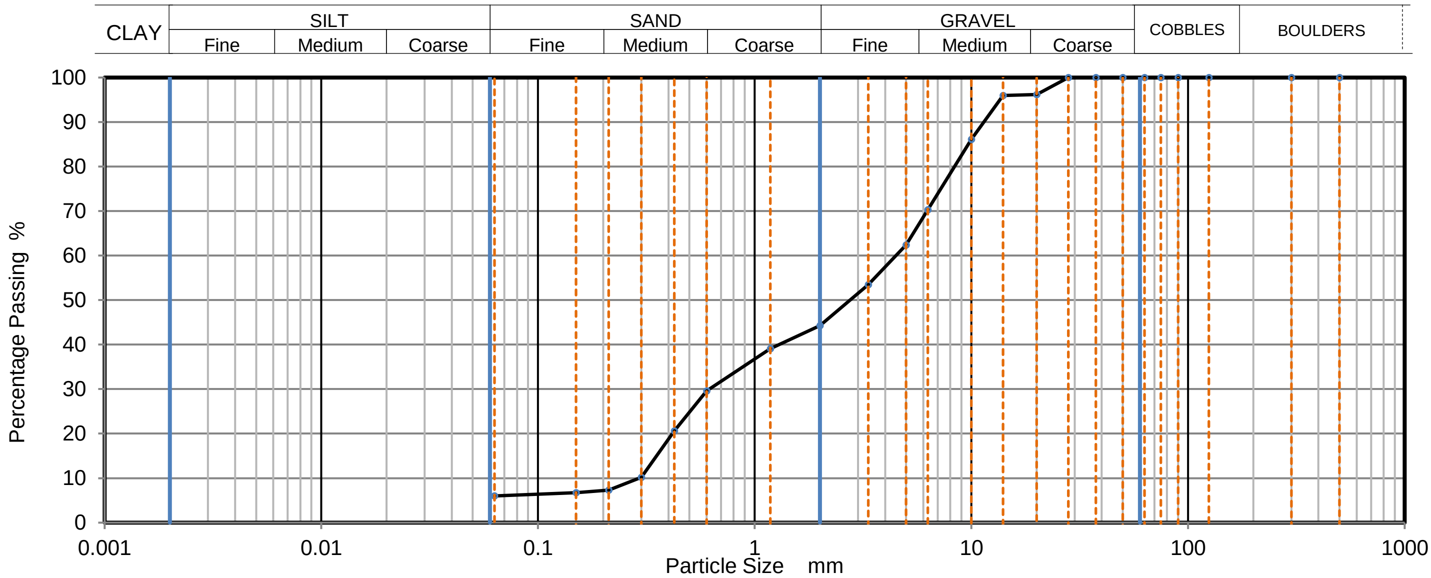
Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	10/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1434574	Depth Top [m]:	4.70
Hole No.:	BH03	Depth Base [m]:	5.40
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly clayey very sandy GRAVEL		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	96		
10	86		
6.3	70		
5	62		
3.35	54		
2	44		
1.18	39		
0.6	30		
0.425	21		
0.3	10		
0.212	7		
0.15	7		
0.063	6		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	55.70
Sand	37.90
Fines <0.063mm	6.40

Grading Analysis		
D100	mm	28
D60	mm	4.49
D30	mm	0.616
D10	mm	0.293
Uniformity Coefficient		15
Curvature Coefficient		0.29

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

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 100.15

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

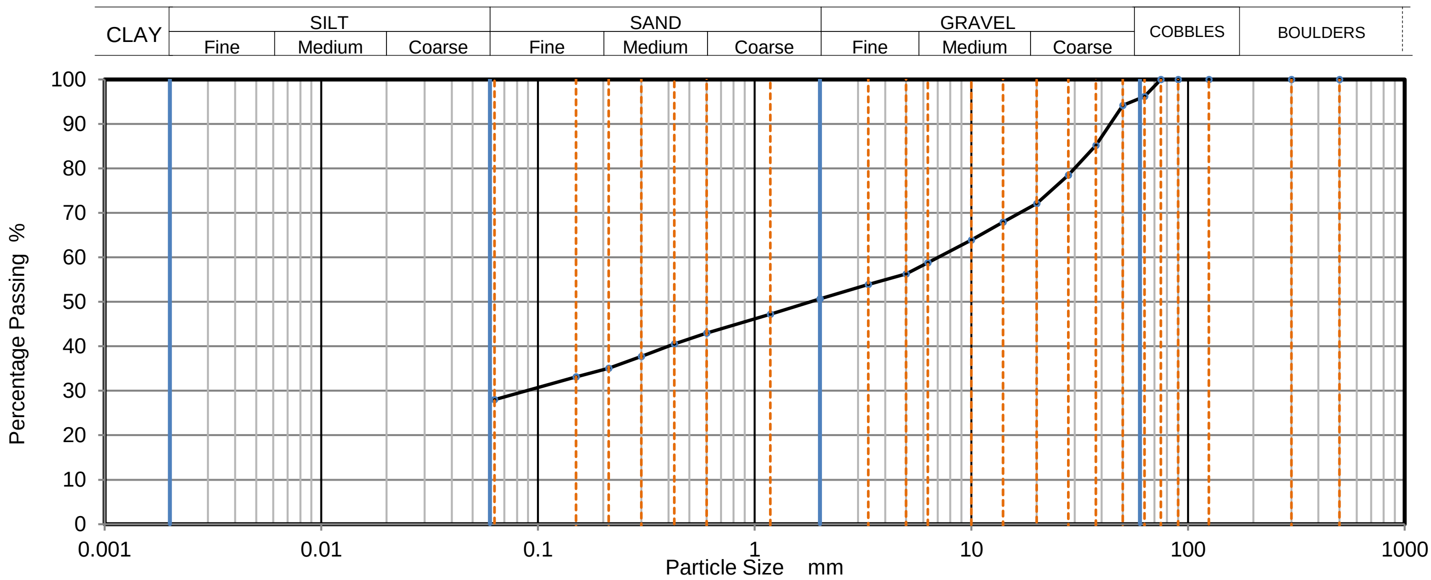
i2 Analytical Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	10/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1434575	Depth Top [m]:	0.50
Hole No.:	BH03	Depth Base [m]:	1.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy clayey GRAVEL with fragments of brick		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	96		
50	94		
37.5	85		
28	79		
20	72		
14	68		
10	64		
6.3	59		
5	56		
3.35	54		
2	51		
1.18	47		
0.6	43		
0.425	41		
0.3	38		
0.212	35		
0.15	33		
0.063	29		

Sample Proportions	% dry mass
Very coarse	3.80
Gravel	45.50
Sand	22.10
Fines <0.063mm	28.50

Grading Analysis		
D100	mm	75
D60	mm	7.05
D30	mm	0.0831
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 100.15

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

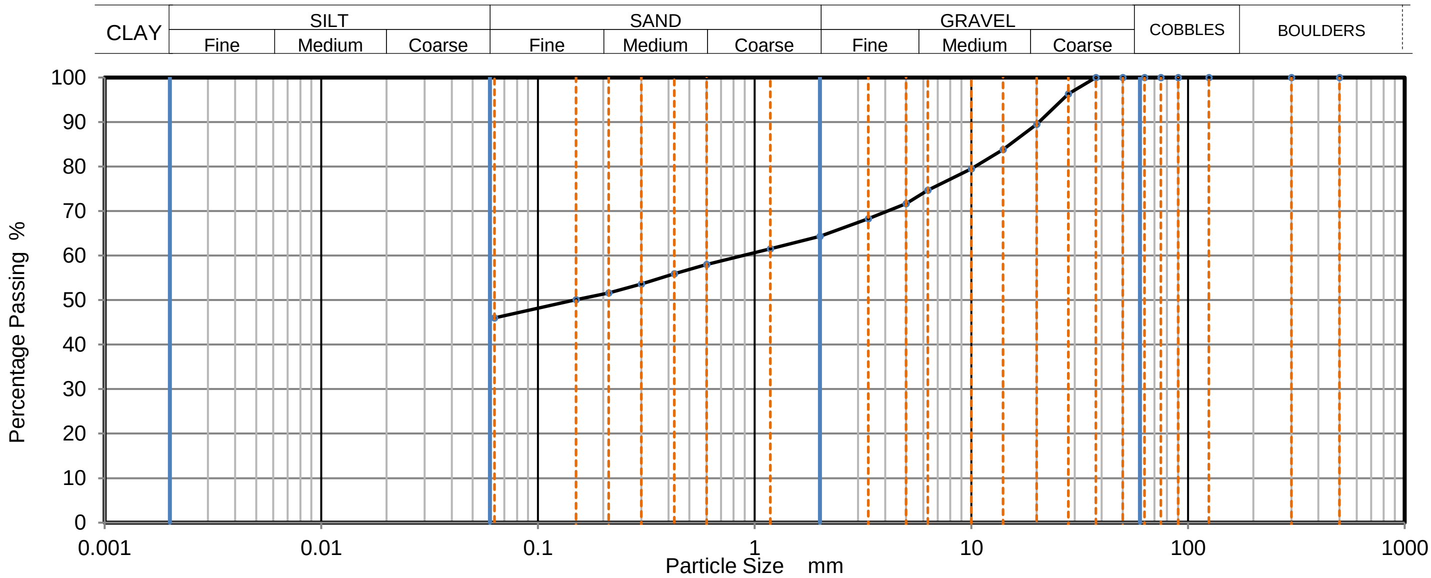
i2 Analytical Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1434576	Depth Top [m]:	1.50
Hole No.:	BH08	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	C
Sample Description:	Dark brown sandy very gravelly CLAY		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	90		
14	84		
10	80		
6.3	75		
5	72		
3.35	68		
2	64		
1.18	62		
0.6	58		
0.425	56		
0.3	54		
0.212	52		
0.15	50		
0.063	47		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	35.70
Sand	17.70
Fines <0.063mm	46.50

Grading Analysis		
D100	mm	37.5
D60	mm	0.88
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 100.15

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

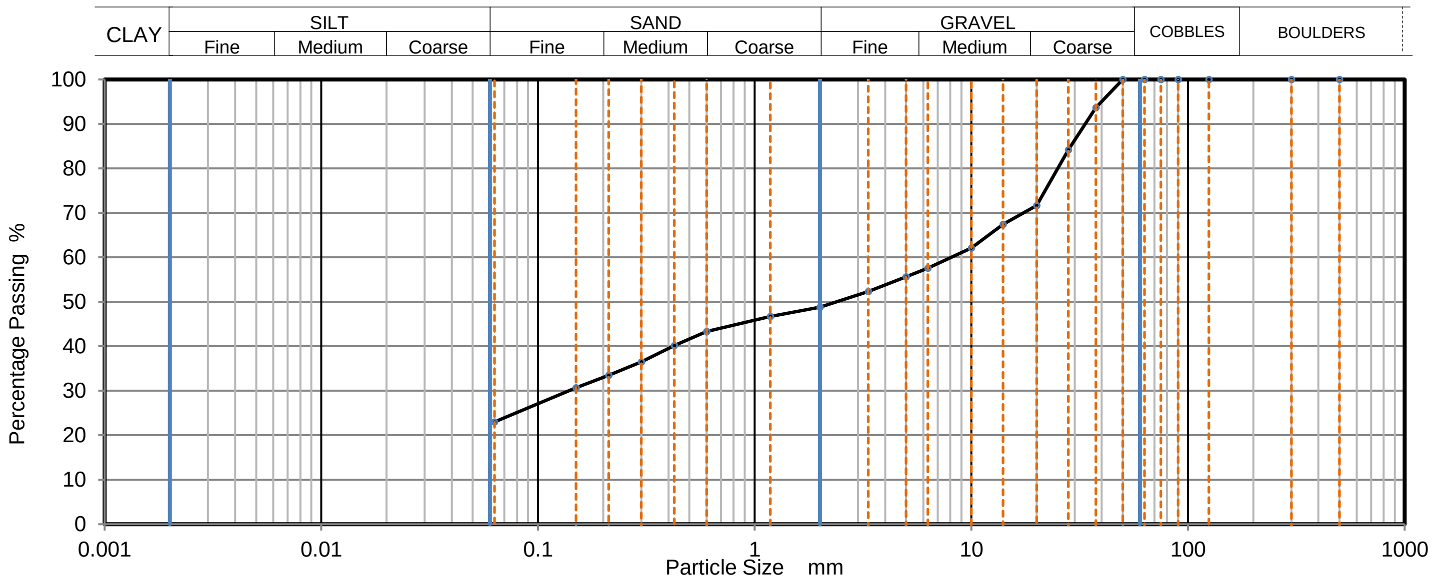
Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	10/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1434578	Depth Top [m]:	1.50
Hole No.:	BH06	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Dark grey clayey sandy GRAVEL		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	84		
20	72		
14	67		
10	62		
6.3	58		
5	56		
3.35	52		
2	49		
1.18	47		
0.6	43		
0.425	40		
0.3	37		
0.212	34		
0.15	31		
0.063	24		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	51.20
Sand	25.30
Fines <0.063mm	23.60

Grading Analysis		
D100	mm	50
D60	mm	8.04
D30	mm	0.138
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 100.15

TEST CERTIFICATE

Unconsolidated Undrained Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

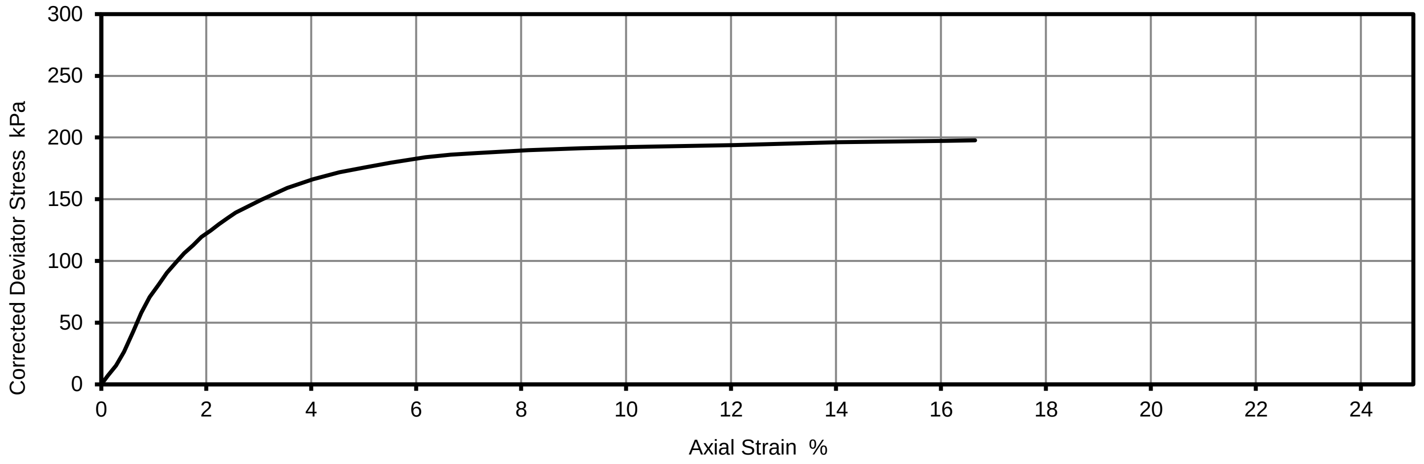
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

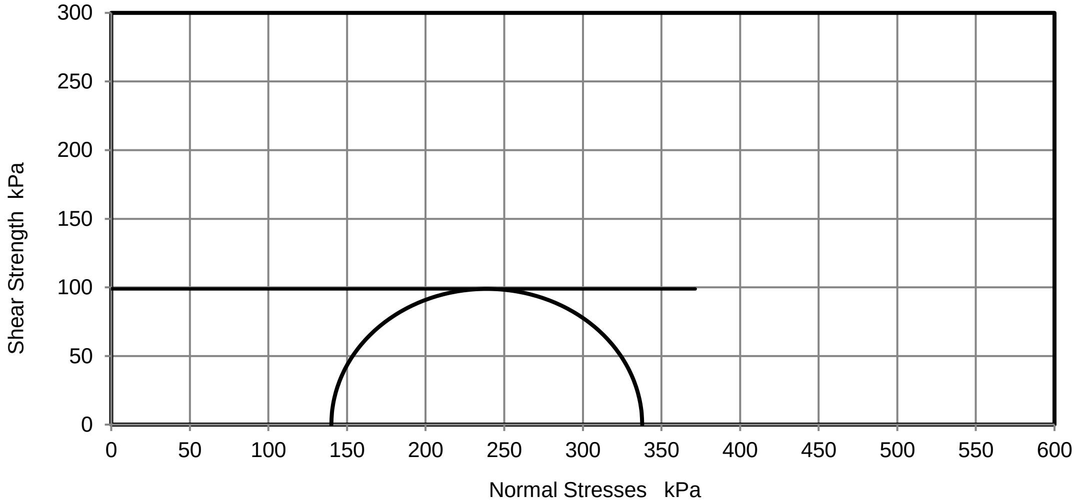
Laboratory Reference:	1434571	Depth Top [m]:	7.00
Hole No.:	BH04	Depth Base [m]:	7.50
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	192.92	mm	Cell Pressure	140	kPa	
Diameter	102.91	mm	Axial Strain at failure	16.6	%	
Bulk Density	1.98	Mg/m3	Deviator Stress, (σ1 - σ3)f	198	kPa	
Moisture Content	31	%	Undrained Shear Strength, cu	99	kPa	½(σ1 - σ3)f
Dry Density	1.52	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.67	kPa	Membrane thickness	0.21	mm	

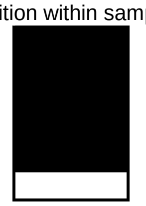
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 184.9

UKAS TESTING
4041

TEST CERTIFICATE

Unconsolidated Undrained Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85305
		Date Sampled:	06/02/2020
		Date Received:	06/02/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

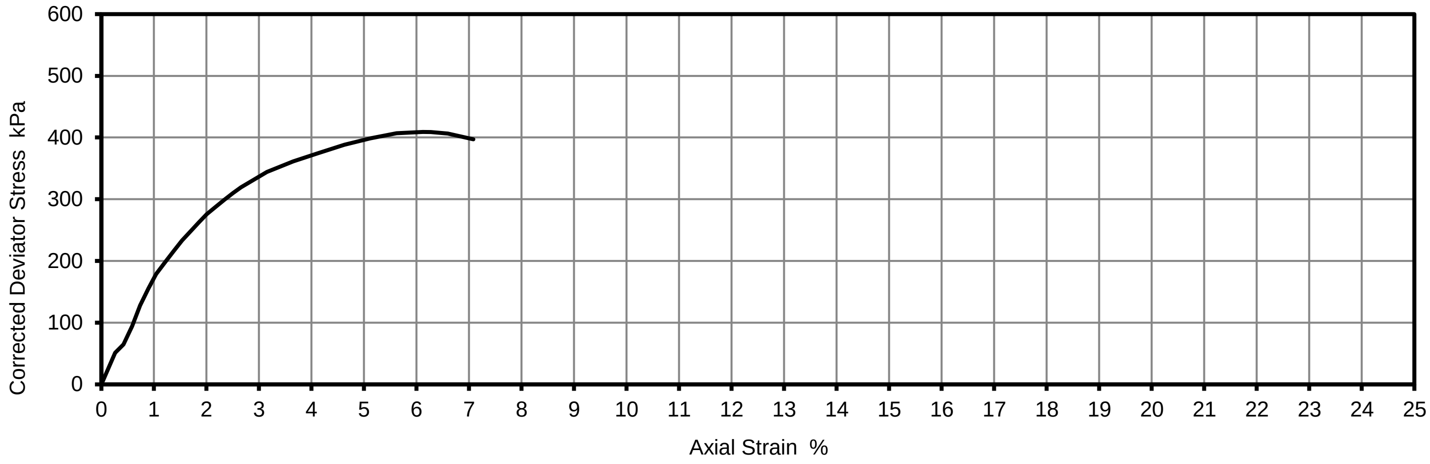
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

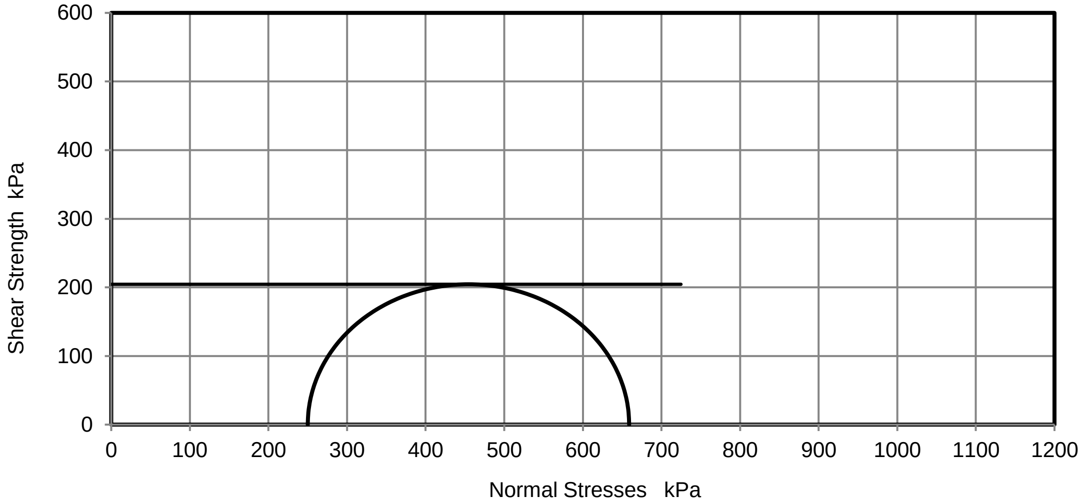
Laboratory Reference:	1434572	Depth Top [m]:	12.50
Hole No.:	BH04	Depth Base [m]:	13.00
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	192.43	mm	Cell Pressure	250	kPa	
Diameter	102.91	mm	Axial Strain at failure	6.3	%	
Bulk Density	2.02	Mg/m3	Deviator Stress, (σ1 - σ3)f	409	kPa	
Moisture Content	25	%	Undrained Shear Strength, cu	204	kPa	½(σ1 - σ3)f
Dry Density	1.61	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.35	kPa	Membrane thickness	0.22	mm	

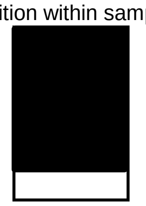
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. Any assessment of compliance with specifications based ttical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."

Signed:

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 20/02/2020

GF 184.9

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

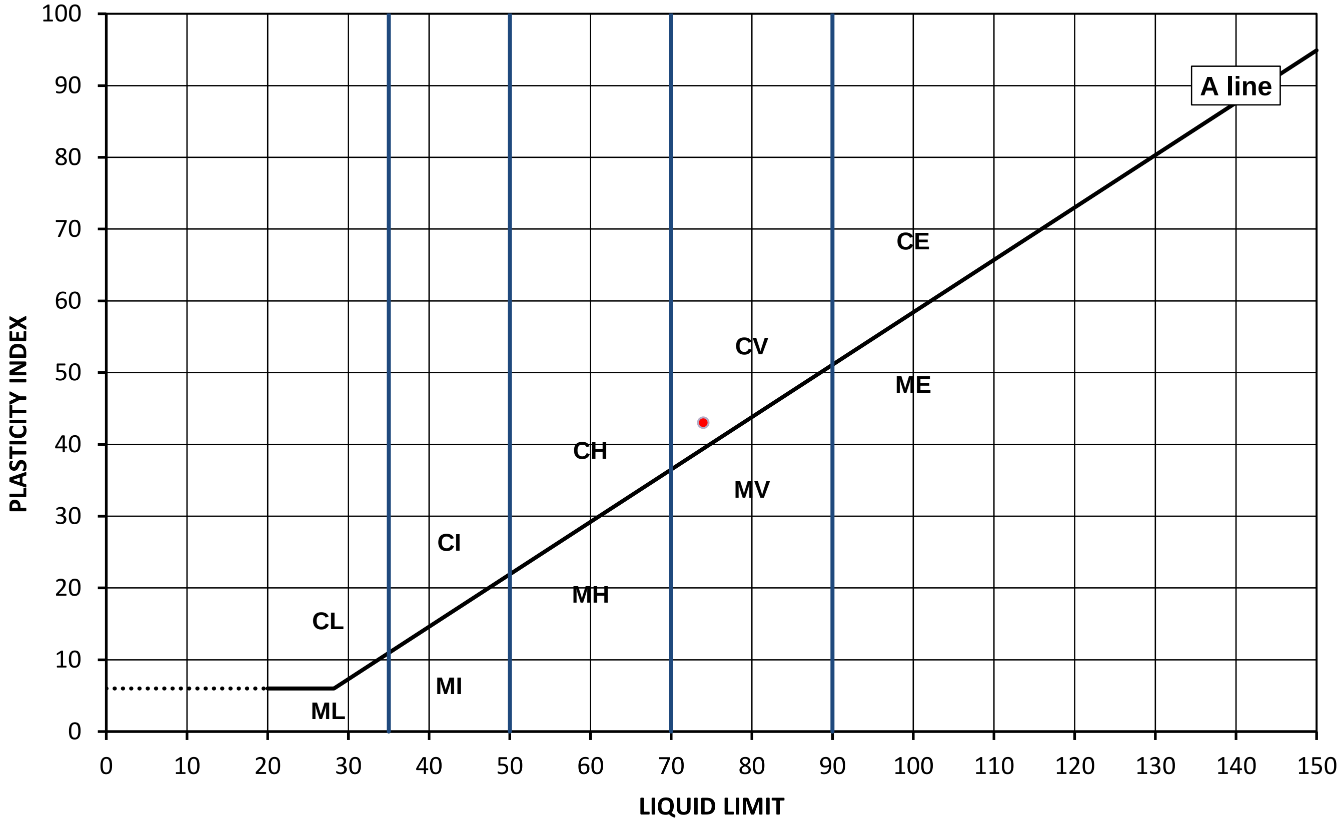
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433195	Depth Top [m]:	7.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Soil Description:	Dark brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
30	74	31	43	100



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: IGE Consulting

Client Address: 14-32 Hewitt Street, Manchester, M15 4GB

Contact: Angharad Jones

Site Address: Hayes

Client Reference: 3249
Job Number: 20-85080
Date Sampled: 29/01/2020
Date Received: 29/01/2020
Date Tested: 13/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

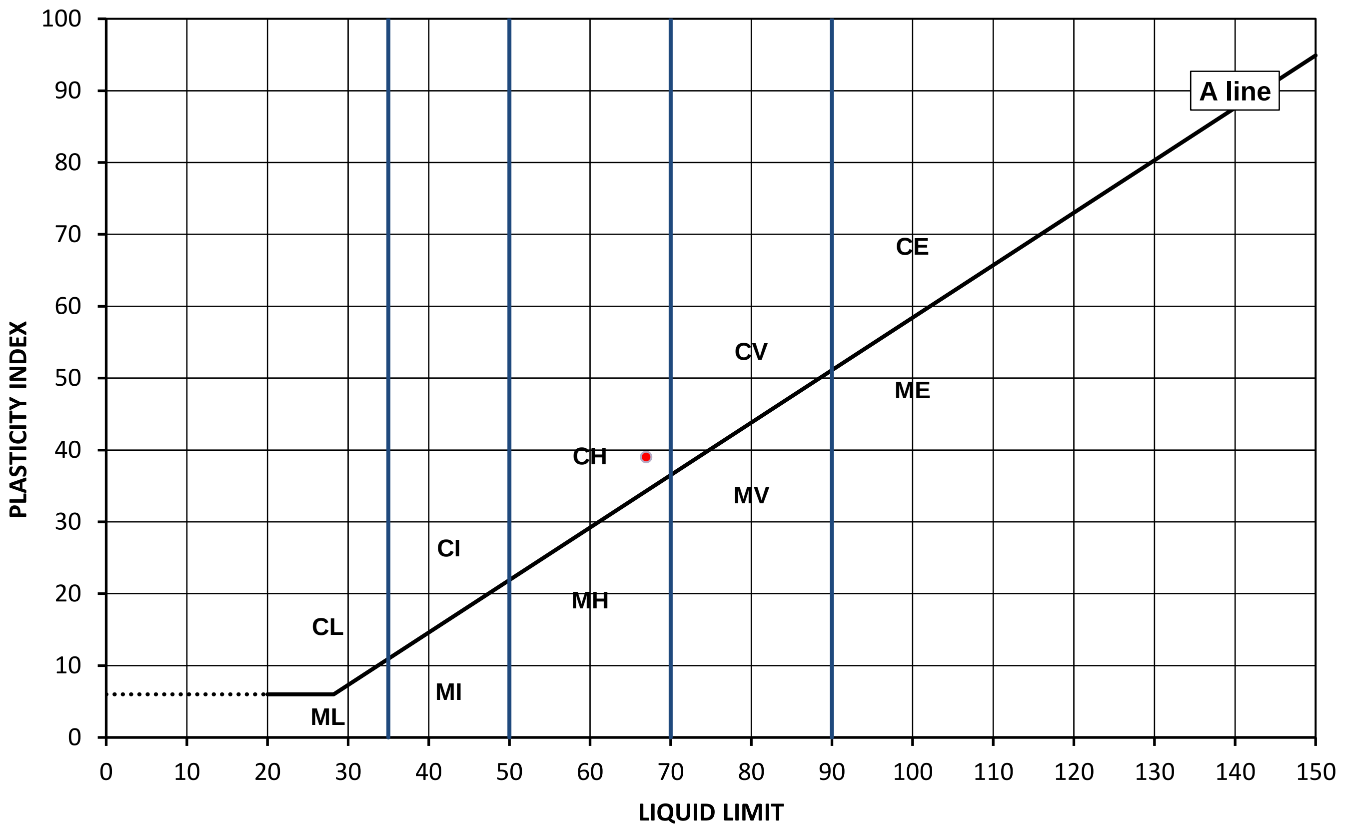
Test Results:

Laboratory Reference: 1433196
Hole No.: BH01
Sample Reference: Not Given
Soil Description: Brown CLAY

Depth Top [m]: 17.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	67	28	39	100



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. Any assessment of compliance with specifications based ttical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

UKAS TESTING 4041

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

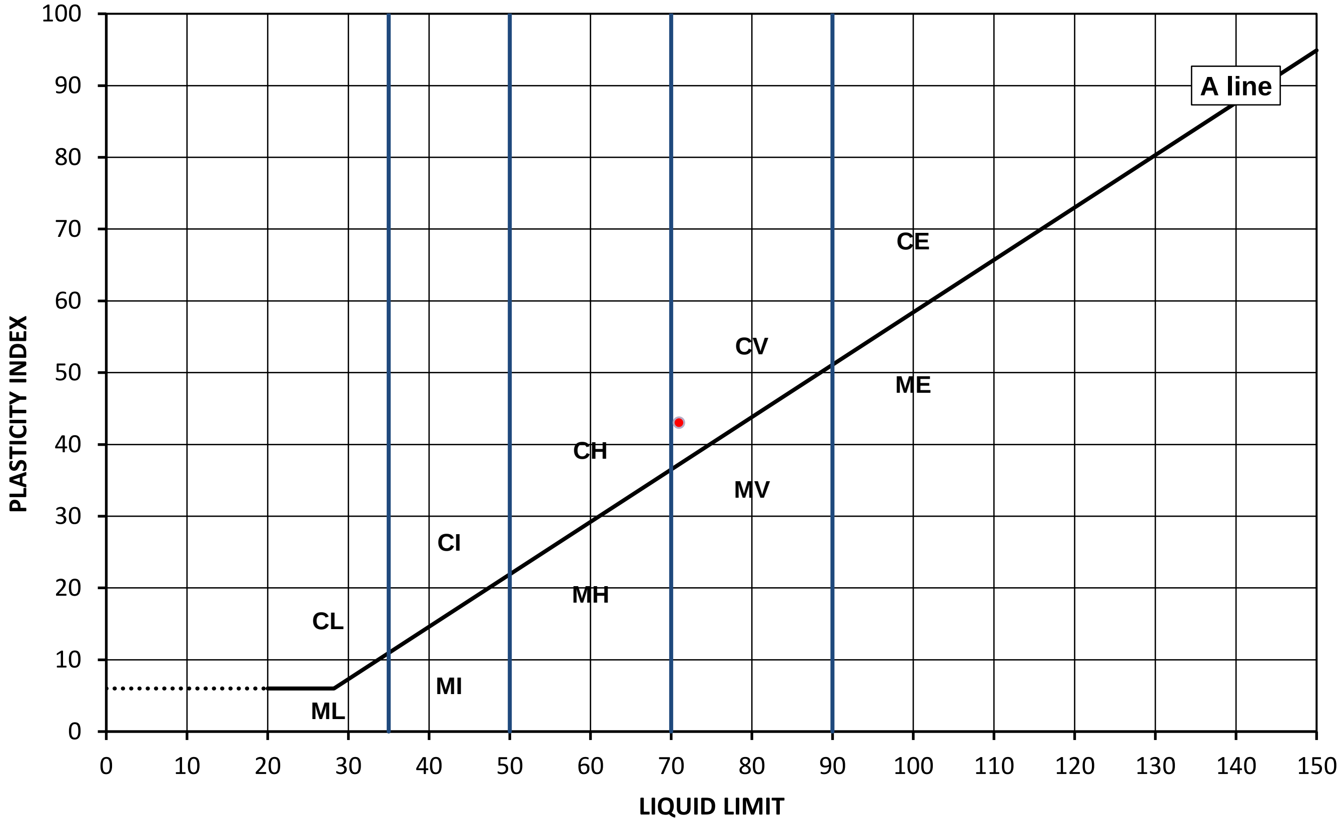
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433198	Depth Top [m]:	33.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Dark brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	71	28	43	100



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

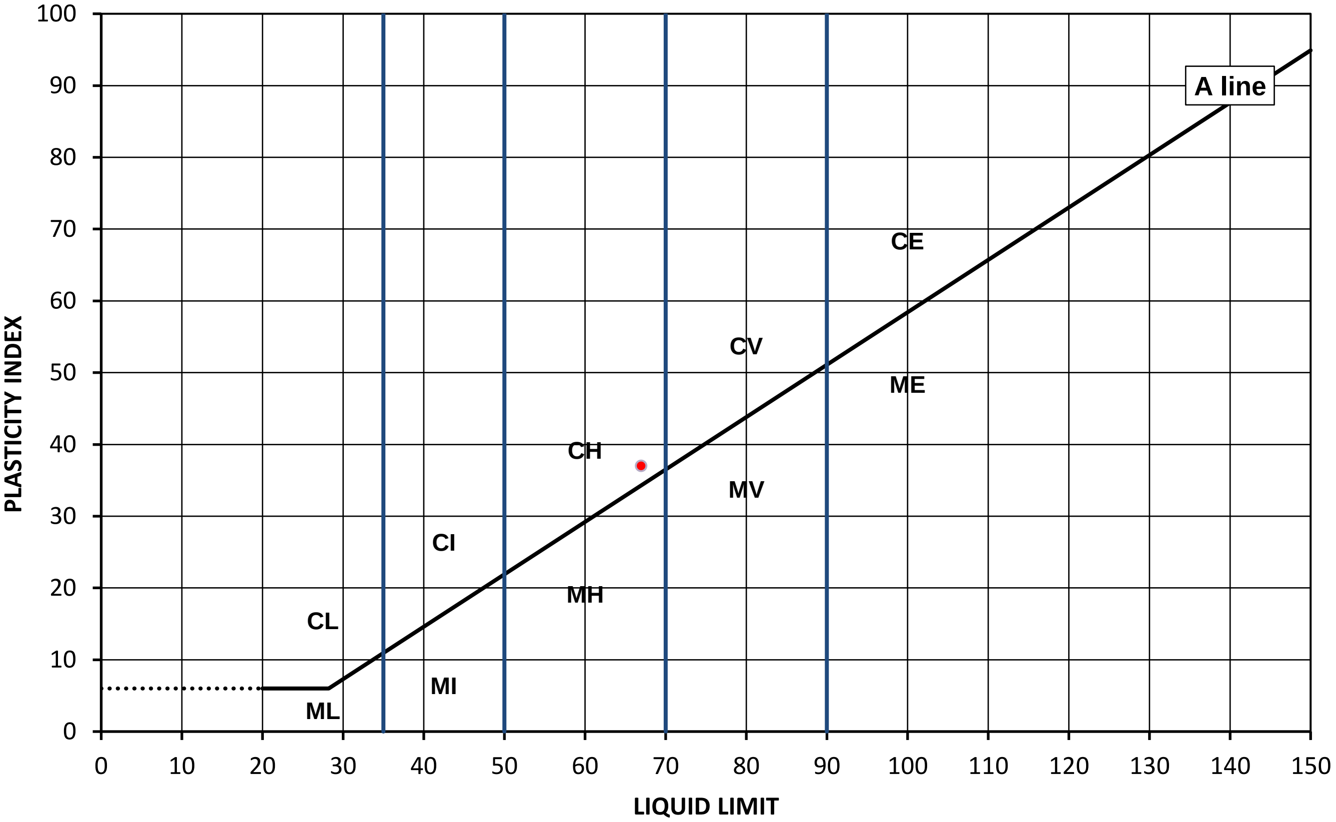
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433199	Depth Top [m]:	9.00
Hole No.:	BH02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Soil Description:	Brown sandy very gravelly CLAY		

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
22	67	30	37	62



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

TEST CERTIFICATE

Liquid and Plastic Limits

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

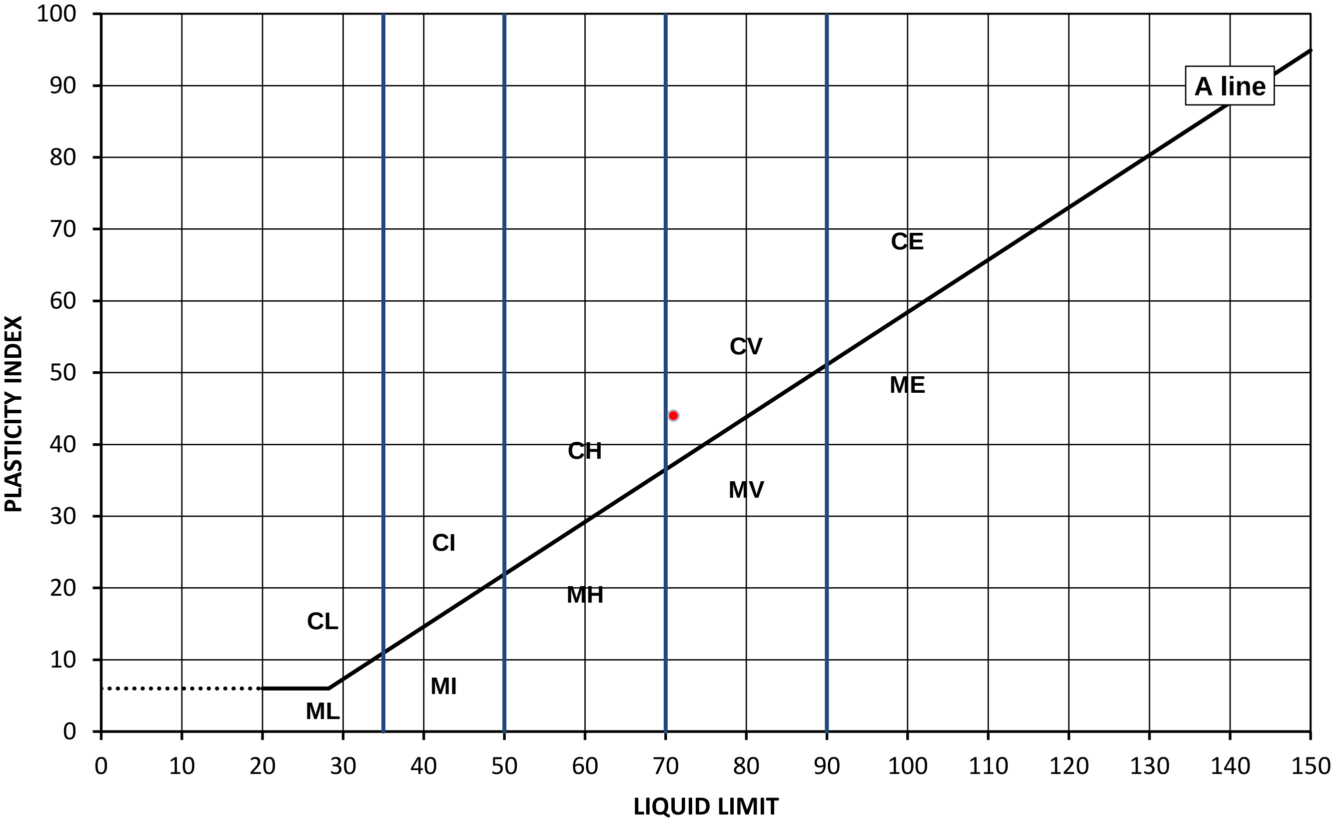
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433202	Depth Top [m]:	7.00
Hole No.:	BH03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Soil Description:	Dark brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
28	71	27	44	100



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

TEST CERTIFICATE

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Liquid and Plastic Limits

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

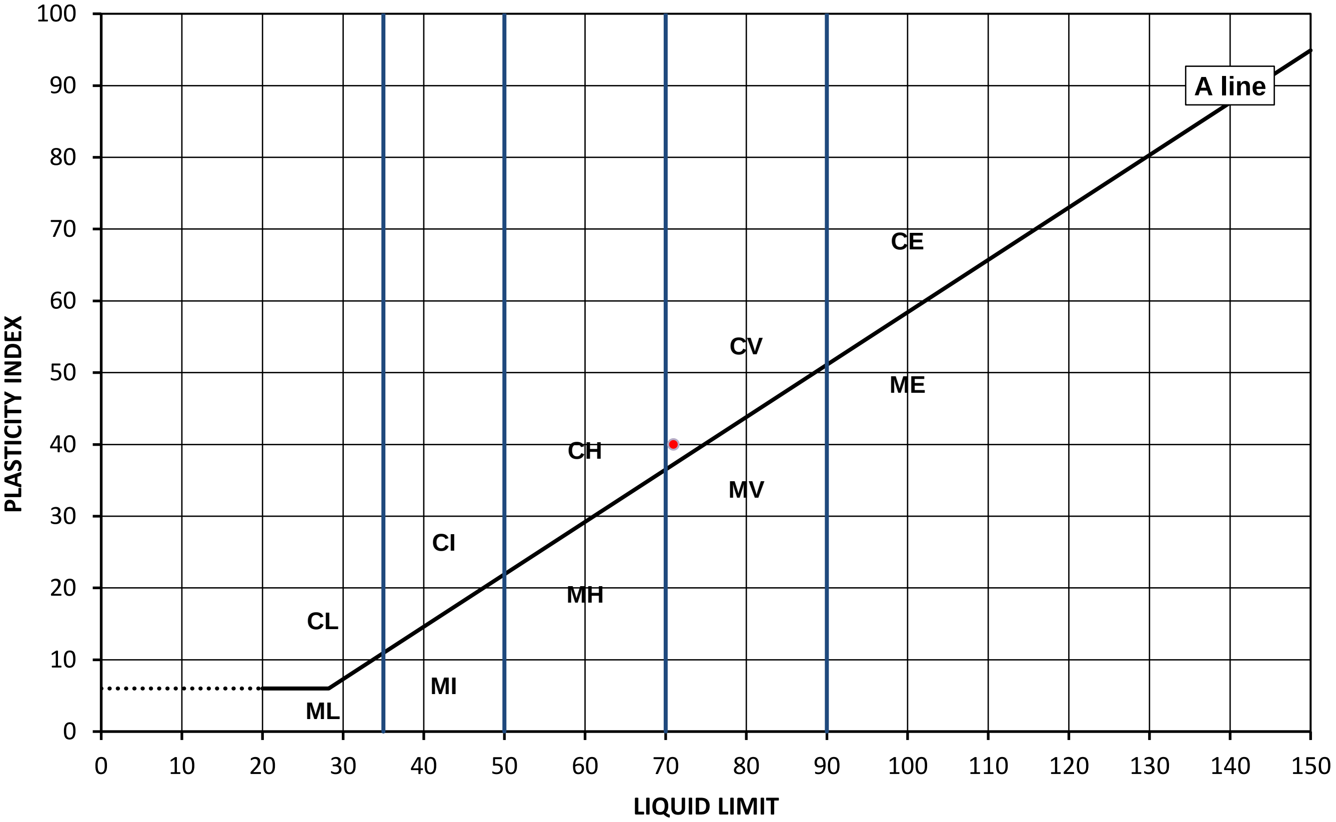
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433206	Depth Top [m]:	27.50
Hole No.:	BH04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Soil Description:	Dark brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	71	31	40	100



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

		Plasticity		Liquid Limit	
C	Clay	L	Low	below 35	
M	Silt	I	Medium	35 to 50	
		H	High	50 to 70	
		V	Very high	70 to 90	
		E	Extremely high	exceeding 90	

Organic O append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. Any assessment of compliance with specifications based ttical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."

Signed: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

 Date Reported: 19/02/2020 **GF 232.6**

TEST CERTIFICATE

4041

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: IGE Consulting
Client Address: 14-32 Hewitt Street, Manchester, M15 4GB
Contact: Angharad Jones
Site Address: Hayes

Client Reference: 3249
Job Number: 20-85080
Date Sampled: 29/01/2020
Date Received: 29/01/2020
Date Tested: 13/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

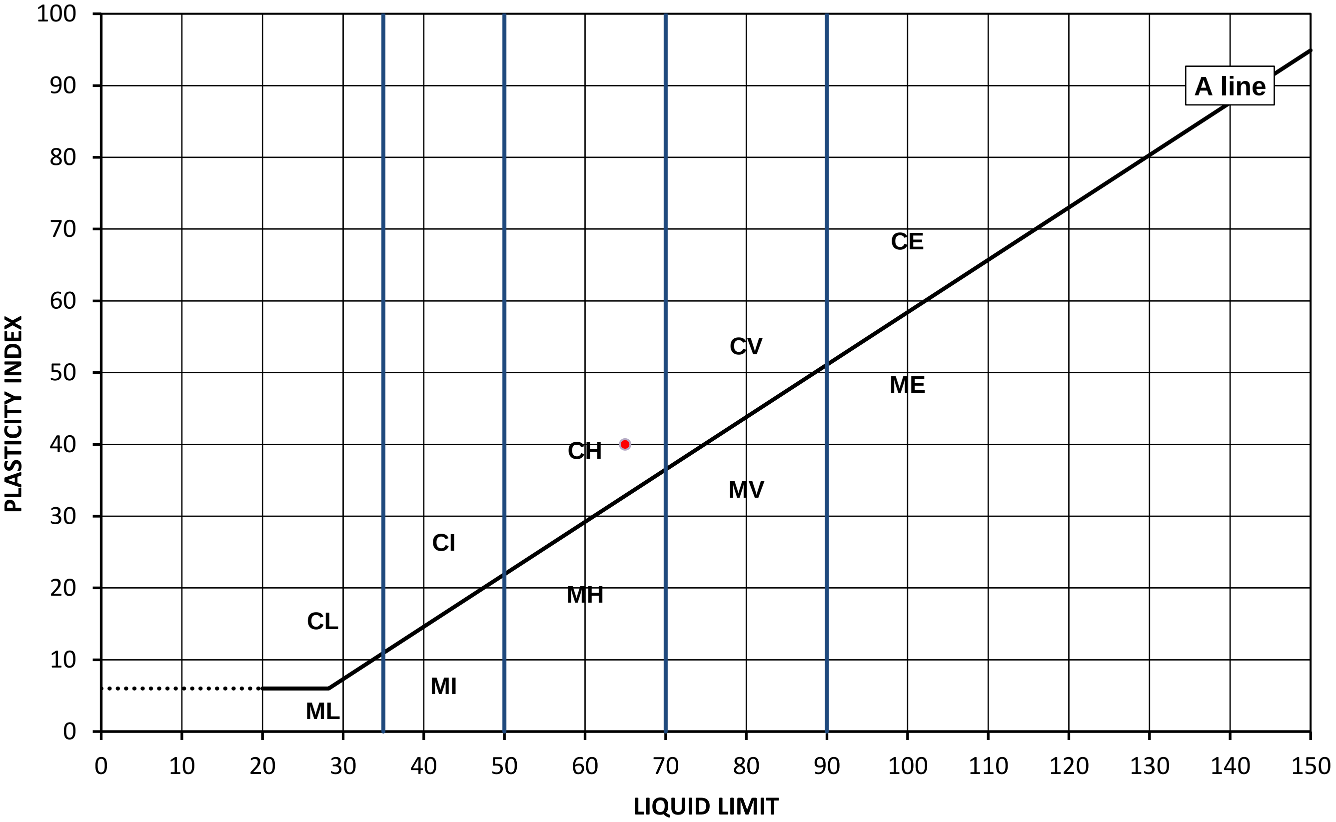
Test Results:

Laboratory Reference: 1433207
Hole No.: BH04
Sample Reference: Not Given
Soil Description: Dark brown CLAY

Depth Top [m]: 17.50
Depth Base [m]: Not Given
Sample Type: U

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	65	25	40	100



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

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

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

TEST CERTIFICATE

Liquid and Plastic Limits

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

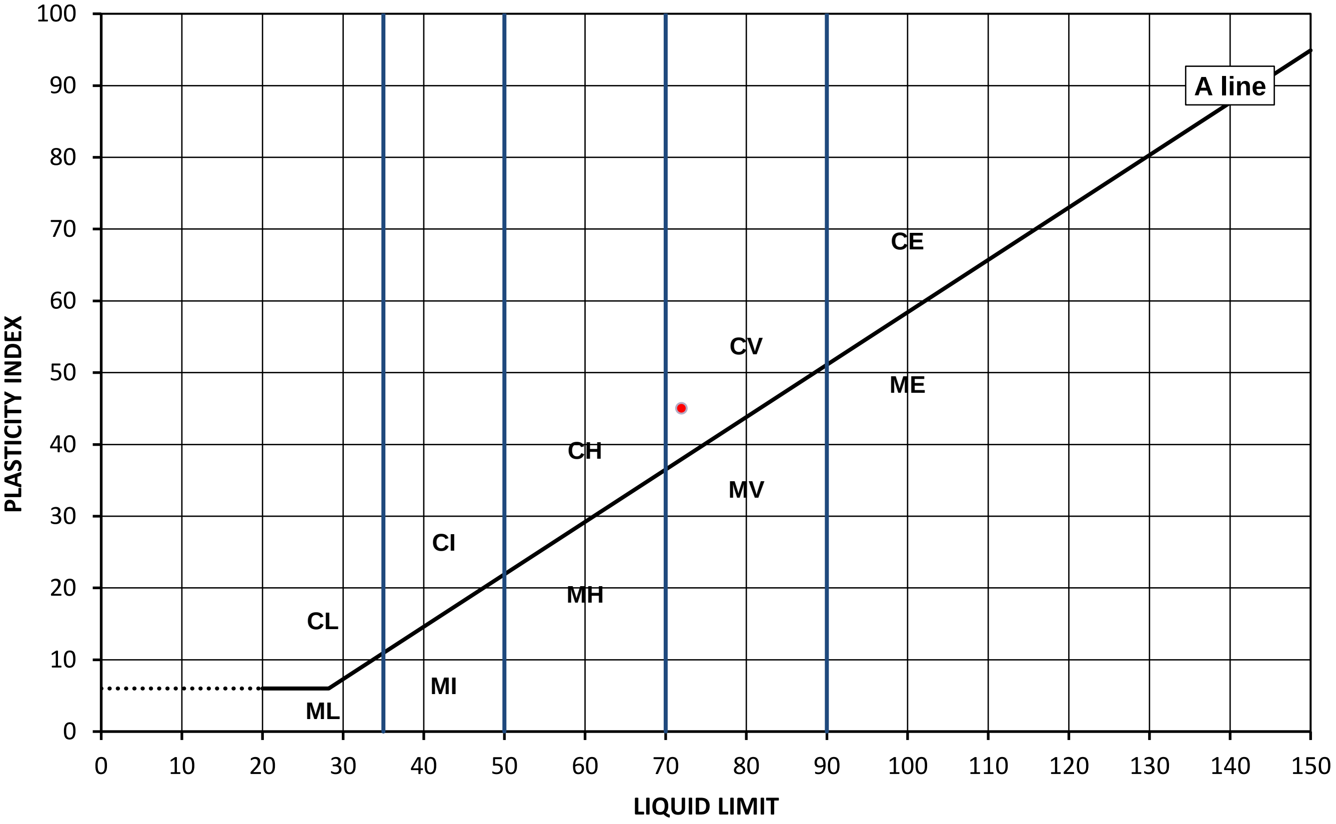
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433209	Depth Top [m]:	12.00
Hole No.:	BH05	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Soil Description:	Dark brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
29	72	27	45	100



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

				Plasticity	Liquid Limit
C	Clay	L	Low		below 35
M	Silt	I	Medium		35 to 50
		H	High		50 to 70
		V	Very high		70 to 90
		E	Extremely high		exceeding 90

Organic O append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 232.6

SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

4041

Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990: Clause 8.2

Client: IGE Consulting

Client Address: 14-32 Hewitt Street, Manchester, M15 4GB

Contact: Angharad Jones

Site Address: Hayes

Client Reference: 3249
Job Number: 20-85080
Date Sampled: 29/01/2020
Date Received: 29/01/2020
Date Tested: 13/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample Reference	Sample Depth Top (m)	Sample Depth Base (m)	Sample Type	Description	Remarks	MC (%)	WC (%)	Atterberg % Passing 425um (%)	Atterberg LL (%)	Atterberg PL (%)	Atterberg PI (%)	Density bulk (Mg/m3)	Density dry (Mg/m3)	Density PD (Mg/m3)	Total Porosity# (%)		
1433195	BH01	Not Given	7.50	Not Given	U	Dark brown CLAY	Atterberg 1 Point	30		100	74	31	43						
1433196	BH01	Not Given	17.00	Not Given	D	Brown CLAY	Atterberg 1 Point	26		100	67	28	39						
1433198	BH01	Not Given	33.50	Not Given	D	Dark brown CLAY	Atterberg 1 Point	27		100	71	28	43						
1433199	BH02	Not Given	9.00	Not Given	U	Brown sandy very gravelly CLAY	Atterberg 1 Point	22		62	67	30	37						
1433201	BH03	Not Given	1.30	1.50	B	Brown sandy very silty CLAY		33											
1433202	BH03	Not Given	7.00	Not Given	U	Dark brown CLAY	Atterberg 1 Point	28		100	71	27	44						
1433204	BH04	Not Given	1.00	1.50	B	Greyish brown gravelly sandy very clayey SILT		43											
1433207	BH04	Not Given	17.50	Not Given	U	Dark brown CLAY	Atterberg 1 Point	26		100	65	25	40						
1433206	BH04	Not Given	27.50	Not Given	U	Dark brown CLAY	Atterberg 1 Point	27		100	71	31	40						
1433209	BH05	Not Given	12.00	Not Given	U	Dark brown CLAY	Atterberg 1 Point	29		100	72	27	45						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

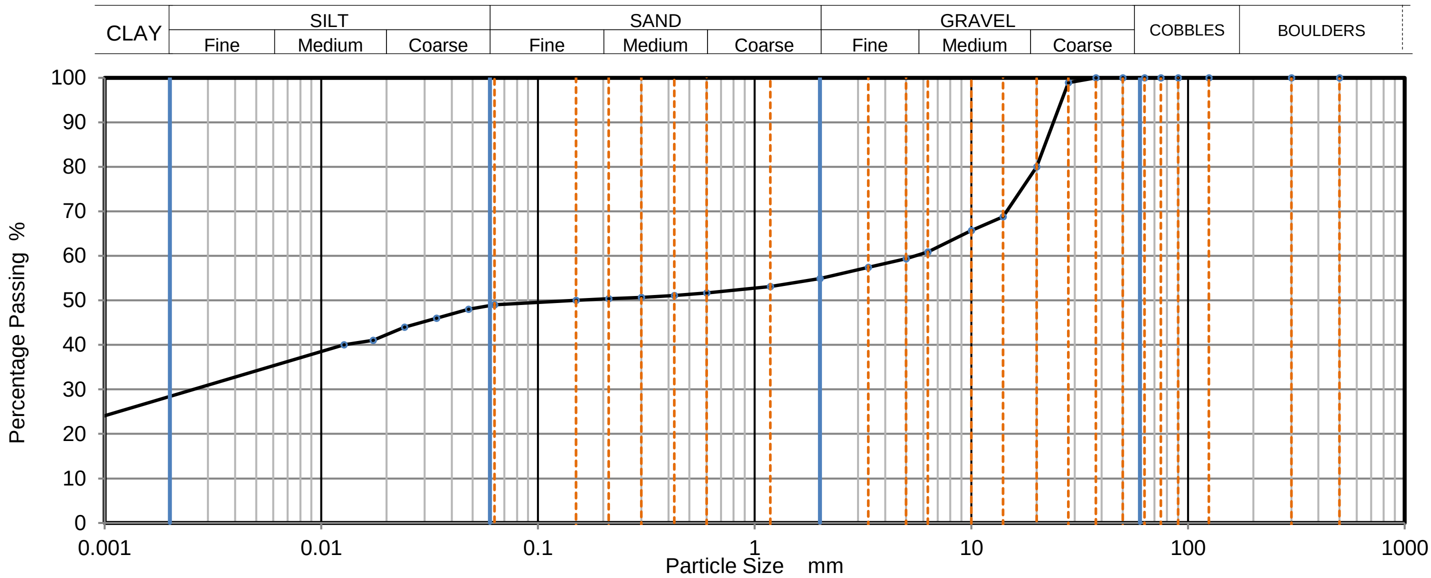
UKAS TESTING 4041

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433199	Depth Top [m]:	9.00
Hole No.:	BH02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown sandy very gravelly CLAY		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	49
300	100	0.0477	48
125	100	0.0340	46
90	100	0.0242	44
75	100	0.0173	41
63	100	0.0127	40
50	100	0.0008	23
37.5	100		
28	99		
20	80		
14	69		
10	66		
6.3	61		
5	59		
3.35	57		
2	55	Particle density	(assumed)
1.18	53	2.65	Mg/m3
0.6	52		
0.425	51		
0.3	51		
0.212	50		
0.15	50		
0.063	49		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	45.10
Sand	5.50
Silt	21.10
Clay	28.30

Grading Analysis		
D100	mm	37.5
D60	mm	5.48
D30	mm	0.00265
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 100.14

UKAS TESTING 4041

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client: IGE Consulting

Client Address: 14-32 Hewitt Street, Manchester, M15 4GB

Contact: Angharad Jones

Site Address: Hayes

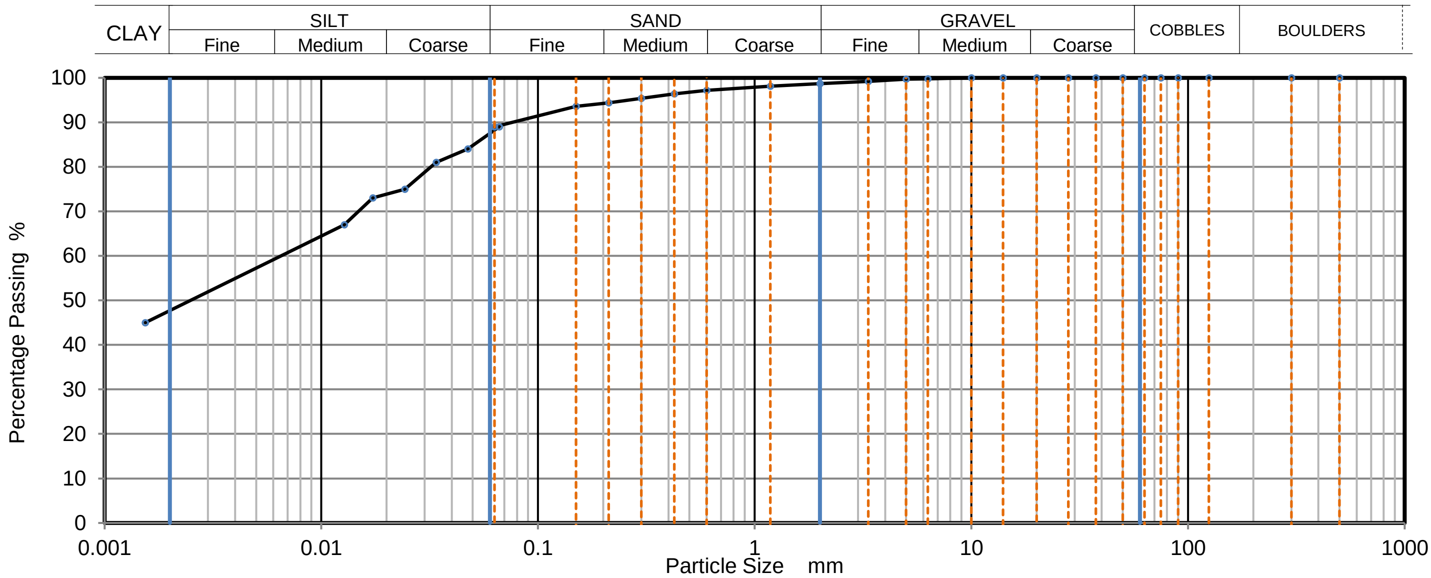
Client Reference: 3249
Job Number: 20-85080
Date Sampled: 29/01/2020
Date Received: 29/01/2020
Date Tested: 08/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1433201
Hole No.: BH03
Sample Reference: Not Given
Sample Description: Brown sandy very silty CLAY

Depth Top [m]: 1.30
Depth Base [m]: 1.50
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0662	89
300	100	0.0475	84
125	100	0.0338	81
90	100	0.0243	75
75	100	0.0173	73
63	100	0.0128	67
50	100	0.0015	45
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99	Particle density	(assumed)
1.18	98	2.65	Mg/m3
0.6	97		
0.425	96		
0.3	95		
0.212	94		
0.15	94		
0.063	89		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	1.30
Sand	9.30
Silt	41.90
Clay	47.50

Grading Analysis		
D100	mm	10
D60	mm	0.00655
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

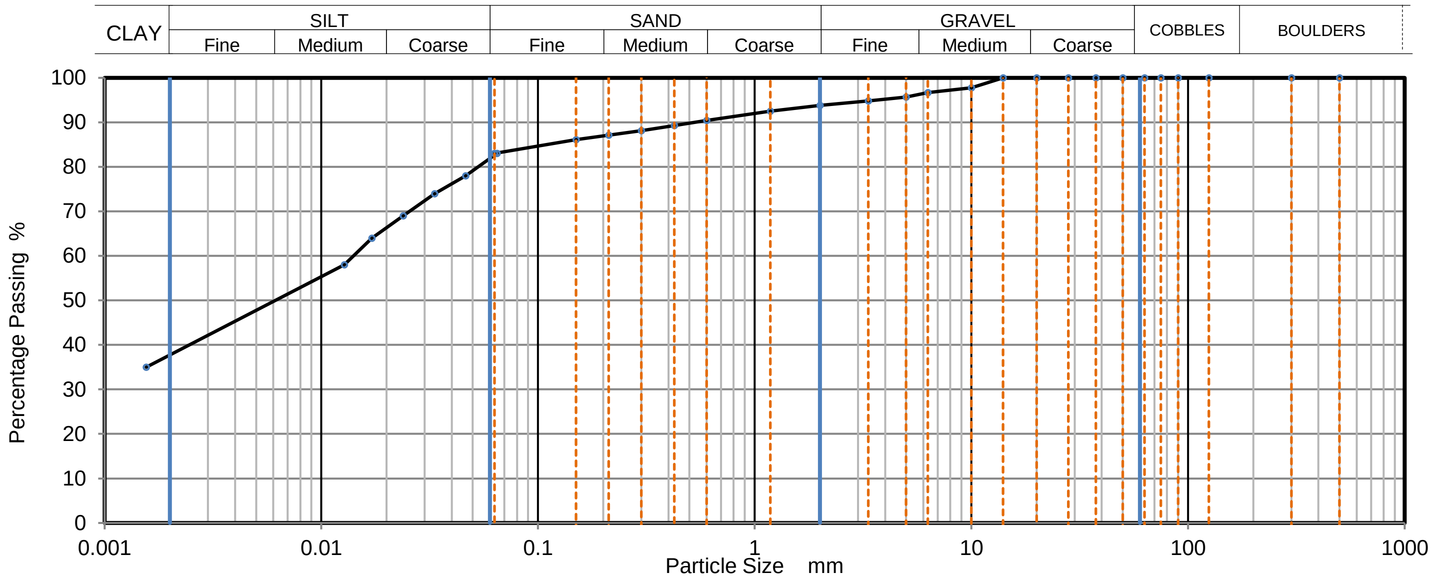
4041

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	08/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433204	Depth Top [m]:	1.00
Hole No.:	BH04	Depth Base [m]:	1.50
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Greyish brown gravelly sandy very clayey SILT		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0646	83
300	100	0.0464	78
125	100	0.0333	74
90	100	0.0239	69
75	100	0.0171	64
63	100	0.0128	58
50	100	0.0016	35
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	97		
5	96		
3.35	95		
2	94	Particle density	(assumed)
1.18	93	2.65	Mg/m3
0.6	90		
0.425	89		
0.3	88		
0.212	87		
0.15	86		
0.063	83		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	6.20
Sand	10.90
Silt	45.60
Clay	37.30

Grading Analysis		
D100	mm	14
D60	mm	0.0141
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 100.14

SUMMARY REPORT

Summary of Moisture Condition Value Test Results

Tested in Accordance with: BS 1377-4: 1990: Clause 5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: IGE Consulting

Client Address: 14-32 Hewitt Street, Manchester, M15 4GB

Contact: Angharad Jones

Site Address: Hayes

Client Reference: 3249
Job Number: 20-85080
Date Sampled: 29/01/2020
Date Received: 29/01/2020
Date Tested: 18/02/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample Reference	Sample Depth Top (m)	Sample Depth Base (m)	Sample Type	Description	Remarks	Retained on 20mm sieve (%)	Moisture Content <20mm (%)	Moisture Condition Value	Method of Interpretation							
1433201	BH03	Not Given	1.30	1.50	B	Brown sandy very silty CLAY		0	33	10.1	Steepest straight line							
1433204	BH04	Not Given	1.00	1.50	B	Greyish brown gravelly sandy very clayey SILT		0	32	8.5	Steepest straight line							

Comments:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 107.11

TEST CERTIFICATE

One Dimensional Consolidation Test

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

4041

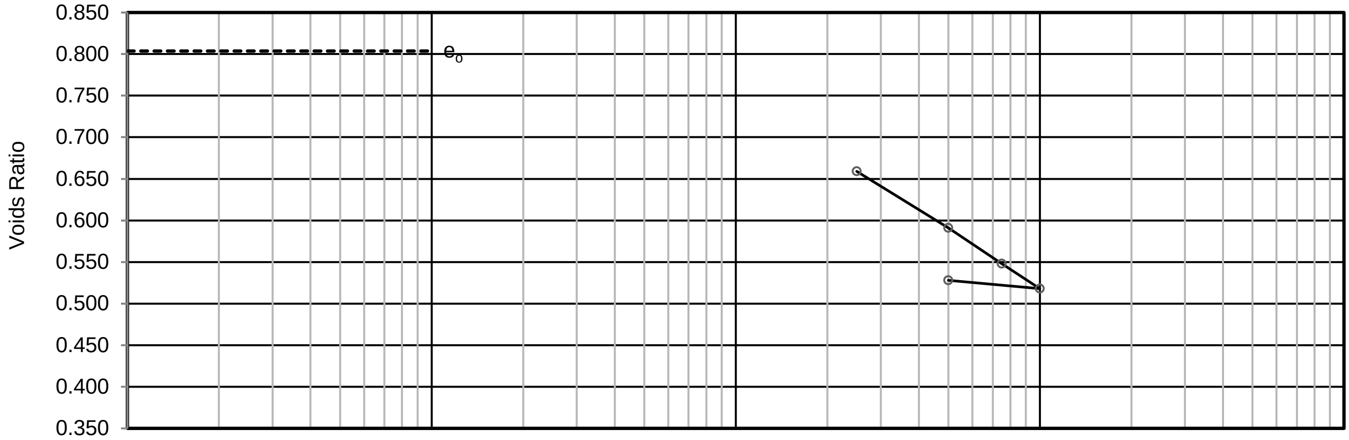
Tested in Accordance with: BS 1377-5: 1990: Clause 3

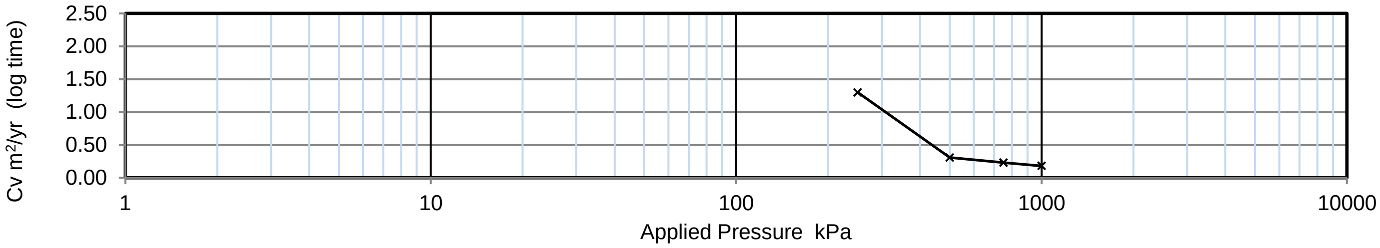
Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433197	Depth Top [m]:	29.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly gravelly CLAY		





Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root m2/yr	Csec
0	0.804	-	-	-	-
250	0.659	0.32	1.3	8.5	0.0019
500	0.591	0.17	0.31	0.7	0.0025
750	0.548	0.11	0.23	0.28	0.0025
1 000	0.518	0.079	0.18	0.24	0.0019
500	0.528	0.013			

Preparation

Index tests			
Orientation of the sample	Vertical		
Particle density	assumed	2.65	Mg/m3
Liquid limit	N/A		%
Plastic limit	N/A		%

Specimen details	Initial	Final	
Diameter	50.00	-	mm
Height	20.00	16.95	mm
Moisture Content	30	25	%
Bulk density	1.91	2.16	Mg/m3
Dry density	1.47	1.73	Mg/m3
Voids Ratio	0.804	0.528	
Saturation	100	124	%
Avg. temperature for test	22.0		°C
Swelling Pressure	Not measured		kPa
Settlement on saturation			%

Note: Cv corrected to 20°C

Remarks: Specimen contains occasional GRAVEL particle

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020 **GF 172.12**

TEST CERTIFICATE

UKAS TESTING 4041

One Dimensional Consolidation Test

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

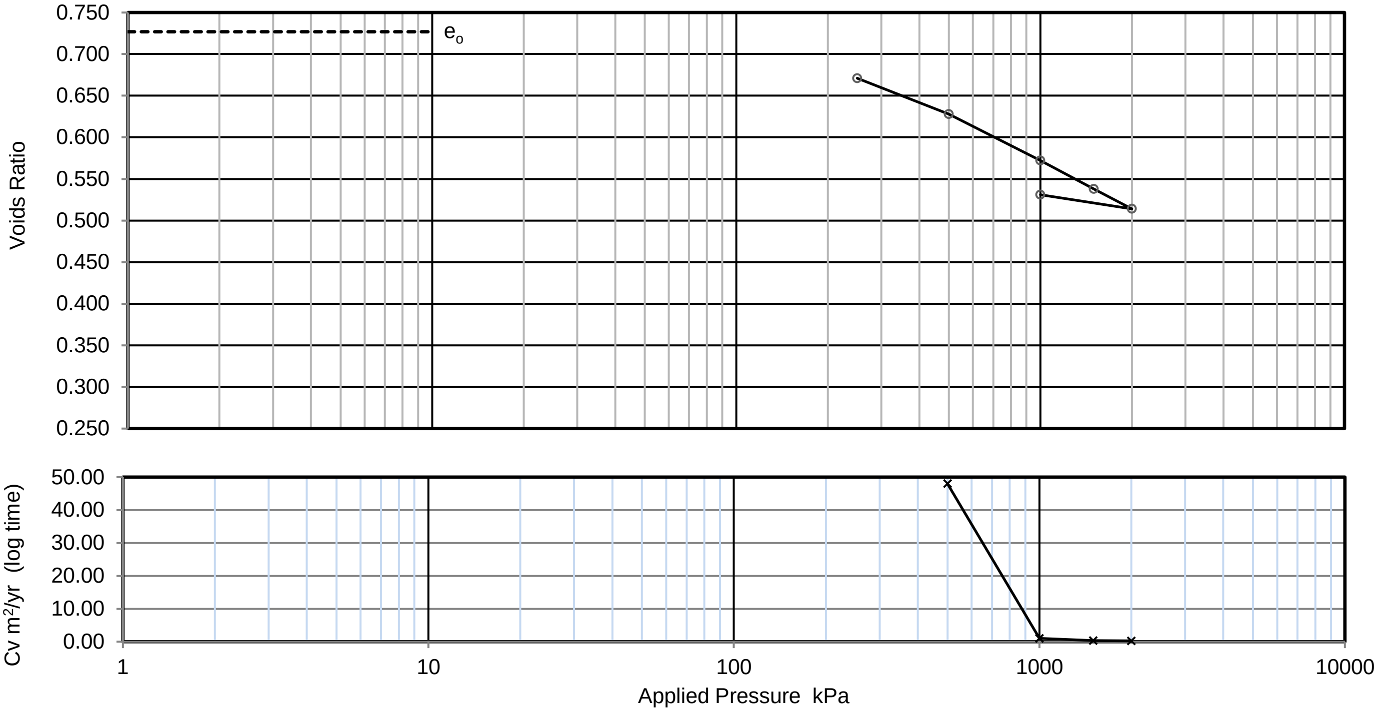
Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1433205	Depth Top [m]:	22.50
Hole No.:	BH04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Greyish brown CLAY		



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root m2/yr	Csec
0	0.727	-	-	-	-
250	0.671	0.13	N/A	N/A	N/A
500	0.628	0.1	48	38	0.0013
1 000	0.572	0.07	1	2.2	0.0013
1 500	0.538	0.042	0.34	0.98	0.0019
2 000	0.514	0.032	0.27	0.43	0.0019
1 000	0.531	0.011			

Preparation

Index tests

Orientation of the sample	Vertical		
Particle density	assumed	2.65	Mg/m3
Liquid limit	N/A		%
Plastic limit	N/A		%

Specimen details	Initial	Final	
Diameter	50.00	-	mm
Height	20.05	17.77	mm
Moisture Content	26	26	%
Bulk density	1.94	2.18	Mg/m3
Dry density	1.53	1.73	Mg/m3
Voids Ratio	0.727	0.531	
Saturation	96	128	%
Avg. temperature for test	22.0		°C
Swelling Pressure	Not measured		kPa
Settlement on saturation			%

Note: Cv corrected to 20°C

Remarks: Stage 1 - swelling

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 172.12

TEST CERTIFICATE
Unconsolidated Undrained Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

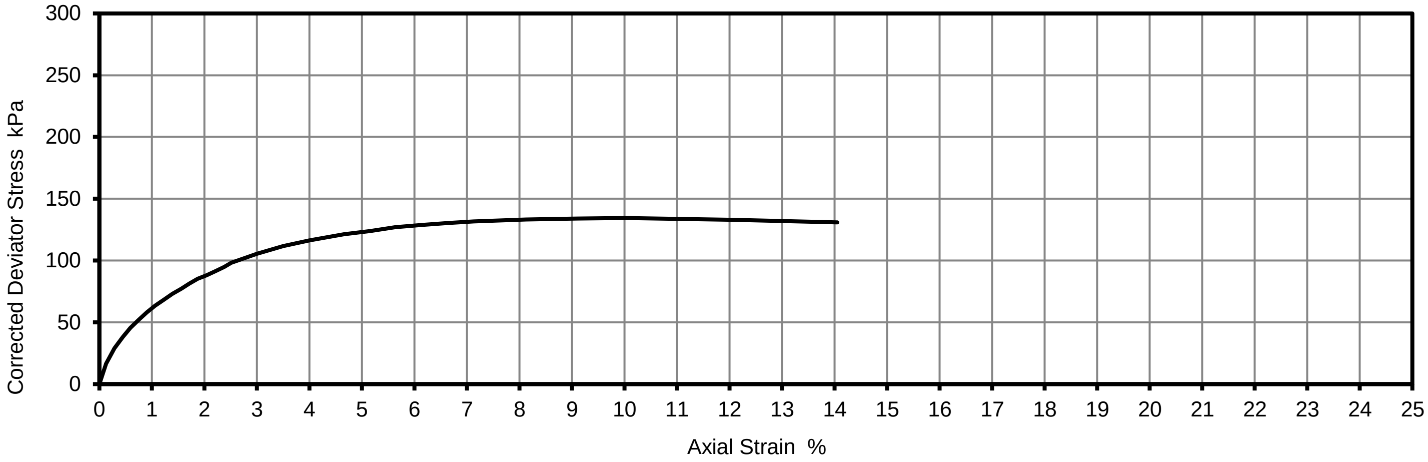
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

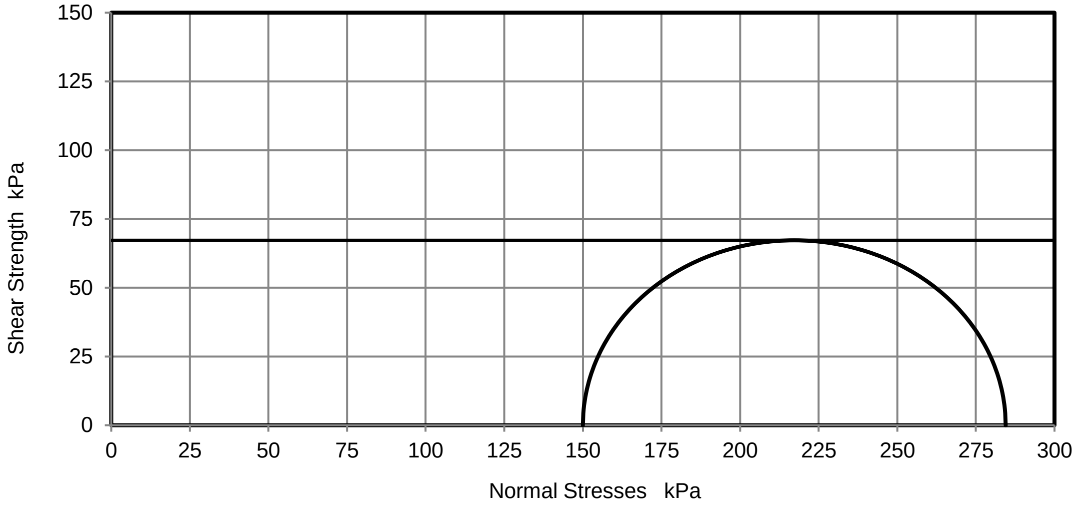
Laboratory Reference:	1433195	Depth Top [m]:	7.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	198.21	mm	Cell Pressure	150	kPa	
Diameter	102.87	mm	Axial Strain at failure	10.1	%	
Bulk Density	1.98	Mg/m3	Deviator Stress, (σ1 - σ3)f	134	kPa	
Moisture Content	30	%	Undrained Shear Strength, cu	67	kPa	½(σ1 - σ3)f
Dry Density	1.53	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.50	kPa	Membrane thickness	0.23	mm	

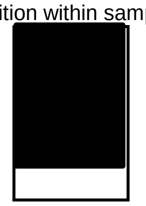
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed:

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE
Unconsolidated Undrained Triaxial Compression
Tested in Accordance with:
BS 1377-7: 1990: Clause 8

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

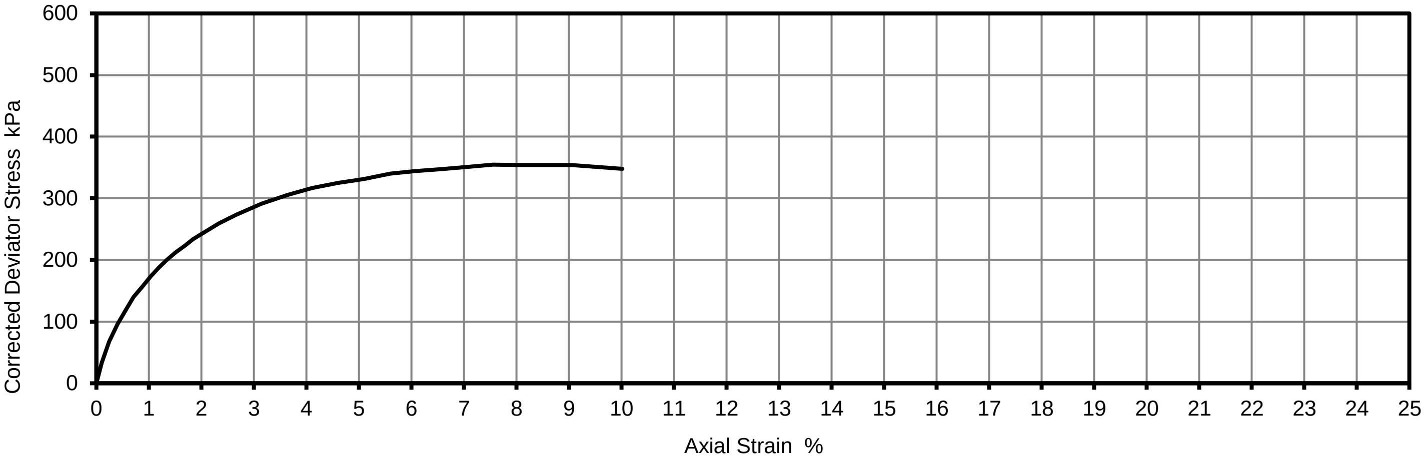
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

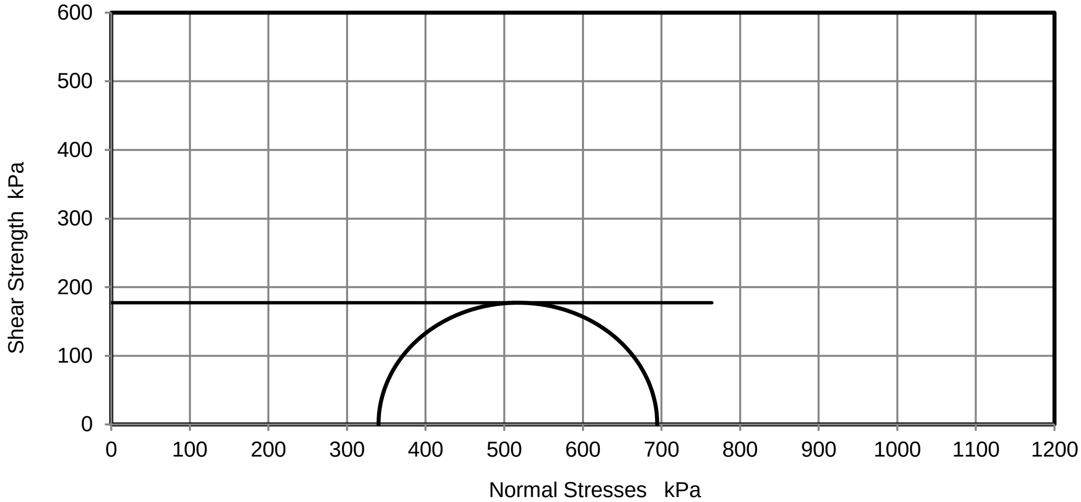
Laboratory Reference:	1433196	Depth Top [m]:	17.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	197.49	mm	Cell Pressure	340	kPa
Diameter	102.32	mm	Axial Strain at failure	7.6	%
Bulk Density	2.00	Mg/m3	Deviator Stress, (σ1 - σ3)f	355	kPa
Moisture Content	26	%	Undrained Shear Strength, cu	177	kPa ½(σ1 - σ3)f
Dry Density	1.59	Mg/m3	Mode of Failure	Compound	
Membrane Correction	0.39	kPa	Membrane thickness	0.22	mm

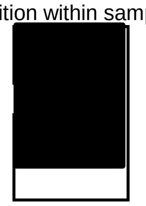
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

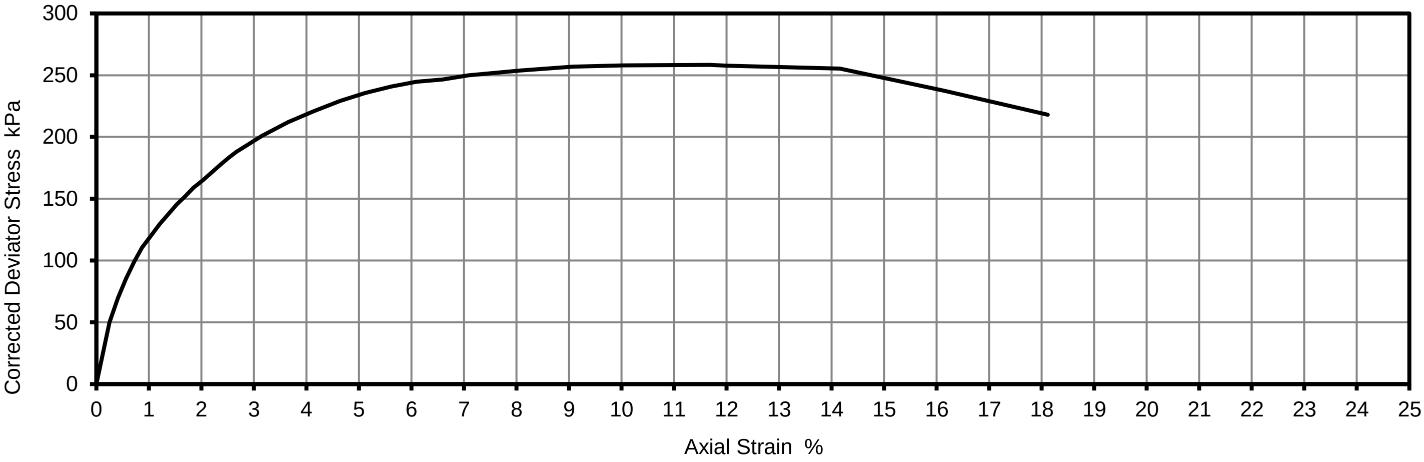
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

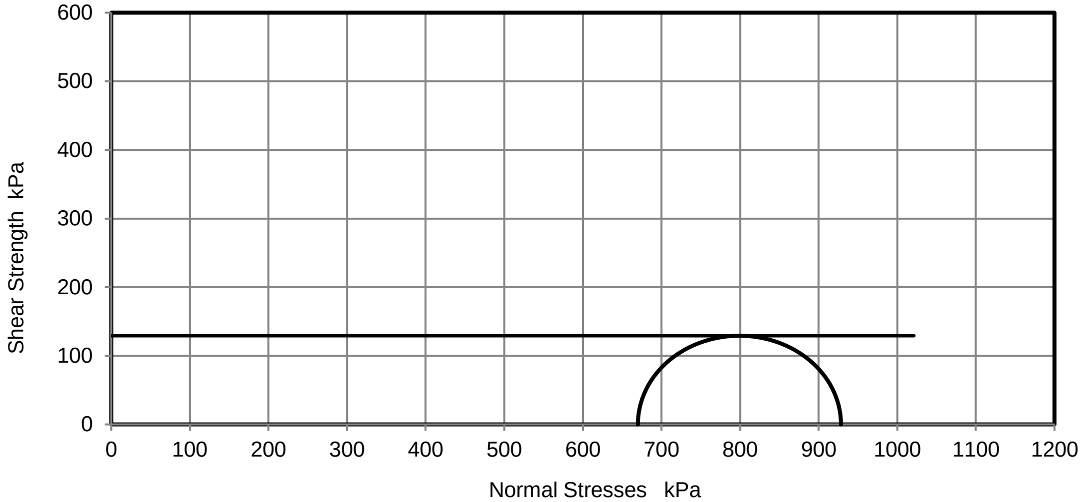
Laboratory Reference:	1433198	Depth Top [m]:	33.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	197.13	mm	Cell Pressure	670	kPa
Diameter	106.93	mm	Axial Strain at failure	11.7	%
Bulk Density	2.02	Mg/m3	Deviator Stress, (σ1 - σ3)f	258	kPa
Moisture Content	27	%	Undrained Shear Strength, cu	129	kPa ½(σ1 - σ3)f
Dry Density	1.59	Mg/m3	Mode of Failure	Compound	
Membrane Correction	0.51	kPa	Membrane thickness	0.22	mm

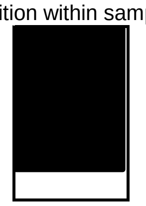
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

TEST CERTIFICATE
Unconsolidated Undrained
Triaxial Compression
Tested in Accordance with:
BS 1377-7: 1990: Clause 8

4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

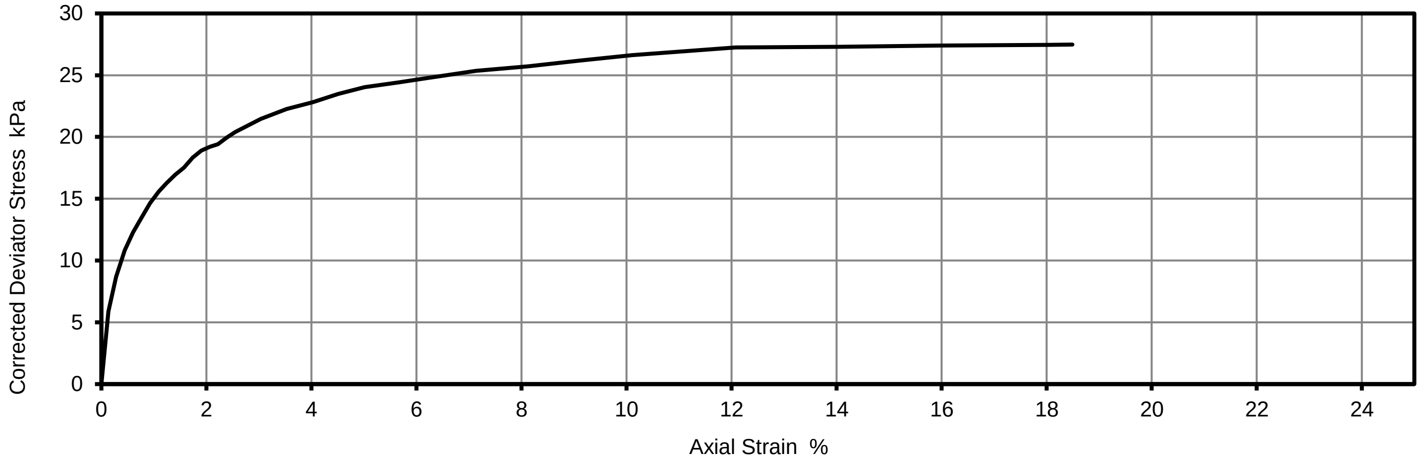
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

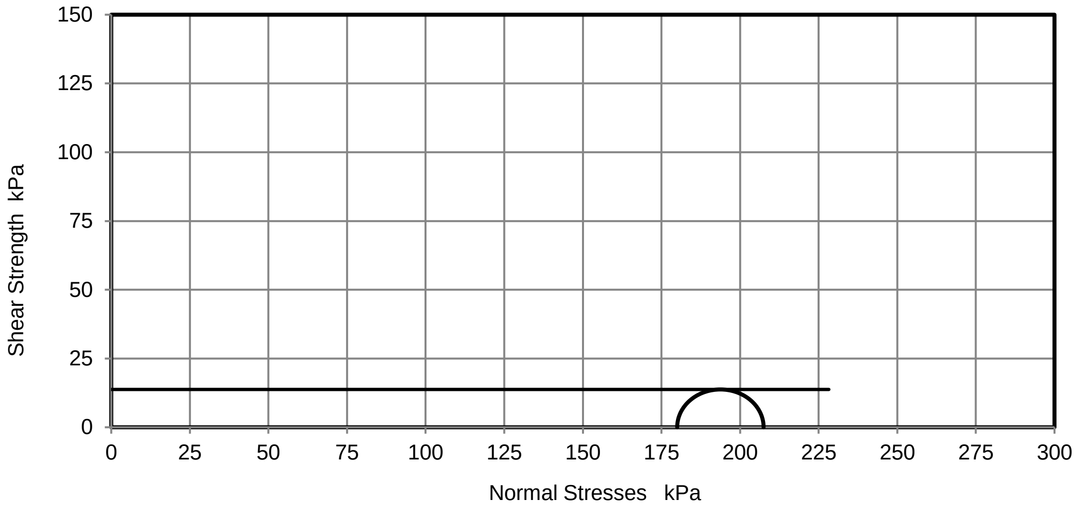
Laboratory Reference:	1433199	Depth Top [m]:	9.00
Hole No.:	BH02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown sandy very gravelly CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	191.09	mm	Cell Pressure	180	kPa	
Diameter	101.89	mm	Axial Strain at failure	18.5	%	
Bulk Density	1.96	Mg/m3	Deviator Stress, (σ1 - σ3)f	27	kPa	
Moisture Content	22	%	Undrained Shear Strength, cu	14	kPa	½(σ1 - σ3)f
Dry Density	1.60	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.81	kPa	Membrane thickness	0.23	mm	

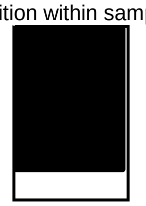
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

UKAS TESTING
4041

TEST CERTIFICATE

Unconsolidated Undrained Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

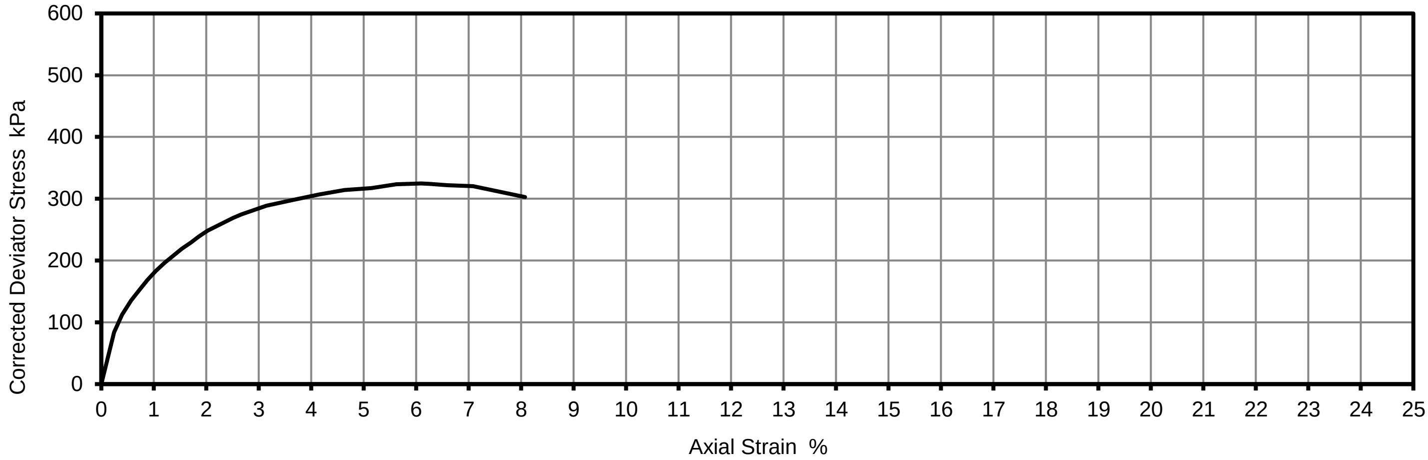
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

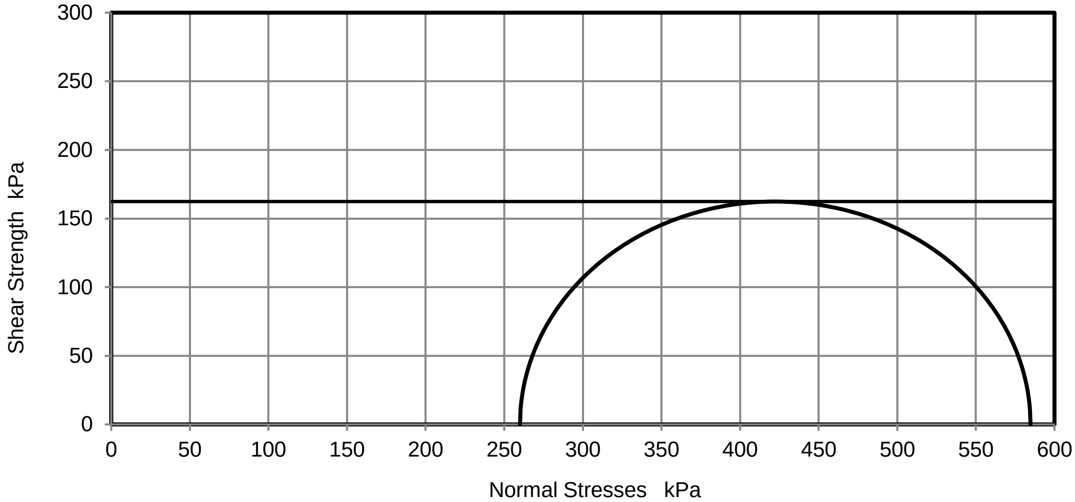
Laboratory Reference:	1433200	Depth Top [m]:	13.00
Hole No.:	BH02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	197.91	mm	Cell Pressure	260	kPa
Diameter	103.24	mm	Axial Strain at failure	6.1	%
Bulk Density	1.97	Mg/m3	Deviator Stress, (σ1 - σ3)f	325	kPa
Moisture Content	26	%	Undrained Shear Strength, cu	162	kPa ½(σ1 - σ3)f
Dry Density	1.56	Mg/m3	Mode of Failure	Brittle	
Membrane Correction	0.34	kPa	Membrane thickness	0.22	mm

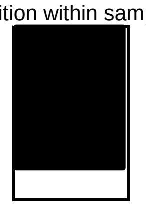
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed:

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE
Unconsolidated Undrained Triaxial Compression
Tested in Accordance with:
BS 1377-7: 1990: Clause 8

4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

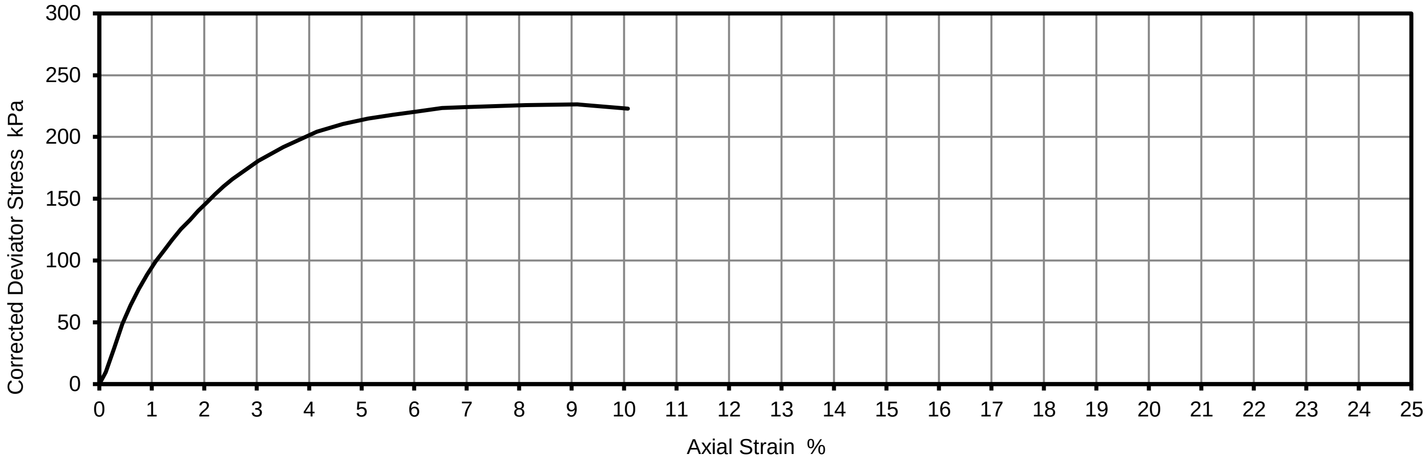
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

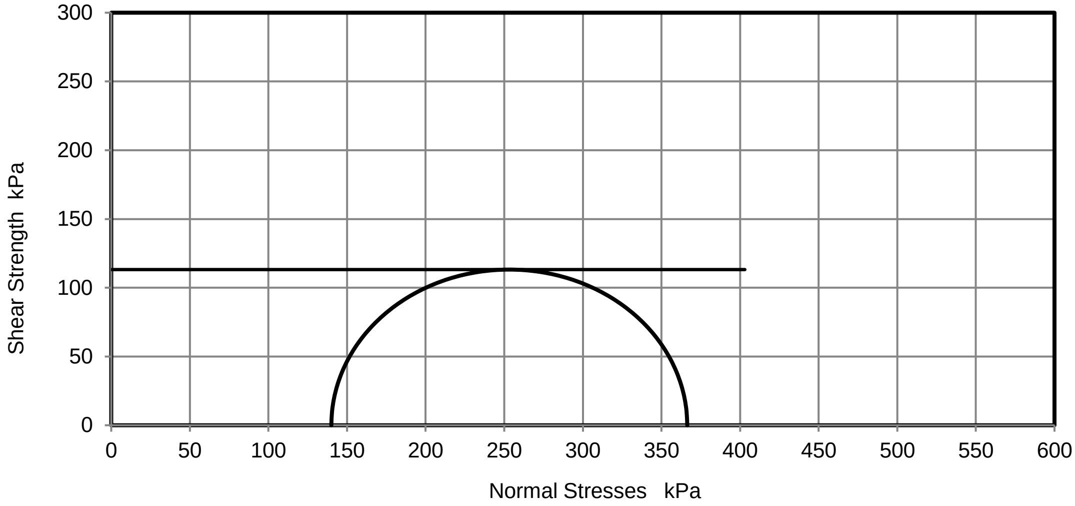
Laboratory Reference:	1433202	Depth Top [m]:	7.00
Hole No.:	BH03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	1.98	%/min
Length	201.84	mm	Cell Pressure	140	kPa
Diameter	102.29	mm	Axial Strain at failure	9.1	%
Bulk Density	2.01	Mg/m3	Deviator Stress, (σ1 - σ3)f	226	kPa
Moisture Content	28	%	Undrained Shear Strength, cu	113	kPa ½(σ1 - σ3)f
Dry Density	1.57	Mg/m3	Mode of Failure	Compound	
Membrane Correction	0.45	kPa	Membrane thickness	0.22	mm

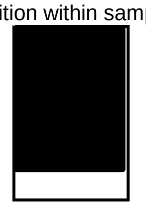
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed:

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

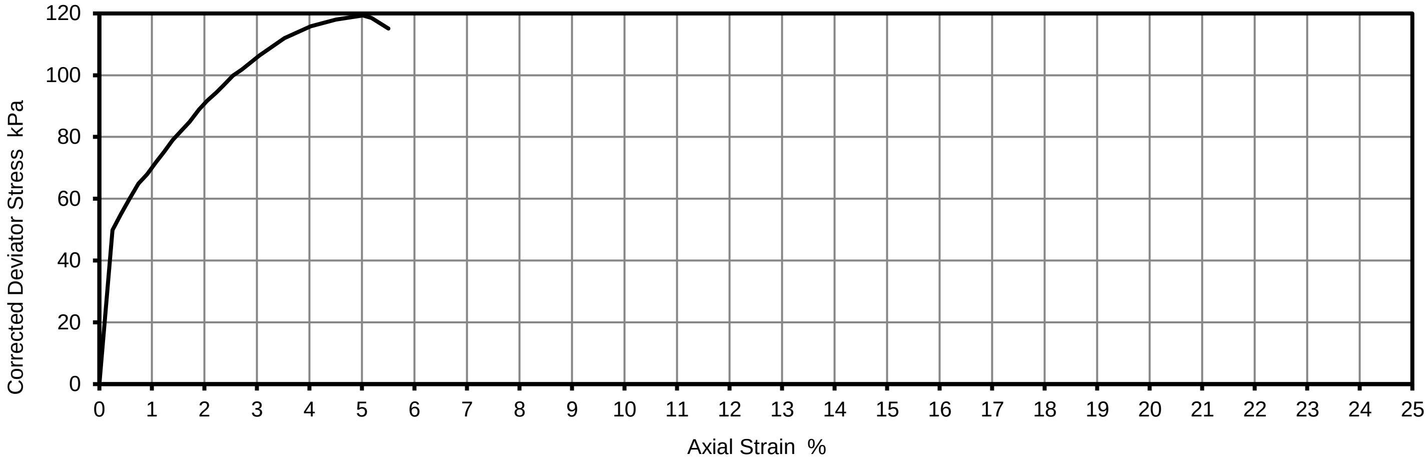
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

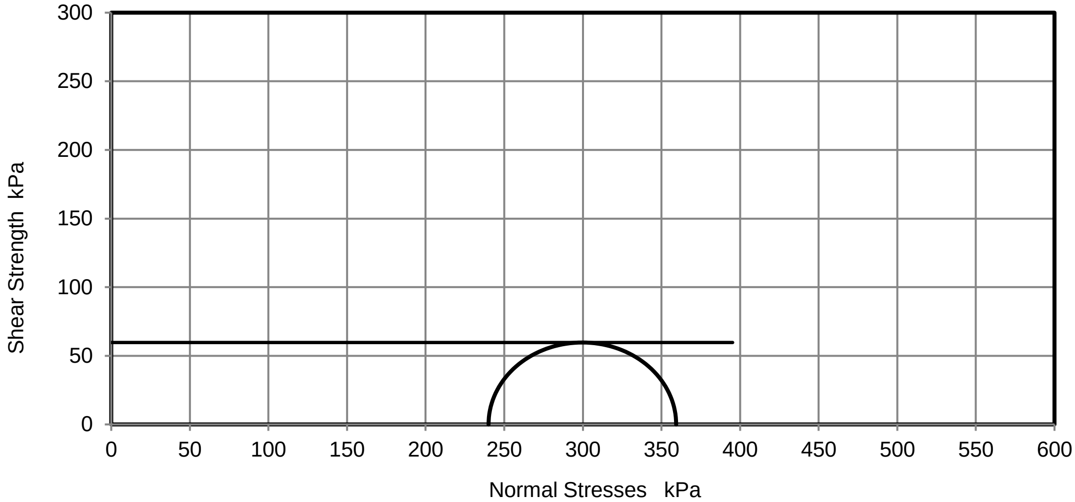
Laboratory Reference:	1433203	Depth Top [m]:	12.00
Hole No.:	BH03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	194.24	mm	Cell Pressure	240	kPa
Diameter	102.34	mm	Axial Strain at failure	5.0	%
Bulk Density	2.02	Mg/m3	Deviator Stress, (σ1 - σ3)f	119	kPa
Moisture Content	27	%	Undrained Shear Strength, cu	60	kPa ½(σ1 - σ3)f
Dry Density	1.59	Mg/m3	Mode of Failure	Brittle	
Membrane Correction	0.29	kPa	Membrane thickness	0.21	mm

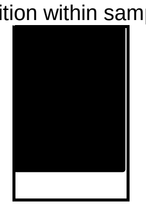
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. Any assessment of compliance with specifications based ttical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."

Signed: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

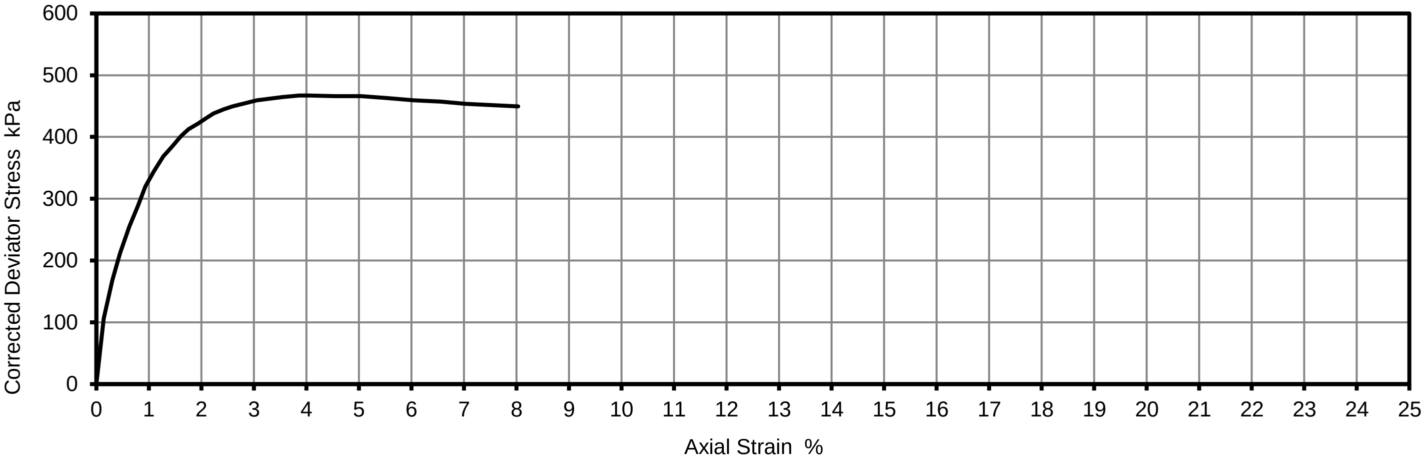
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

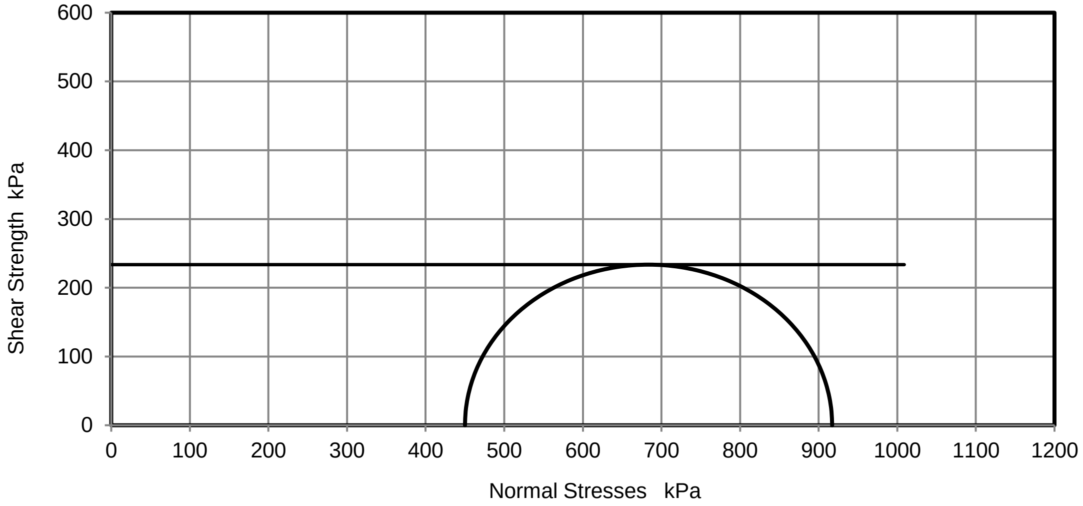
Laboratory Reference:	1433205	Depth Top [m]:	22.50
Hole No.:	BH04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Greyish brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	72.96	mm	Cell Pressure	450	kPa	
Diameter	37.94	mm	Axial Strain at failure	3.9	%	
Bulk Density	1.99	Mg/m3	Deviator Stress, (σ1 - σ3)f	467	kPa	
Moisture Content	24	%	Undrained Shear Strength, cu	234	kPa	½(σ1 - σ3)f
Dry Density	1.61	Mg/m3	Mode of Failure	Brittle		
Membrane Correction	0.61	kPa	Membrane thickness	0.22	mm	

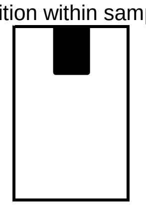
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE
Unconsolidated Undrained Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

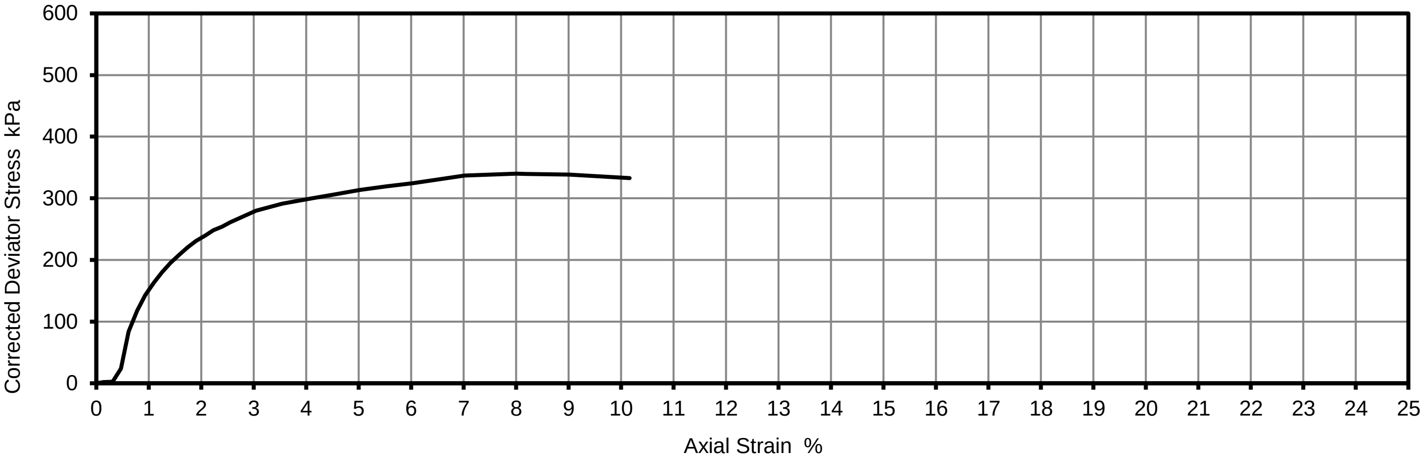
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

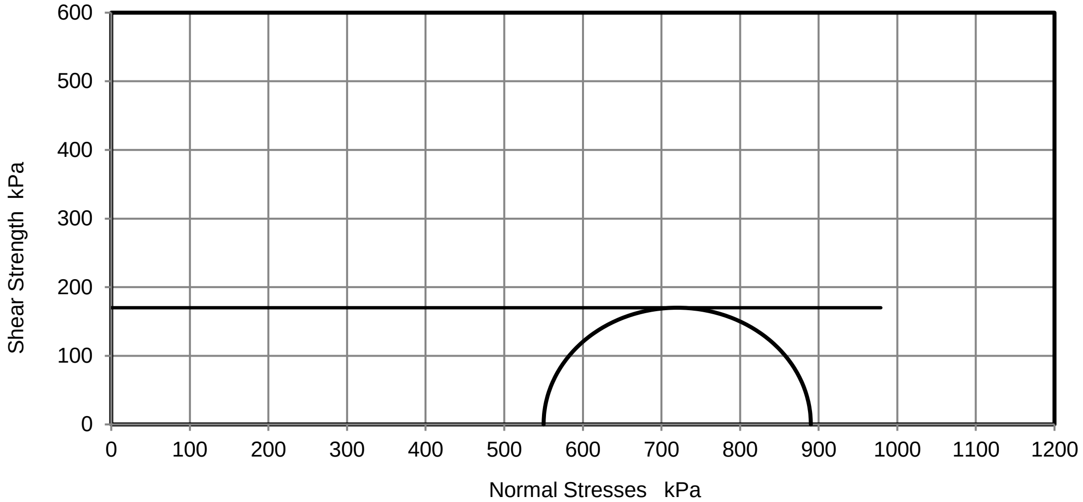
Laboratory Reference:	1433206	Depth Top [m]:	27.50
Hole No.:	BH04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	196.62	mm	Cell Pressure	550	kPa	
Diameter	102.66	mm	Axial Strain at failure	8.0	%	
Bulk Density	1.98	Mg/m3	Deviator Stress, (σ1 - σ3)f	340	kPa	
Moisture Content	27	%	Undrained Shear Strength, cu	170	kPa	½(σ1 - σ3)f
Dry Density	1.56	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.41	kPa	Membrane thickness	0.22	mm	

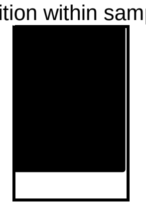
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE

Unconsolidated Undrained Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

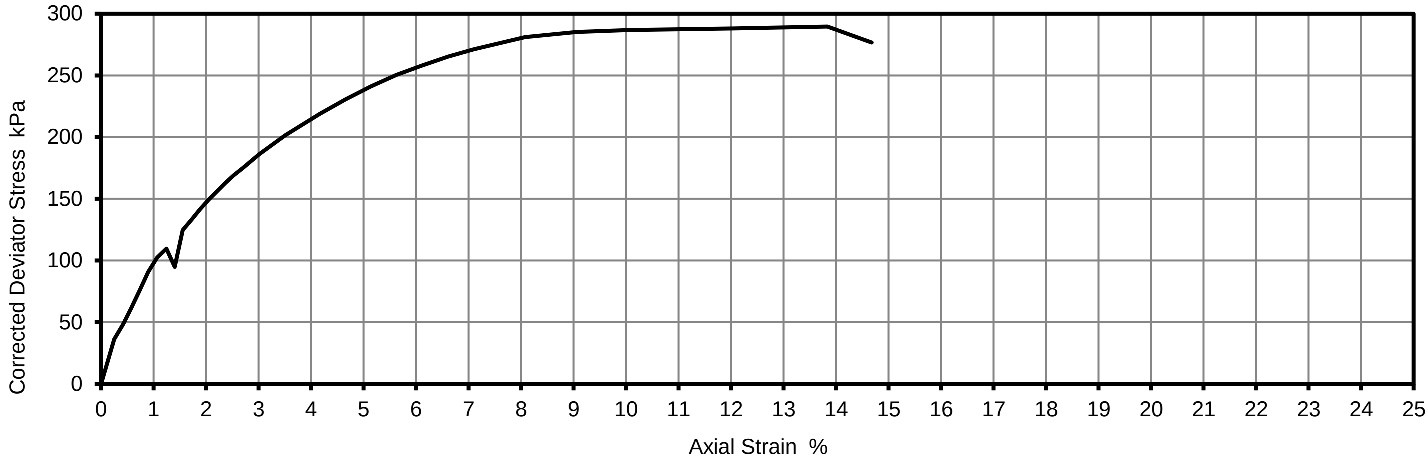
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

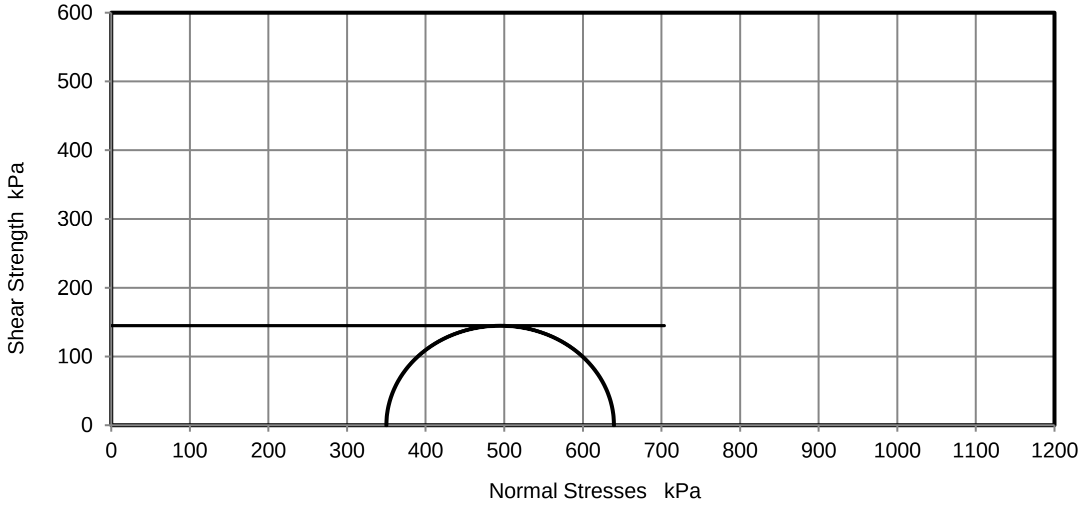
Laboratory Reference:	1433207	Depth Top [m]:	17.50
Hole No.:	BH04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	200.38	mm	Cell Pressure	350	kPa	
Diameter	101.69	mm	Axial Strain at failure	13.8	%	
Bulk Density	2.00	Mg/m3	Deviator Stress, (σ1 - σ3)f	290	kPa	
Moisture Content	26	%	Undrained Shear Strength, cu	145	kPa	½(σ1 - σ3)f
Dry Density	1.59	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.59	kPa	Membrane thickness	0.21	mm	

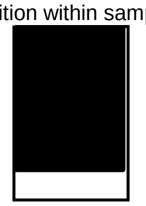
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

TEST CERTIFICATE
Unconsolidated Undrained
Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

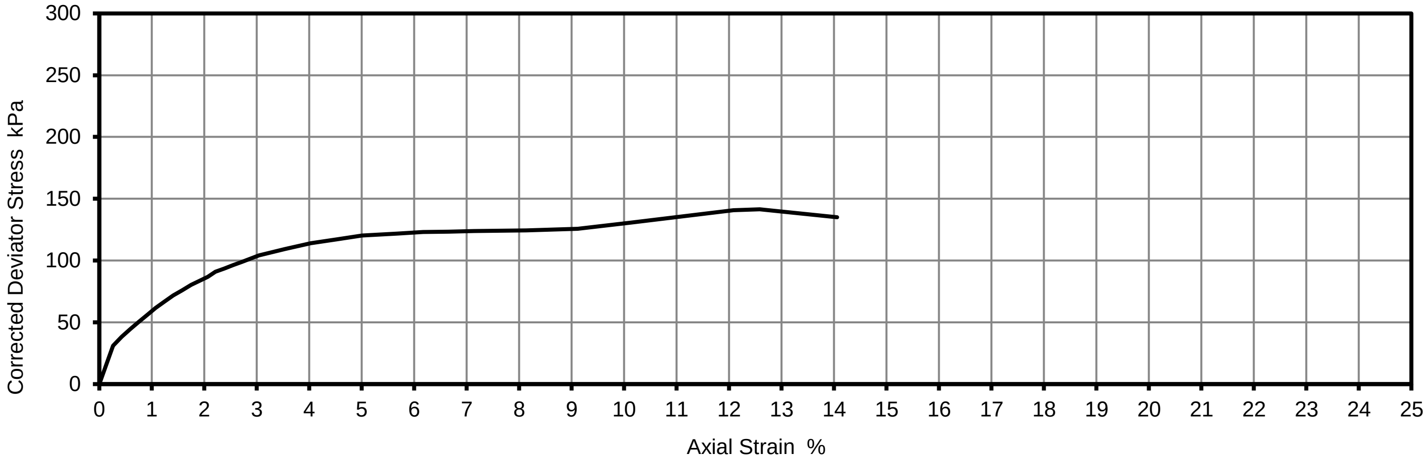
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

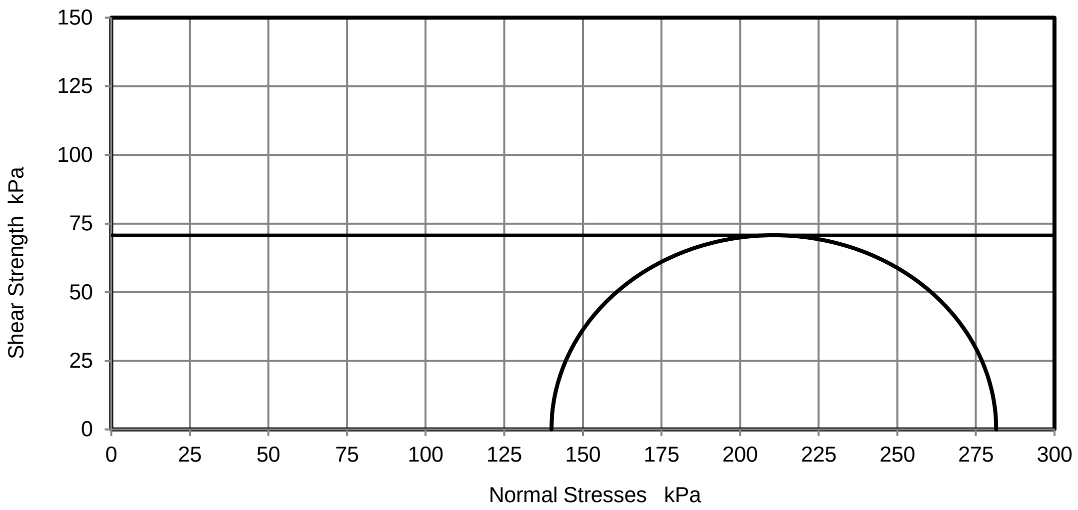
Laboratory Reference:	1433208	Depth Top [m]:	7.00
Hole No.:	BH05	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	196.39	mm	Cell Pressure	140	kPa	
Diameter	102.89	mm	Axial Strain at failure	12.6	%	
Bulk Density	1.99	Mg/m3	Deviator Stress, (σ1 - σ3)f	141	kPa	
Moisture Content	27	%	Undrained Shear Strength, cu	71	kPa	½(σ1 - σ3)f
Dry Density	1.57	Mg/m3	Mode of Failure	Brittle		
Membrane Correction	0.57	kPa	Membrane thickness	0.22	mm	

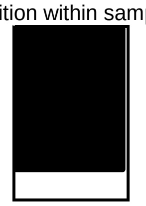
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

Date Reported: 19/02/2020

GF 184.8

UKAS TESTING 4041

TEST CERTIFICATE

Unconsolidated Undrained
Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Analytical i2 Environmental Science

Client:	IGE Consulting	Client Reference:	3249
Client Address:	14-32 Hewitt Street, Manchester, M15 4GB	Job Number:	20-85080
		Date Sampled:	29/01/2020
		Date Received:	29/01/2020
Contact:	Angharad Jones	Date Tested:	13/02/2020
Site Address:	Hayes	Sampled By:	Not Given

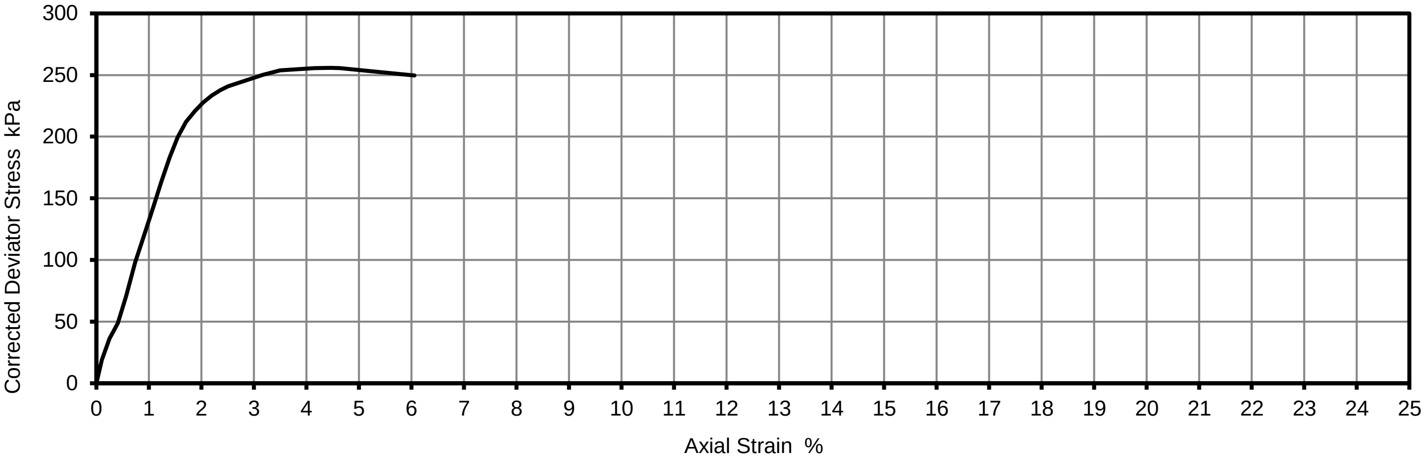
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

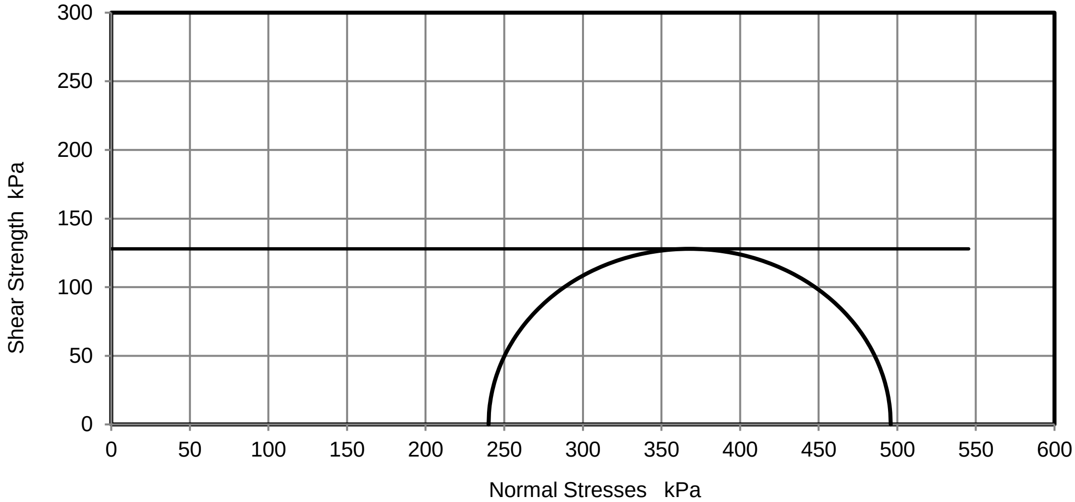
Laboratory Reference:	1433209	Depth Top [m]:	12.00
Hole No.:	BH05	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	194.17	mm	Cell Pressure	240	kPa
Diameter	103.46	mm	Axial Strain at failure	4.5	%
Bulk Density	1.94	Mg/m3	Deviator Stress, (σ1 - σ3)f	256	kPa
Moisture Content	29	%	Undrained Shear Strength, cu	128	kPa ½(σ1 - σ3)f
Dry Density	1.50	Mg/m3	Mode of Failure	Compound	
Membrane Correction	0.27	kPa	Membrane thickness	0.23	mm

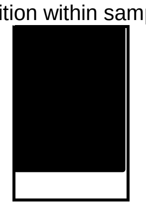
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Signed: Piotrowski

Dariusz Piotrowski
PL Geotechnical Laboratory Manager
for and on behalf of i2 Analytical Ltd

 Date Reported: 19/02/2020 **GF 184.8**

Angharad Jones
IGE Consulting
14-32 Hewitt Street
Manchester
M15 4GB

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: angharadjones@igeconsulting.co.uk

Analytical Report Number : 20-88538

Project / Site name:	Hayes	**Samples received on:**	21/02/2020
Your job number:	3249	**Samples instructed on:**	21/02/2020
Your order number:		**Analysis completed by:**	27/02/2020
Report Issue Number:	1	**Report issued on:**	27/02/2020
Samples Analysed:	4 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 20-88538

Project / Site name: Hayes

Lab Sample Number				1450842	1450843	1450844	1450845	
Sample Reference				BH01	BH01	BH04	BH04	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				14.00-15.00	17.00-18.00	22.00-23.00	31.00-32.00	
Date Sampled				21/02/2020	21/02/2020	21/02/2020	21/02/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	17	19	14	16	
Total mass of sample received	kg	0.001	NONE	1.1	1.2	1.2	1.2	

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	8.9	8.8	8.8	
Total Sulphate as SO_4	mg/kg	50	MCERTS	1600	540	1100	770	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.85	0.28	0.38	0.39	
Total Sulphur	mg/kg	50	MCERTS	13000	3200	6700	4700	

Analytical Report Number : 20-88538

Project / Site name: Hayes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1450842	BH01	None Supplied	14.00-15.00	Brown clay.
1450843	BH01	None Supplied	17.00-18.00	Brown clay.
1450844	BH04	None Supplied	22.00-23.00	Brown clay.
1450845	BH04	None Supplied	31.00-32.00	Brown clay.

Analytical Report Number : 20-88538

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Angharad Jones
IGE Consulting
14-32 Hewitt Street
Manchester
M15 4GB

i2 Analytical Ltd.
7 Woodshots Meadow,
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Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: angharadjones@igeconsulting.co.uk

Analytical Report Number : 20-88539

Project / Site name:	Hayes	**Samples received on:**	21/02/2020
Your job number:	3249	**Samples instructed on:**	21/02/2020
Your order number:		**Analysis completed by:**	28/02/2020
Report Issue Number:	1	**Report issued on:**	28/02/2020
Samples Analysed:	3 soil samples		

Signed: ____________________

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 20-88539

Project / Site name: Hayes

Lab Sample Number				1450846	1450847	1450848		
Sample Reference				BH08	BH02	BH04		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				7.50-8.00	11.00-11.50	28.00-29.00		
Date Sampled				21/02/2020	21/02/2020	21/02/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	19	19	15		
Total mass of sample received	kg	0.001	NONE	1.4	1.5	1.2		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8.4	9.0		
Total Sulphate as SO_4	mg/kg	50	MCERTS	590	750	620		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.20	0.33	0.14		
Total Sulphur	mg/kg	50	MCERTS	2900	3600	3300		

Analytical Report Number : 20-88539

Project / Site name: Hayes

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1450846	BH08	None Supplied	7.50-8.00	Brown clay.
1450847	BH02	None Supplied	11.00-11.50	Brown clay.
1450848	BH04	None Supplied	28.00-29.00	Brown clay.

Analytical Report Number : 20-88539

Project / Site name: Hayes

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

YourGeotechnical

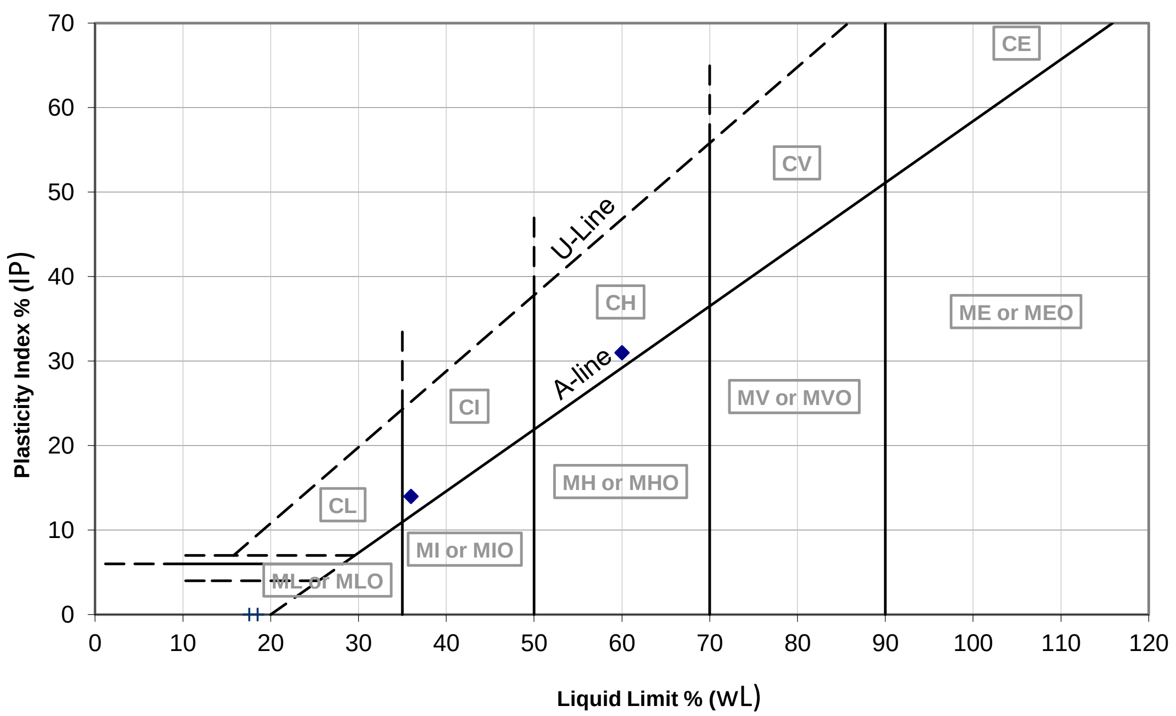
Chilgrove Business Centre
Chilgrove Park Road
Chichester
PO18 9HU

Client: Paragon

Job No:	Site:	Date:	Sheet:
YE 7331	Bulls Bridge.	09/07/2019	1

Interpretation of Moisture Content, Liquid and Plastic Limits

Location	Depth (m)	Moisture Content (w) (%)	Liquid Limit (w_L) (%)	Plastic Limit (w_P) (%)	Plasticity Index (I_P) (%)	Retained by 0.425mm (%)	Modified (w) (w') (%)	Modified (I_P) (I_P') (%)	Liquidity/ Consistency (I_L) (%)	(I_C) (%)	Casagrande Class	N.H.B.C Class (%)
TP04	2.60	24	36	22	14	0	24	14	0.1	0.9	C I	LOW
WS06A	4.5-5	67	60	29	31	11	75	28	1.2	-0.2	C H	MEDIUM



***Your* Geotechnical Ltd**

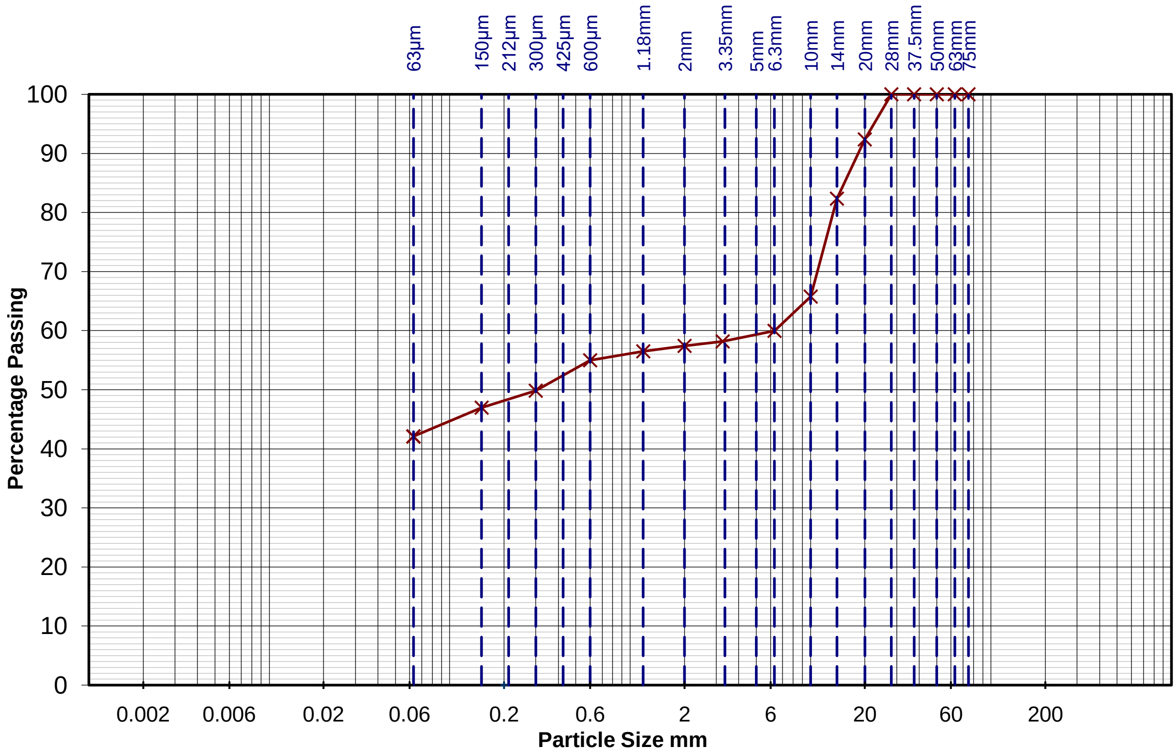
Particle Size Distribution

BS 1377 : Part 2 : 1990 : 9.2 / 9.3

Client: Paragon.
Site: Bulls Bridge.
BH/TP No. TP06
Sample No. -
Tested by: TS **Chkd by:** RL **Depth:** 3.00m

Date: 04/07/2019 **Date:** 04/07/2019

Sieve Size	75	63	50	37.5	28	20	14	10	6.3	
Percentage Passing	100.0	100.0	100.0	100.0	100.0	92.4	82.4	65.8	59.9	
Sieve Size	5	3.35	2	1.18	0.6	0.425	0.3	0.212	0.15	0.063
Percentage Passing	-	58.2	57.4	56.5	55.0	-	49.8	-	47.0	42.1



Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	Silt			Sand			Gravel				

DESCRIPTION: Very clayey/silty, sandy, fine to coarse GRAVEL.

Remarks:	Contract Number YE 7331.
	Figure number 1

***Your* Geotechnical Ltd**

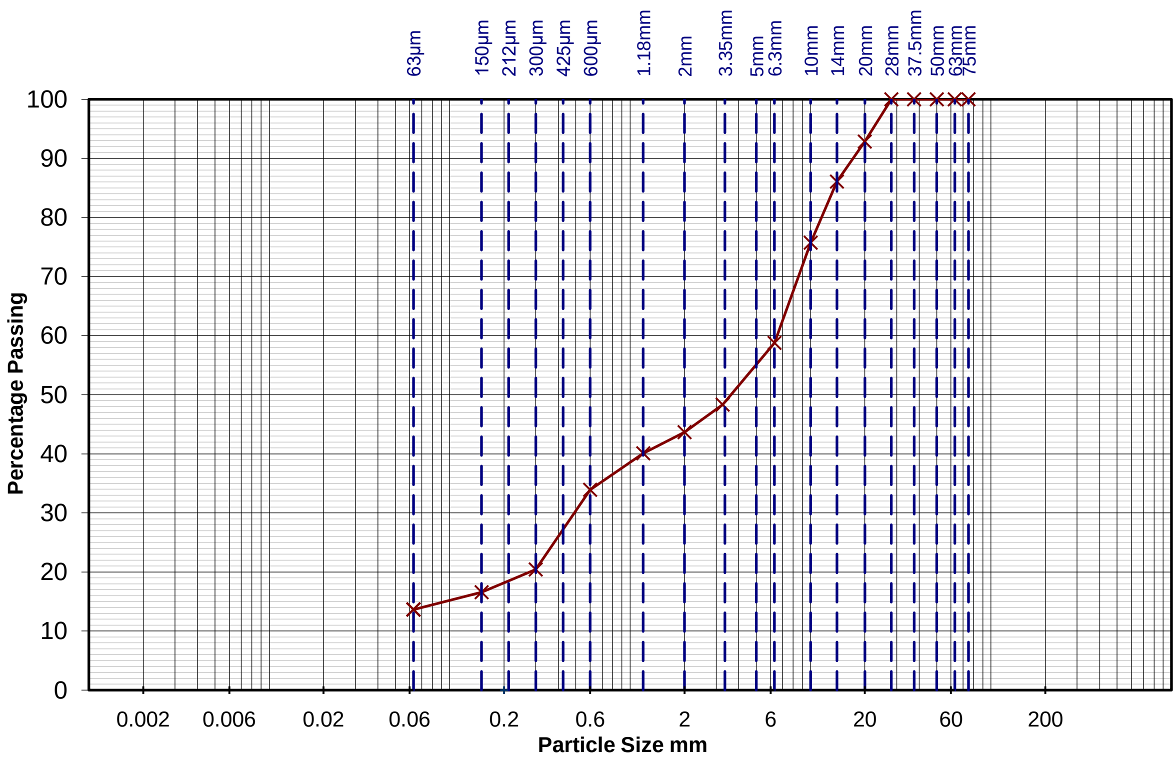
Particle Size Distribution

BS 1377 : Part 2 : 1990 : 9.2 / 9.3

Client: Paragon. **BH/TP No.** WS02
Site: Bulls Bridge. **Sample No.** -
Tested by: TS **Chkd by:** RL **Depth:** 3.75-4.00m

Date: 04/07/2019 **Date:** 04/07/2019

Sieve Size	75	63	50	37.5	28	20	14	10	6.3	
Percentage Passing	100.0	100.0	100.0	100.0	100.0	92.8	86.1	75.7	58.8	
Sieve Size	5	3.35	2	1.18	0.6	0.425	0.3	0.212	0.15	0.063
Percentage Passing	-	48.3	43.7	40.1	33.9	-	20.4	-	16.6	13.6



Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	Silt			Sand			Gravel				

DESCRIPTION: Clayey/silty, very sandy fine to coarse GRAVEL.

Remarks:	Contract Number YE 7331
	Figure number 1

Rob Lewis
Your Environment
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Chilgrove Park Road
Chilgrove
Chichester
West Sussex
PO18 9HU

DETS Ltd
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Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 19-09923

Site Reference:	Bulls Bridge
Project / Job Ref:	YE 7331
Order No:	None Supplied
Sample Receipt Date:	11/07/2019
Sample Scheduled Date:	11/07/2019
Report Issue Number:	1
Reporting Date:	15/07/2019

Authorised by:

Dave Ashworth
Deputy Quality Manager

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4480

Soil Analysis Certificate						
DETS Report No: 19-09923	**Date Sampled**	10/07/19				
Your Environment	**Time Sampled**	None Supplied				
Site Reference: Bulls Bridge	**TP / BH No**	TP03				
Project / Job Ref: YE 7331	**Additional Refs**	None Supplied				
Order No: None Supplied	**Depth (m)**	0.70				
Reporting Date: 15/07/2019	**DETS Sample No**	420873				

Determinand	**Unit**	**RL**	**Accreditation**					
pH	pH Units	N/a	**MCERTS**	9.6				
Total Sulphate as SO_4	mg/kg	< 200	NONE	2740				
Total Sulphate as SO_4	%	< 0.02	NONE	0.27				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	357				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.36				
Total Sulphur	%	< 0.02	NONE	0.10				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 19-09923	
Your Environment	
Site Reference: Bulls Bridge	
Project / Job Ref: YE 7331	
Order No: None Supplied	
Reporting Date: 15/07/2019	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
420873	TP03	None Supplied	0.70	7.7	Brown sandy gravel with stones and concrete

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Tel : 01622 850410

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 19-09923
Your Environment
Site Reference: Bulls Bridge
Project / Job Ref: YE 7331
Order No: None Supplied
Reporting Date: 15/07/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

4480

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DETS Report No: 19-09627

Site Reference:	Hayes
Project / Job Ref:	YE7331
Order No:	None Supplied
Sample Receipt Date:	08/07/2019
Sample Scheduled Date:	08/07/2019
Report Issue Number:	1
Reporting Date:	10/07/2019

Authorised by:

Dave Ashworth
Deputy Quality Manager

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Soil Analysis Certificate						
DETS Report No: 19-09627	**Date Sampled**	27/06/19				
Your Environment	**Time Sampled**	None Supplied				
Site Reference: Hayes	**TP / BH No**	WS04				
Project / Job Ref: YE7331	**Additional Refs**	None Supplied				
Order No: None Supplied	**Depth (m)**	2.50 - 3.00				
Reporting Date: 10/07/2019	**DETS Sample No**	419917				

Determinand	**Unit**	**RL**	**Accreditation**					
pH	pH Units	N/a	**MCERTS**	7.9				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	131				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.13				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 19-09627
Your Environment
Site Reference: Hayes
Project / Job Ref: YE7331
Order No: None Supplied
Reporting Date: 10/07/2019

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 419917	WS04	None Supplied	2.50 - 3.00	14	Black sandy gravel with stones and concrete

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

$ samples exceeded recommended holding times

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
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Tel : 01622 850410

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 19-09627
Your Environment
Site Reference: Hayes
Project / Job Ref: YE7331
Order No: None Supplied
Reporting Date: 10/07/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
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Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
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Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
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Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

APPENDIX 10: PRELIMINARY WASTE ASSESSMENT

YourEnvironment

HazWasteOnline™

Waste Classification Report

483D8-V9C5D-TR96Y

Job name

YE7331

Description/Comments

Project

YE7331

Site

Bulls Bridge Industrial Estate, Hayes

Related Documents

#	Name	Description
None		

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:
Rachel Giles
Date:
18 Jul 2019 10:30 GMT
Telephone:
01243 787 150

Company:
YourEnvironment
Unit 6, Chilgrove Business Centre
Chilgrove Park Road
Chichester
PO18 9HU

Report

Created by: Rachel Giles
Created date: 18 Jul 2019 10:30 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	WS1	0.75	Non Hazardous		3
2	WS2	0.50	Non Hazardous		5
3	WS3	0.75	Non Hazardous		8
4	WS4	0.80	Non Hazardous		10
5	WS5	0.50	Non Hazardous		12
6	WS5[2]	3.50	Non Hazardous		15
7	WS6A	0.80	Non Hazardous		17
8	WS7	2.50	Non Hazardous		20
9	WS8	0.30	Non Hazardous		23
10	WS9	2.00	Non Hazardous		26
11	WS10	0.50	Hazardous	HP 7, HP 11	29

Appendices	Page

Classification of sample: WS1

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

Sample details

Sample Name:		LoW Code:	
WS1		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.75 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		32	mg/kg	1.32	42.25	mg/kg	0.00423 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		105	mg/kg	1.126	118.218	mg/kg	0.0118 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	28	mg/kg	1.56	43.675	mg/kg	0.0028 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		41	mg/kg	2.976	122.027	mg/kg	0.0122 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				54	mg/kg	2.774	149.804	mg/kg	0.015 %		
11	TPH (C6 to C40) petroleum group			TPH		<42	mg/kg		<42	mg/kg	<0.0042 %		<LOD
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand CLP index number / EC Number / CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene 601-022-00-9 / 202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4] / 95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } 006-007-00-5		<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		pH PH		7.5	pH		7.5	pH	7.5 pH		
18		naphthalene 601-052-00-2 / 202-049-5 / 91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19		acenaphthylene 205-917-1 / 208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		acenaphthene 201-469-6 / 83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		fluorene 201-695-5 / 86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22		phenanthrene 201-581-5 / 85-01-8		0.23	mg/kg		0.23	mg/kg	0.000023 %		
23		anthracene 204-371-1 / 120-12-7		0.15	mg/kg		0.15	mg/kg	0.000015 %		
24		fluoranthene 205-912-4 / 206-44-0		0.25	mg/kg		0.25	mg/kg	0.000025 %		
25		pyrene 204-927-3 / 129-00-0		0.24	mg/kg		0.24	mg/kg	0.000024 %		
26		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27		chrysene 601-048-00-0 / 205-923-4 / 218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		0.37	mg/kg		0.37	mg/kg	0.000037 %		
29		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
31		indeno[123-cd]pyrene 205-893-2 / 193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
32		dibenz[a,h]anthracene 601-041-00-2 / 200-181-8 / 53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
33		benzo[ghi]perylene 205-883-8 / 191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
34		phenol 604-001-00-2 / 203-632-7 / 108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
								Total:	0.0558 %		

Key

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

Classification of sample: WS2

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

Sample details

Sample Name:		LoW Code:	
WS2		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand (CLP index number / EC Number / CAS Number)	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		20	mg/kg	1.32	26.407	mg/kg	0.00264 %		
2		cadmium { cadmium oxide } 048-002-00-0 / 215-146-2 / 1306-19-0		0.4	mg/kg	1.142	0.457	mg/kg	0.0000457 %		
3		chromium in chromium(III) compounds { chromium(III) oxide } / 215-160-9 / 1308-38-9		26	mg/kg	1.462	38	mg/kg	0.0038 %		
4		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0 / 215-607-8 / 1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5		copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		87	mg/kg	1.126	97.952	mg/kg	0.0098 %		
6		lead { lead chromate } 082-004-00-2 / 231-846-0 / 7758-97-6	1	146	mg/kg	1.56	227.733	mg/kg	0.0146 %		
7		mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8		nickel { nickel chromate } 028-035-00-7 / 238-766-5 / 14721-18-7		24	mg/kg	2.976	71.43	mg/kg	0.00714 %		
9		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10		zinc { zinc chromate } 024-007-00-3		210	mg/kg	2.774	582.571	mg/kg	0.0583 %		
11		TPH (C6 to C40) petroleum group / / TPH		49	mg/kg		49	mg/kg	0.0049 %		
12		benzene 601-020-00-8 / 200-753-7 / 71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13		toluene 601-021-00-3 / 203-625-9 / 108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14		ethylbenzene 601-023-00-4 / 202-849-4 / 100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } 006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		pH		PH		7.5	pH		7.5	pH	7.5 pH		
18		naphthalene 601-052-00-2	202-049-5	91-20-3		0.41	mg/kg		0.41	mg/kg	0.000041 %		
19		acenaphthylene	205-917-1	208-96-8		0.25	mg/kg		0.25	mg/kg	0.000025 %		
20		acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		fluorene	201-695-5	86-73-7		0.14	mg/kg		0.14	mg/kg	0.000014 %		
22		phenanthrene	201-581-5	85-01-8		0.85	mg/kg		0.85	mg/kg	0.000085 %		
23		anthracene	204-371-1	120-12-7		0.48	mg/kg		0.48	mg/kg	0.000048 %		
24		fluoranthene	205-912-4	206-44-0		2.35	mg/kg		2.35	mg/kg	0.000235 %		
25		pyrene	204-927-3	129-00-0		2.22	mg/kg		2.22	mg/kg	0.000222 %		
26		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		1.66	mg/kg		1.66	mg/kg	0.000166 %		
27		chrysene 601-048-00-0	205-923-4	218-01-9		1.47	mg/kg		1.47	mg/kg	0.000147 %		
28		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		1.94	mg/kg		1.94	mg/kg	0.000194 %		
29		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.58	mg/kg		0.58	mg/kg	0.000058 %		
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		1.28	mg/kg		1.28	mg/kg	0.000128 %		
31		indeno[123-cd]pyrene	205-893-2	193-39-5		1.09	mg/kg		1.09	mg/kg	0.000109 %		
32		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		0.11	mg/kg		0.11	mg/kg	0.000011 %		
33		benzo[ghi]perylene	205-883-8	191-24-2		0.81	mg/kg		0.81	mg/kg	0.000081 %		
34		phenol 604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
										Total:	0.106 %		

Key

User supplied data

Determinand values ignored for classification, see column 'Conc. Not Used' for reason

Determinand defined or amended by HazWasteOnline (see Appendix A)

Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration

<LOD Below limit of detection

CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0049%)

Classification of sample: WS3

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

Sample details

Sample Name:		LoW Code:	
WS3		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.75 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		19	mg/kg	1.32	25.086	mg/kg	0.00251 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		76	mg/kg	1.126	85.568	mg/kg	0.00856 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	381	mg/kg	1.56	594.29	mg/kg	0.0381 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.1	mg/kg	1.353	1.489	mg/kg	0.000149 %		
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		22	mg/kg	2.976	65.478	mg/kg	0.00655 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				211	mg/kg	2.774	585.345	mg/kg	0.0585 %		
11	TPH (C6 to C40) petroleum group			TPH		<42	mg/kg		<42	mg/kg	<0.0042 %		<LOD
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand CLP index number | EC Number | CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene 601-022-00-9 | 202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4] | 95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } 006-007-00-5		<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		pH PH		8	pH		8	pH	8pH		
18		naphthalene 601-052-00-2 | 202-049-5 | 91-20-3		0.85	mg/kg		0.85	mg/kg	0.000085 %		
19		acenaphthylene 205-917-1 | 208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		acenaphthene 201-469-6 | 83-32-9		0.13	mg/kg		0.13	mg/kg	0.000013 %		
21		fluorene 201-695-5 | 86-73-7		0.18	mg/kg		0.18	mg/kg	0.000018 %		
22		phenanthrene 201-581-5 | 85-01-8		1.22	mg/kg		1.22	mg/kg	0.000122 %		
23		anthracene 204-371-1 | 120-12-7		0.31	mg/kg		0.31	mg/kg	0.000031 %		
24		fluoranthene 205-912-4 | 206-44-0		1.96	mg/kg		1.96	mg/kg	0.000196 %		
25		pyrene 204-927-3 | 129-00-0		1.7	mg/kg		1.7	mg/kg	0.00017 %		
26		benzo[a]anthracene 601-033-00-9 | 200-280-6 | 56-55-3		0.76	mg/kg		0.76	mg/kg	0.000076 %		
27		chrysene 601-048-00-0 | 205-923-4 | 218-01-9		1.04	mg/kg		1.04	mg/kg	0.000104 %		
28		benzo[b]fluoranthene 601-034-00-4 | 205-911-9 | 205-99-2		1.13	mg/kg		1.13	mg/kg	0.000113 %		
29		benzo[k]fluoranthene 601-036-00-5 | 205-916-6 | 207-08-9		0.32	mg/kg		0.32	mg/kg	0.000032 %		
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 | 200-028-5 | 50-32-8		0.63	mg/kg		0.63	mg/kg	0.000063 %		
31		indeno[123-cd]pyrene 205-893-2 | 193-39-5		0.43	mg/kg		0.43	mg/kg	0.000043 %		
32		dibenz[a,h]anthracene 601-041-00-2 | 200-181-8 | 53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
33		benzo[ghi]perylene 205-883-8 | 191-24-2		0.35	mg/kg		0.35	mg/kg	0.000035 %		
34		phenol 604-001-00-2 | 203-632-7 | 108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
								Total:	0.126 %		

Key

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

Classification of sample: WS4

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

Sample details

Sample Name:
WS4
Sample Depth:
0.80 m

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

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		34	mg/kg	1.32	44.891	mg/kg	0.00449 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		89	mg/kg	1.462	130.078	mg/kg	0.013 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		**<LOD**
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		113	mg/kg	1.126	127.225	mg/kg	0.0127 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	67	mg/kg	1.56	104.508	mg/kg	0.0067 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		**<LOD**
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		56	mg/kg	2.976	166.671	mg/kg	0.0167 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		**<LOD**
10	zinc { zinc chromate }	024-007-00-3				116	mg/kg	2.774	321.801	mg/kg	0.0322 %		
11	TPH (C6 to C40) petroleum group			TPH		<42	mg/kg		<42	mg/kg	<0.0042 %		**<LOD**
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		**<LOD**
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**

#		Determinand CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } 006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		pH		PH		8.4	pH		8.4	pH	8.4 pH		
18		naphthalene 601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19		acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22		phenanthrene	201-581-5	85-01-8		0.33	mg/kg		0.33	mg/kg	0.000033 %		
23		anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24		fluoranthene	205-912-4	206-44-0		0.32	mg/kg		0.32	mg/kg	0.000032 %		
25		pyrene	204-927-3	129-00-0		0.28	mg/kg		0.28	mg/kg	0.000028 %		
26		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.41	mg/kg		0.41	mg/kg	0.000041 %		
27		chrysene 601-048-00-0	205-923-4	218-01-9		0.56	mg/kg		0.56	mg/kg	0.000056 %		
28		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		1.27	mg/kg		1.27	mg/kg	0.000127 %		
29		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.31	mg/kg		0.31	mg/kg	0.000031 %		
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.33	mg/kg		0.33	mg/kg	0.000033 %		
31		indeno[123-cd]pyrene	205-893-2	193-39-5		0.37	mg/kg		0.37	mg/kg	0.000037 %		
32		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
33		benzo[ghi]perylene	205-883-8	191-24-2		0.3	mg/kg		0.3	mg/kg	0.00003 %		
34		phenol 604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
35		1,1-dichloroethane and 1,2-dichloroethane (combined)	203-458-1, 200-863-5	107-06-2, 75-34-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
										Total:	0.094 %		

Key

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

Classification of sample: WS5

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

Sample details

Sample Name:	LoW Code:	
WS5	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.50 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand CLP index number / EC Number / CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
2		cadmium { cadmium oxide } 048-002-00-0 / 215-146-2 / 1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
3		chromium in chromium(III) compounds { chromium(III) oxide } 215-160-9 / 1308-38-9		24	mg/kg	1.462	35.077	mg/kg	0.00351 %		
4		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0 / 215-607-8 / 1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5		copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		24	mg/kg	1.126	27.021	mg/kg	0.0027 %		
6		lead { lead chromate } 082-004-00-2 / 231-846-0 / 7758-97-6	1	58	mg/kg	1.56	90.469	mg/kg	0.0058 %		
7		mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8		nickel { nickel chromate } 028-035-00-7 / 238-766-5 / 14721-18-7		13	mg/kg	2.976	38.691	mg/kg	0.00387 %		
9		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10		zinc { zinc chromate } 024-007-00-3		146	mg/kg	2.774	405.025	mg/kg	0.0405 %		
11		TPH (C6 to C40) petroleum group TPH		400	mg/kg		400	mg/kg	0.04 %		
12		benzene 601-020-00-8 / 200-753-7 / 71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13		toluene 601-021-00-3 / 203-625-9 / 108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14		ethylbenzene 601-023-00-4 / 202-849-4 / 100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
16	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2 mg/kg	1.884	<3.768 mg/kg	<0.000377 %		<LOD
17	pH			PH		9.9 pH		9.9 pH	9.9 pH		
18	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
19	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
20	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
21	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	phenanthrene		201-581-5	85-01-8		0.74 mg/kg		0.74 mg/kg	0.000074 %		
23	anthracene		204-371-1	120-12-7		0.2 mg/kg		0.2 mg/kg	0.00002 %		
24	fluoranthene		205-912-4	206-44-0		0.73 mg/kg		0.73 mg/kg	0.000073 %		
25	pyrene		204-927-3	129-00-0		0.54 mg/kg		0.54 mg/kg	0.000054 %		
26	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.22 mg/kg		0.22 mg/kg	0.000022 %		
27	chrysene	601-048-00-0	205-923-4	218-01-9		0.29 mg/kg		0.29 mg/kg	0.000029 %		
28	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.3 mg/kg		0.3 mg/kg	0.00003 %		
29	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
30	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.16 mg/kg		0.16 mg/kg	0.000016 %		
31	indeno[123-cd]pyrene		205-893-2	193-39-5		0.11 mg/kg		0.11 mg/kg	0.000011 %		
32	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
33	benzo[ghi]perylene		205-883-8	191-24-2		0.12 mg/kg		0.12 mg/kg	0.000012 %		
34	phenol	604-001-00-2	203-632-7	108-95-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
35	1,1-dichloroethane and 1,2-dichloroethane (combined)		203-458-1, 200-863-5	107-06-2, 75-34-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
								Total:	0.102 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.04%)

Classification of sample: WS5[2]

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

Sample details

Sample Name:		LoW Code:	
WS5[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
3.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7	mg/kg	1.32	9.242	mg/kg	0.000924 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		12	mg/kg	1.126	13.511	mg/kg	0.00135 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	25	mg/kg	1.56	38.995	mg/kg	0.0025 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		8	mg/kg	2.976	23.81	mg/kg	0.00238 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				34	mg/kg	2.774	94.321	mg/kg	0.00943 %		
11	TPH (C6 to C40) petroleum group			TPH		<42	mg/kg		<42	mg/kg	<0.0042 %		<LOD
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2 mg/kg		<2 mg/kg	<0.0002 %		**<LOD**
16		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2 mg/kg	1.884	<3.768 mg/kg	<0.000377 %		**<LOD**
17	●	pH			PH		7.1 pH		7.1 pH	7.1 pH		
18		naphthalene	601-052-00-2	202-049-5	91-20-3		0.13 mg/kg		0.13 mg/kg	0.000013 %		
19	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
20	●	acenaphthene		201-469-6	83-32-9		0.17 mg/kg		0.17 mg/kg	0.000017 %		
21	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
22	●	phenanthrene		201-581-5	85-01-8		0.33 mg/kg		0.33 mg/kg	0.000033 %		
23	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
24	●	fluoranthene		205-912-4	206-44-0		0.46 mg/kg		0.46 mg/kg	0.000046 %		
25	●	pyrene		204-927-3	129-00-0		0.35 mg/kg		0.35 mg/kg	0.000035 %		
26		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.18 mg/kg		0.18 mg/kg	0.000018 %		
27		chrysene	601-048-00-0	205-923-4	218-01-9		0.29 mg/kg		0.29 mg/kg	0.000029 %		
28		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.32 mg/kg		0.32 mg/kg	0.000032 %		
29		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
30		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.17 mg/kg		0.17 mg/kg	0.000017 %		
31	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.13 mg/kg		0.13 mg/kg	0.000013 %		
32		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
33	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
34		phenol	604-001-00-2	203-632-7	108-95-2		<2 mg/kg		<2 mg/kg	<0.0002 %		**<LOD**
									Total:	0.0266 %		

Key

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

Classification of sample: WS6A

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

Sample details

Sample Name:		LoW Code:	
WS6A		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.80 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		15	mg/kg	1.32	19.805	mg/kg	0.00198 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		26	mg/kg	1.462	38	mg/kg	0.0038 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		35	mg/kg	1.126	39.406	mg/kg	0.00394 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	102	mg/kg	1.56	159.101	mg/kg	0.0102 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		25	mg/kg	2.976	74.407	mg/kg	0.00744 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				114	mg/kg	2.774	316.253	mg/kg	0.0316 %		
11	TPH (C6 to C40) petroleum group			TPH		488	mg/kg		488	mg/kg	0.0488 %		
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
16		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		**<LOD**
17	●	pH			PH		9.1	pH		9.1	pH	9.1 pH		
18		naphthalene	601-052-00-2	202-049-5	91-20-3		4.65	mg/kg		4.65	mg/kg	0.000465 %		
19	●	acenaphthylene		205-917-1	208-96-8		0.2	mg/kg		0.2	mg/kg	0.00002 %		
20	●	acenaphthene		201-469-6	83-32-9		9.79	mg/kg		9.79	mg/kg	0.000979 %		
21	●	fluorene		201-695-5	86-73-7		8.6	mg/kg		8.6	mg/kg	0.00086 %		
22	●	phenanthrene		201-581-5	85-01-8		33.7	mg/kg		33.7	mg/kg	0.00337 %		
23	●	anthracene		204-371-1	120-12-7		7.27	mg/kg		7.27	mg/kg	0.000727 %		
24	●	fluoranthene		205-912-4	206-44-0		20.6	mg/kg		20.6	mg/kg	0.00206 %		
25	●	pyrene		204-927-3	129-00-0		15	mg/kg		15	mg/kg	0.0015 %		
26		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		3.05	mg/kg		3.05	mg/kg	0.000305 %		
27		chrysene	601-048-00-0	205-923-4	218-01-9		2.94	mg/kg		2.94	mg/kg	0.000294 %		
28		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.45	mg/kg		2.45	mg/kg	0.000245 %		
29		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.74	mg/kg		0.74	mg/kg	0.000074 %		
30		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.55	mg/kg		1.55	mg/kg	0.000155 %		
31	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.73	mg/kg		0.73	mg/kg	0.000073 %		
32		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.15	mg/kg		0.15	mg/kg	0.000015 %		
33	●	benzo[ghi]perylene		205-883-8	191-24-2		0.6	mg/kg		0.6	mg/kg	0.00006 %		
34		phenol	604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
											Total:	0.122 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0488%)

Classification of sample: WS7

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

Sample details

Sample Name:		LoW Code:	
WS7		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
2.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		22	mg/kg	1.32	29.047	mg/kg	0.0029 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.4	mg/kg	1.142	0.457	mg/kg	0.0000457 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		32	mg/kg	1.462	46.77	mg/kg	0.00468 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		62	mg/kg	1.126	69.805	mg/kg	0.00698 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	307	mg/kg	1.56	478.863	mg/kg	0.0307 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.7	mg/kg	1.353	2.301	mg/kg	0.00023 %		
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		22	mg/kg	2.976	65.478	mg/kg	0.00655 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				285	mg/kg	2.774	790.632	mg/kg	0.0791 %		
11	TPH (C6 to C40) petroleum group			TPH		391	mg/kg		391	mg/kg	0.0391 %		
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		**<LOD**
17	•	pH			PH		7.5	pH		7.5	pH	7.5 pH		
18		naphthalene	601-052-00-2	202-049-5	91-20-3		0.81	mg/kg		0.81	mg/kg	0.000081 %		
19	•	acenaphthylene		205-917-1	208-96-8		0.15	mg/kg		0.15	mg/kg	0.000015 %		
20	•	acenaphthene		201-469-6	83-32-9		1.73	mg/kg		1.73	mg/kg	0.000173 %		
21	•	fluorene		201-695-5	86-73-7		2.1	mg/kg		2.1	mg/kg	0.00021 %		
22	•	phenanthrene		201-581-5	85-01-8		11.3	mg/kg		11.3	mg/kg	0.00113 %		
23	•	anthracene		204-371-1	120-12-7		6.42	mg/kg		6.42	mg/kg	0.000642 %		
24	•	fluoranthene		205-912-4	206-44-0		22.1	mg/kg		22.1	mg/kg	0.00221 %		
25	•	pyrene		204-927-3	129-00-0		15.4	mg/kg		15.4	mg/kg	0.00154 %		
26		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		7.68	mg/kg		7.68	mg/kg	0.000768 %		
27		chrysene	601-048-00-0	205-923-4	218-01-9		6.35	mg/kg		6.35	mg/kg	0.000635 %		
28		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		6.17	mg/kg		6.17	mg/kg	0.000617 %		
29		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.08	mg/kg		2.08	mg/kg	0.000208 %		
30		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		4.42	mg/kg		4.42	mg/kg	0.000442 %		
31	•	indeno[123-cd]pyrene		205-893-2	193-39-5		1.79	mg/kg		1.79	mg/kg	0.000179 %		
32		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.44	mg/kg		0.44	mg/kg	0.000044 %		
33	•	benzo[ghi]perylene		205-883-8	191-24-2		1.29	mg/kg		1.29	mg/kg	0.000129 %		
34		phenol	604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
											Total:	0.182 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0391%)

Classification of sample: WS8

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

Sample details

Sample Name:
WS8
Sample Depth:
0.30 m

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

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		14	mg/kg	1.32	18.485	mg/kg	0.00185 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		22	mg/kg	1.462	32.154	mg/kg	0.00322 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		46	mg/kg	1.126	51.791	mg/kg	0.00518 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	843	mg/kg	1.56	1314.924	mg/kg	0.0843 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		16	mg/kg	2.976	47.62	mg/kg	0.00476 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				124	mg/kg	2.774	343.994	mg/kg	0.0344 %		
11	TPH (C6 to C40) petroleum group			TPH		138	mg/kg		138	mg/kg	0.0138 %		
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
16	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		**<LOD**
17	pH			PH		10.4	pH		10.4	pH	10.4 pH		
18	naphthalene	601-052-00-2	202-049-5	91-20-3		0.35	mg/kg		0.35	mg/kg	0.000035 %		
19	acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
20	acenaphthene		201-469-6	83-32-9		0.16	mg/kg		0.16	mg/kg	0.000016 %		
21	fluorene		201-695-5	86-73-7		0.16	mg/kg		0.16	mg/kg	0.000016 %		
22	phenanthrene		201-581-5	85-01-8		1.56	mg/kg		1.56	mg/kg	0.000156 %		
23	anthracene		204-371-1	120-12-7		0.32	mg/kg		0.32	mg/kg	0.000032 %		
24	fluoranthene		205-912-4	206-44-0		2.84	mg/kg		2.84	mg/kg	0.000284 %		
25	pyrene		204-927-3	129-00-0		2.54	mg/kg		2.54	mg/kg	0.000254 %		
26	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.34	mg/kg		1.34	mg/kg	0.000134 %		
27	chrysene	601-048-00-0	205-923-4	218-01-9		1.42	mg/kg		1.42	mg/kg	0.000142 %		
28	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.71	mg/kg		1.71	mg/kg	0.000171 %		
29	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.53	mg/kg		0.53	mg/kg	0.000053 %		
30	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.23	mg/kg		1.23	mg/kg	0.000123 %		
31	indeno[123-cd]pyrene		205-893-2	193-39-5		0.8	mg/kg		0.8	mg/kg	0.00008 %		
32	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.14	mg/kg		0.14	mg/kg	0.000014 %		
33	benzo[ghi]perylene		205-883-8	191-24-2		0.67	mg/kg		0.67	mg/kg	0.000067 %		
34	phenol	604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
										Total:	0.152 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0138%)

Classification of sample: WS9

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

Sample details

Sample Name:
WS9
Sample Depth:
2.00 m

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

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		143	mg/kg	1.462	209.002	mg/kg	0.0209 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		76	mg/kg	1.126	85.568	mg/kg	0.00856 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	77	mg/kg	1.56	120.106	mg/kg	0.0077 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		19	mg/kg	2.976	56.549	mg/kg	0.00565 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				86	mg/kg	2.774	238.577	mg/kg	0.0239 %		
11	TPH (C6 to C40) petroleum group			TPH		400	mg/kg		400	mg/kg	0.04 %		
12	benzene	601-020-00-8	200-753-7	71-43-2		12	mg/kg		12	mg/kg	0.0012 %		
13	toluene	601-021-00-3	203-625-9	108-88-3		13	mg/kg		13	mg/kg	0.0013 %		
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
16		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		**<LOD**
17	●	pH			PH		9.2	pH		9.2	pH	9.2 pH		
18		naphthalene	601-052-00-2	202-049-5	91-20-3		0.57	mg/kg		0.57	mg/kg	0.000057 %		
19	●	acenaphthylene		205-917-1	208-96-8		0.33	mg/kg		0.33	mg/kg	0.000033 %		
20	●	acenaphthene		201-469-6	83-32-9		0.12	mg/kg		0.12	mg/kg	0.000012 %		
21	●	fluorene		201-695-5	86-73-7		1.22	mg/kg		1.22	mg/kg	0.000122 %		
22	●	phenanthrene		201-581-5	85-01-8		14.2	mg/kg		14.2	mg/kg	0.00142 %		
23	●	anthracene		204-371-1	120-12-7		4.22	mg/kg		4.22	mg/kg	0.000422 %		
24	●	fluoranthene		205-912-4	206-44-0		23.8	mg/kg		23.8	mg/kg	0.00238 %		
25	●	pyrene		204-927-3	129-00-0		17.5	mg/kg		17.5	mg/kg	0.00175 %		
26		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		7.92	mg/kg		7.92	mg/kg	0.000792 %		
27		chrysene	601-048-00-0	205-923-4	218-01-9		7.78	mg/kg		7.78	mg/kg	0.000778 %		
28		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		7.83	mg/kg		7.83	mg/kg	0.000783 %		
29		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.54	mg/kg		2.54	mg/kg	0.000254 %		
30		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		4.81	mg/kg		4.81	mg/kg	0.000481 %		
31	●	indeno[123-cd]pyrene		205-893-2	193-39-5		2.31	mg/kg		2.31	mg/kg	0.000231 %		
32		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.69	mg/kg		0.69	mg/kg	0.000069 %		
33	●	benzo[ghi]perylene		205-883-8	191-24-2		1.85	mg/kg		1.85	mg/kg	0.000185 %		
34		phenol	604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
											Total:	0.123 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinands:

benzene: (conc.: 0.0012%)
toluene: (conc.: 0.0013%)

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.04%)

Classification of sample: WS10

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:		LoW Code:	
WS10		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.265%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.265%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand CLP index number / EC Number / CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		6	mg/kg	1.32	7.922	mg/kg	0.000792 %		
2	cadmium { cadmium oxide } 048-002-00-0 / 215-146-2 / 1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<LOD
3	chromium in chromium(III) compounds { chromium(III) oxide } 215-160-9 / 1308-38-9		13	mg/kg	1.462	19	mg/kg	0.0019 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0 / 215-607-8 / 1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		13	mg/kg	1.126	14.637	mg/kg	0.00146 %		
6	lead { lead chromate } 082-004-00-2 / 231-846-0 / 7758-97-6	1	27	mg/kg	1.56	42.115	mg/kg	0.0027 %		
7	mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate } 028-035-00-7 / 238-766-5 / 14721-18-7		11	mg/kg	2.976	32.739	mg/kg	0.00327 %		

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				32	mg/kg	2.774	88.773	mg/kg	0.00888 %		
11	TPH (C6 to C40) petroleum group			TPH		2646	mg/kg		2646	mg/kg	0.265 %		
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
15	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
16	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17	pH			PH		8.3	pH		8.3	pH	8.3 pH		
18	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19	acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20	acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21	fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22	phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
23	anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24	fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25	pyrene		204-927-3	129-00-0		0.13	mg/kg		0.13	mg/kg	0.000013 %		
26	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27	chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
29	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
30	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
31	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
32	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
33	benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
34	phenol	604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
										Total:	0.287 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.265%)

Classification of sample: TP4

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

Sample details

Sample Name: **TP4**
Sample Depth: **0.80 m**

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

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		317	mg/kg	1.32	418.543	mg/kg	0.0419 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		5.8	mg/kg	1.142	6.626	mg/kg	0.000663 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		75	mg/kg	1.126	84.442	mg/kg	0.00844 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	52	mg/kg	1.56	81.11	mg/kg	0.0052 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		32	mg/kg	2.976	95.24	mg/kg	0.00952 %		
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
10	zinc { zinc chromate }	024-007-00-3				48	mg/kg	2.774	133.159	mg/kg	0.0133 %		
11	TPH (C6 to C40) petroleum group			TPH		<42	mg/kg		<42	mg/kg	<0.0042 %		<LOD
12	benzene	601-020-00-8	200-753-7	71-43-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
13	toluene	601-021-00-3	203-625-9	108-88-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
14	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		pH			PH		7.8	pH		7.8	pH	7.8 pH		
18		naphthalene	601-052-00-2	202-049-5	91-20-3		0.12	mg/kg		0.12	mg/kg	0.000012 %		
19		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22		phenanthrene		201-581-5	85-01-8		0.33	mg/kg		0.33	mg/kg	0.000033 %		
23		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24		fluoranthene		205-912-4	206-44-0		0.2	mg/kg		0.2	mg/kg	0.00002 %		
25		pyrene		204-927-3	129-00-0		0.16	mg/kg		0.16	mg/kg	0.000016 %		
26		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27		chrysene	601-048-00-0	205-923-4	218-01-9		0.17	mg/kg		0.17	mg/kg	0.000017 %		
28		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.12	mg/kg		0.12	mg/kg	0.000012 %		
29		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
30		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
31		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
32		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
33		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
34		phenol	604-001-00-2	203-632-7	108-95-2		<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
35		1,1-dichloroethane and 1,2-dichloroethane (combined)		203-458-1, 200-863-5	107-06-2, 75-34-3		<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
											Total:	0.0895 %		

Key

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

Classification of sample: TP6

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

Sample details

Sample Name:		LoW Code:	
TP6		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		arsenic { arsenic trioxide }				13	mg/kg	1.32	17.164	mg/kg	0.00172 %		
		033-003-00-0	215-481-4	1327-53-3									
2		cadmium { cadmium oxide }				0.3	mg/kg	1.142	0.343	mg/kg	0.0000343 %		
		048-002-00-0	215-146-2	1306-19-0									
3		chromium in chromium(III) compounds { chromium(III) oxide }				11	mg/kg	1.462	16.077	mg/kg	0.00161 %		
			215-160-9	1308-38-9									
4		chromium in chromium(VI) compounds { chromium(VI) oxide }				<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
5		copper { dicopper oxide; copper (I) oxide }				31	mg/kg	1.126	34.903	mg/kg	0.00349 %		
		029-002-00-X	215-270-7	1317-39-1									
6		lead { lead chromate }			1	60	mg/kg	1.56	93.589	mg/kg	0.006 %		
		082-004-00-2	231-846-0	7758-97-6									
7		mercury { mercury dichloride }				<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
8		nickel { nickel chromate }				11	mg/kg	2.976	32.739	mg/kg	0.00327 %		
		028-035-00-7	238-766-5	14721-18-7									
9		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<3	mg/kg	2.554	<7.661	mg/kg	<0.000766 %		<LOD
		034-002-00-8											
10		zinc { zinc chromate }				73	mg/kg	2.774	202.513	mg/kg	0.0203 %		
		024-007-00-3											
11		TPH (C6 to C40) petroleum group				198	mg/kg		198	mg/kg	0.0198 %		
				TPH									
12		benzene				<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
13		toluene				<5	mg/kg		<5	mg/kg	<0.0005 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
14		ethylbenzene				<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
		601-023-00-4	202-849-4	100-41-4									

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
16	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2 mg/kg	1.884	<3.768 mg/kg	<0.000377 %		<LOD
17	pH			PH		8.1 pH		8.1 pH	8.1 pH		
18	naphthalene	601-052-00-2	202-049-5	91-20-3		1.82 mg/kg		1.82 mg/kg	0.000182 %		
19	acenaphthylene		205-917-1	208-96-8		0.18 mg/kg		0.18 mg/kg	0.000018 %		
20	acenaphthene		201-469-6	83-32-9		0.57 mg/kg		0.57 mg/kg	0.000057 %		
21	fluorene		201-695-5	86-73-7		0.41 mg/kg		0.41 mg/kg	0.000041 %		
22	phenanthrene		201-581-5	85-01-8		3.77 mg/kg		3.77 mg/kg	0.000377 %		
23	anthracene		204-371-1	120-12-7		2.23 mg/kg		2.23 mg/kg	0.000223 %		
24	fluoranthene		205-912-4	206-44-0		8.03 mg/kg		8.03 mg/kg	0.000803 %		
25	pyrene		204-927-3	129-00-0		6.05 mg/kg		6.05 mg/kg	0.000605 %		
26	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		2.53 mg/kg		2.53 mg/kg	0.000253 %		
27	chrysene	601-048-00-0	205-923-4	218-01-9		2.98 mg/kg		2.98 mg/kg	0.000298 %		
28	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.95 mg/kg		2.95 mg/kg	0.000295 %		
29	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.89 mg/kg		0.89 mg/kg	0.000089 %		
30	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.49 mg/kg		1.49 mg/kg	0.000149 %		
31	indeno[123-cd]pyrene		205-893-2	193-39-5		0.94 mg/kg		0.94 mg/kg	0.000094 %		
32	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.2 mg/kg		0.2 mg/kg	0.00002 %		
33	benzo[ghi]perylene		205-883-8	191-24-2		0.72 mg/kg		0.72 mg/kg	0.000072 %		
34	phenol	604-001-00-2	203-632-7	108-95-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
35	1,1-dichloroethane and 1,2-dichloroethane (combined)		203-458-1, 200-863-5	107-06-2, 75-34-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
								Total:	0.0632 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No free product on PID

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0198%)

Appendix A: Classifier defined and non CLP determinands

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

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

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

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s)/Risk Phrase(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s)/Risk Phrase(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

pH (CAS Number: PH)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1,1-dichloroethane and 1,2-dichloroethane (combined) (EC Number: 203-458-1, 200-863-5, CAS Number: 107-06-2, 75-34-3)

Description/Comments: Combines the hazard statements and risk phrases for 1,1-dichloroethane and 1,2-dichloroethane
Data source: N/a
Data source date: 14 Oct 2016
Hazard Statements: Aquatic Chronic 3 H412 , Carc. 1B H350 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315 , Acute Tox. 4 H302 , Flam. Liq. 2 H225

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2019.197.3909.7942 (16 Jul 2019)
HazWasteOnline Database: 2019.197.3909.7942 (16 Jul 2019)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

APPENDIX 11: GENERIC ENVIRONMENTAL RISK ASSESSMENT

11.0 GENERIC ENVIRONMENTAL RISK ASSESSMENT

11.1 Introduction

11.1.1 This appendix provides additional background information on certain approaches and methods used by Paragon in the preparation of this report.

11.1.2 This report uses the term 'geoenvironmental' to describe aspect relating to ground related environmental issues, such as contamination. The term 'geotechnical' is used to describe aspects relating to the physical nature of the site, such as foundation requirements.

11.1.3 A two-staged approach is used to classify land:

- The first stage is referred to as a Phase 1 Investigation which includes a desk study and site walkover. Following this a preliminary conceptual site model (CSM) is developed to identify geotechnical and geoenvironmental risks.
- The second stage is referred to as Phase 2 Site Investigation, which comprises the intrusive ground investigation, laboratory testing and provision of a risk assessment whereby the CSM identified in the CSM is updated based on the site conditions.

11.1.4 The Geoenvironmental Phase 1 and Phase 2 Investigations have been completed in general accordance with BS10175:2011+A1:2017.

11.1.5 The Geotechnical aspects of the report have been broadly written in general accordance with Eurocode 7 (BS EN 1997-2:2007) and are written with the intention of fulfilling the general requirements of a Ground Investigation Report (GIR) outlined in Section 6.

11.2 Phase 1 Investigation

11.2.1 The preliminary risk assessment is made of both geotechnical and geoenvironmental hazards identified at the desk study stage. This is then updated based on the findings of the Phase 2 Investigation. The risk associated with hazards uses a matrix of probability of occurrence vs the consequence. Geotechnical risks are assessed using a ground model.

11.2.2 In the context of geoenvironmental risks, in order for there to be a risk there must be a viable pollutant linkage, which means there must be a source of contaminations, a potential receptor and a pathway linking the two. The purpose of the Preliminary Conceptual Site Model is to identify all of the potential contaminant linkages and qualitatively assess the potential risks associated with these linkages. Contaminant linkages are potentially unacceptable risks in terms of current contaminated land regime legal framework and require either further assessment through the ground investigation. Should one of the three linkages be absent then there is no linkage and no further action is required.

11.2.3 Geoenvironmental risks are also outlined within Environmental Protection Act 1990, Part 2A which uses the term 'significant harm or significant possibility of significant harm (SPOSH)', where the term 'harm' is significant.

11.2.4 Paragon has adopted a classification level based on definitions within CIRIA Report C552 and professional judgement. Paragon's Rationale for Risk Ratings is presented in Table 1. The classification for the probability of harm is presented in Table 2.

11.2.5 *Table 1. Rationale for Risk Ratings*

Risk Rating	Risk Rating	Rationale	Examples
High	H	Contaminants very likely or known to represent an unacceptable risk, SPOSH. Equivalent to EA Category 1 pollution incident including persistent and/or extensive detrimental effects on water quality, closure of a potable abstraction point. Site not suitable for proposed use Enforcement action possible Urgent action required	Significant short-term effects to humans is defined as serious injury, defects or death. Die-back of plants in landscaped areas. Short term pollution of controlled waters, major fish kill. Elevated contaminants close to potable abstraction. Major damage to buildings i.e. explosion
Medium to High	M H	Contaminants likely or known to represent an unacceptable risk Action required.	Possible short-term effects and likely long-term effects to humans is defined as serious injury, defects or death. Buildings unsafe to occupy. Ingress of contaminants through plastic pipes. Stress or dead plants in landscaped areas. Pollution of sensitive water resources
Medium	M	Contaminants likely to exceed assessment criteria and may to represent an unacceptable risk. Some damage to property (crops, buildings etc). Some action required.	Significant long-term effects to humans is defined as serious injury, defects or death. Buildings unsafe to occupy. Potential ingress of contaminants through plastic pipes. Stress or dead plants in landscaped areas. Pollution of sensitive water resources
Low to Medium	L M	Contaminants may exceed assessment criteria but no harm as no unacceptable intake or contact. Minor or short-lived damage to property, ecosystems. Site likely to be suitable for proposed use Action unlikely whilst in current use	Harm not significant, pollutant linkage broken. Minor damage to plants in landscaped areas. Minor damage to buildings.
Low	L	Contaminants likely or known to have no risk of harm. Site likely to be suitable for proposed use Repairable effects to damage to property etc. No further action required	No measurable effects. No significant impact to property, plants, ecosystems.

11.2.6 *Table 2. Classification of Probability of Geoenvironmental Risks*

Classification	Risk Rating
High Likelihood	There is a contaminant 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 contaminant linkage and all the elements are present, which means that it is probable that an event will occur.
Low Likelihood	There is a contaminant linkage and circumstances are possible under which an event could occur. However, it is no means certain that even over a longer period such event could take place and is less likely in the shorter term.
Unlikely	There is a contaminant linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

11.2.7 *Table 3. Probability / Consequence Graphic*

		Consequence				
		High	**Moderate to High**	**Moderate**	**Low to Moderate**	**Low**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk
	Likely	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Low / Moderate Risk	Low Risk	Low Risk	Very Low Risk
	Unlikely	Low / Moderate Risk	Low Risk	Very Low Risk	Very Low Risk	Very Low Risk
	No Linkage	No Risk				

11.3 Contaminant Analysis

11.3.1 The procedures set out in DEFRA/Environmental Agency Report: Land Contamination: Risk Management (LCRM) 2019, ISO 10381-5:2005 Soil Quality – Sampling and the DoE Industry Profiles provide good summaries of priority pollutants for UK sites. These have been used during the Phase 1 assessment to scope the analysis of chemicals of concern.

11.4	**Generic Tier 1 Human Health Risk Assessment**
11.4.1	Generic Assessment Criteria (GAC) are used as the limit at which exceedances would cause harm. GAC are developed based on assumptions of characteristics and behaviours or sources, pathways and receptors. These are largely conservative and are calculated using the Contaminated Land Exposure Assessment (CLEA) model, which uses exposure to the receptor and toxicology data of the contaminant in the assessment. Published and industry recognised GACs have been produced for a range of environments: • Residential with homegrown produce • Residential without homegrown produce • Commercial • Allotments • Public Open Space – Park (POS_{park}) • Public Open Space – Residential (POS_{Resi}).
11.4.2	The results of the chemical laboratory testing were screened using GACs based on two sources: • Category 4 Screening Levels (C4SLs) including cadmium, Benzo(a)pyrene, benzene, arsenic, lead and chromium VI, produced by LQM CIEH. • Suitable 4 Use Levels (S4UL) produced by LQM CIEH (2015).
11.4.3	Category 4 Screening Levels were developed to screen out land affected by contamination under Part 2A of the EPA 1990. They represent a low level of risk whilst still being protective of human health.
11.4.4	In general accordance with Health Protection Agency (HPA) guidance for the risk assessment approaches for Polycyclic Aromatic Hydrocarbons (PAH), 2010, benzo(a)pyrene has been used as a surrogate marker for carcinogenic PAHs. The threshold PAHs have been assessed individually.
11.4.5	Statistical analysis has been carried out on populations of greater than six results. Where the population is less than six, statistical analysis has been deemed inappropriate. Therefore, the maximum concentration of each contaminant has been recorded. The Upper Confidence Level or U_{95} has been calculated to present the level at which we would be 95% confident that the true mean is less than the GAC. All non-detect values have been treated as being equal to half the limit of detection.
11.4.6	These results have been used to carry out a Level 1: Quantitative Human Health Assessment for the ground contamination present against standards for the proposed commercial use of the property. These results can also be used for a preliminary assessment for off-site disposal classification.

11.5 Controlled Waters Risk Assessment

11.5.1 The Environment Agency Groundwater Protection Policy (GP3) outlines the legal framework, detailed policies, technical background and the tools to be used in the protection of groundwater. The Water Framework Directive (2000/60/EC) set out the protocol for controlling water quality of the whole water environment. During Groundwater Risk Assessments the impact on controlled waters is outlined. Controlled waters include groundwater, surface water, coastal waters, inland waters and reservoirs.

11.5.2 Aquifers are classified based on their sensitivity. The following aquifer definitions are adopted.

- Principal Aquifers - These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
- Secondary Aquifers - These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:
    - Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; and
    - Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
- Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
- Unproductive Strata - These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

11.5.3 To determine the impact of contaminants on groundwater and surface water Environmental Quality Standards (EQS) have been used as screening criteria.

11.6 Gas Risk Assessment

11.6.1 The pragmatic approach to ground gas risk assessment by Card et al 2012 has been followed to determine the gas risk of the site. This method compares the Total Organic Content (TOC) of the Made Ground, and the age and depth of the fill to provide a basis to determine the Characteristic Situation of the site.

11.6.2 The risks associated with methane and carbon dioxide are assessed using BS8485:2015 and guidelines from CIRIA (Wilson et al 2007), the NHBC (Boyle and Witherington 2007) and CL:AIRE RB17 (Card et al 2012).

11.6.3 These methods use the gas monitoring results to produce a Gas Screening Value, which is compared to Tables set out within the guidance. Information on the proposed development is then used to determine the level of gas protection required via a scoring system. Each gas protection measure is assigned a score and combinations of the measures are used to meet the score required.

11.7 Property – Water Supply Pipes

11.7.1 Standard Water Supply Pipe Assessment has been undertaken in general accordance with UK Water Industry Research (UKWIR) Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. Ref 10/WM/03/21, published 2010. The results of soil testing have been used to identify which pipes should be used, from options including, ductile iron, steel, polyethylene (PE), PE barrier, PVC and copper.

11.7.2 *Table 4. Thresholds for pipe material*

Test Group	**Testing Required**	**PE (mg/kg)**	**PVC (mg/kg)**	**Barrier Pipe (PE-Al-PE) (mg/kg)**	**Wrapped Steel**	**Wrapped Ductile Iron**	**Copper**
Total VOCs	Where Preliminary Risk ssessment (PRA) has identified land potentially affected by contamination	0.5	0.125	Pass	Pass	Pass	Pass
Total BTEX & MTBE		0.1	0.03	Pass	Pass	Pass	Pass
Total SVOCs		2	1.4	Pass	Pass	Pass	Pass
EC5–EC10 aliphatic and aromatic hydrocarbons		2	1.4	Pass	Pass	Pass	Pass
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	Pass	Pass	Pass	Pass
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	Pass	Pass	Pass	Pass
Phenols		2	0.4	Pass	Pass	Pass	Pass
Creosols and chlorinated phenols		2	0.04				
Ethers	Only where identified	0.5	1	Pass	Pass	Pass	Pass
Nitrobenzene		0.5	0.4	Pass	Pass	Pass	Pass
Ketones		0.5	0.02	Pass	Pass	Pass	Pass
Aldehydes		0.5	0.02	Pass	Pass	Pass	Pass
Amines		Fail	Pass	Pass	Pass	Pass	Pass
Corrosive	Conductivity Redox pH	Pass	Pass	Pass	*Corrosive if pH <7 and conductivity >400us/cm*	*Corrosive if pH<5, Eh not neutral and conductivity >400us/cm*	*Corrosive if pH<5 or >8 and Eh positive*

APPENDIX 12: JOMAS 2018 INVESTIGATION REPORT

GEO-ENVIRONMENTAL & GEOTECHNICAL ASSESSMENT
(GROUND INVESTIGATION)
REPORT

FOR

NORTH HYDE GARDENS,
HAYES,
UB3 4QR

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Report Title: Geo-environmental & Geotechnical Assessment Ground Investigation Report for North Hyde Gardens, Hayes, UB3 4QR.

Report Status: Final

Job No: P1470J1364/SL

Date of Issue: May 2018

QUALITY CONTROL - REVISIONS

Version	*Date*	*Issued By*

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APPENDICES

EXECUTIVE SUMMARY

Legal & General UK Property Fund commissioned Jomas Associates Ltd to undertake a Geo-environmental and Geotechnical ground investigation at the site North Hyde Gardens, Hayes, UB3 4QR.

The principle objectives of the study were as follows:

- To determine the nature and where possible, the extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);
- To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action; and,
- To obtain geotechnical parameters to inform preliminary foundation design.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

Site History and Ground Investigation	
Current Site Use	Disused engineering works
Proposed Site Use	Demolition of the existing buildings and the construction of new commercial units with associated offices, lorry docks, roadways and car parks.
Desk Study Overview	A Desk Study report has been produced for the site and issued separately (Jomas – April 2018). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information. A review of historical maps indicates that the site was undeveloped (with the exception of possible encroachment of neighbouring railway embankment) until 1935 when a creosoting works is shown on the site, with associated railway infrastructure and ground working features. A tank is also shown on site at this time. Only minor redevelopments are shown on site until the 1960s when the site is shown to be vacant, holding only ground working features. By the 1980 map a power station is shown on the western half of the site, with the eastern half undeveloped. No changes are shown until the 2002 map edition when the current structure is shown on site. No further changes are shown on site up to the most recent 2014 map edition. The surrounding areas have seen largely commercial/industrial use, starting with brick fields in the late 1800s, followed by creosoting works, engineering works and factories amongst other commercial uses developed in the late 1800s up to 1920. Tanks are shown immediately adjacent to site on the 1935 map, when a large cocoa factory is also shown 100m south-west of site. The surrounding industrial sites remain up to the present day, having undergone various redevelopments throughout the mapped period. The British Geological Survey indicates that the site is directly underlain by Langley Silt and Lynch Hill Gravel superficial deposits. These are underlain by solid deposits of the London Clay Formation. Artificial deposits are also reported within the site. Historic borehole logs provided for the site and surrounding area show the ground conditions to comprise Made Ground to approximately 3.0-4.0mbgl, overlying sand and gravel to approximately 6.0-8.0mbgl, overlying grey brown clay to a maximum proven depth of 9.0mbgl.

Site History and Ground Investigation	
	The superficial deposits underlying the site are identified as a Principal Aquifer with the underlying solid deposits identified as Unproductive. A review of the EnviroInsight Report indicates that there are no source protection zones within 500m of the site. The nearest detailed river entry is reported 16m south east of the site, identified as a the Yeading Brook. The Grand Union Canal lies 30m south west of the site. There are no Environment Agency Zone 2 or 3 floodplains reported within 250m of the site.
Intrusive Investigation	The ground investigation was undertaken on 23rd and 24th May 2018, and consisted of the following: • 7No window sampling boreholes, drilled up to 6.0m below ground level (bgl), with associated in situ testing and sampling; • 3No cable percussion boreholes with associated in situ testing and sampling; • 8No in-situ California bearing ratio tests; • Laboratory analysis for chemical and geotechnical purposes, • 4No return visits to monitor ground gas concentrations and groundwater levels have been completed.
Ground Conditions	The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground (up to 5.6mbgl depth), overlying sandy clayey gravel/gravelly sand to a maximum proven depth of 6.00mbgl, overlying clay to the base of the boreholes at a maximum proven depth of 15.45mbgl. It is considered that these represent Made Ground over Lynch Hill Gravels and London Clay. During the investigation groundwater was reported within Window Sample boreholes WS1, WS2, WS3, WS5 and WS7 at depths between 2.00mbgl and 3.80mbgl. Groundwater was also reported as being struck within cable percussive boreholes BH1, BH2 and BH3c at depths between 1.50mbgl and 5.20mbgl, rising to between 1.00mbgl and 4.70mbgl after 20 minutes monitoring. Groundwater was not reported within WS4 and WS9. During return monitoring groundwater was reported at depths of between 1.77mbgl and 3.72mbgl.
Environmental Considerations	Following generic risk assessments, no elevated levels of contaminants have been detected in soils when compared to generic screening criteria for a commercial end use. Asbestos fibres were detected in 3No samples out of 9No screened. Loose chrysotile and amosite fibres were detected and quantified as <0.001% asbestos by weight in all samples. On this basis the soils are not considered hazardous in terms of waste disposal; however there is no safe level of asbestos with regard to human health. The site proposal indicates that the majority of the site will remain covered by a combination of the proposed building footprint and hard surfacing. Where this is the case, no formal remedial measures are considered necessary in terms of human health, as the building and hard surfacing are expected to provide a barrier to potential receptors. In areas of soft landscaping, it would be prudent to replace the soils with approximately 450mm of imported clean subsoil and topsoil, placed on a membrane. Following groundwater sampling, analysis and generic quantitative risk assessment, a pollutant linkage to controlled waters is not considered to exist. Vapour risk assessment indicates that the levels of contaminants identified in groundwater do not pose a vapour risk to end users of a commercial development.

Site History and Ground Investigation	
	Ground gas risk assessment using worst-case results indicates that the site may be considered Characteristic Situation 1, meaning no formal gas protection measures are considered necessary. It is noted that buried obstructions prevented advancement of several proposed borehole locations (WS2, WS6, BH3) in central and eastern areas of the site. Ground conditions could be present in these areas (and within the footprint of the existing building) that differ significantly from those identified within this investigation. It is therefore recommended that a trial pitting exercise be undertaken following demolition, in order to confirm the absence of gross contamination in these areas. As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.
Geotechnical Considerations	Based upon the information obtained to date, due to the depth of the Made Ground encountered within the site, it is considered that conventional foundations will be unsuitable for the proposed development Consequently, either a piled foundation solution within the underlying London Clay should be considered. Indicative pile capacities are provided in Table 9.2. Alternatively ground improvement techniques could be used. This is likely to result in an allowable bearing capacity of between 100kPa -125kPa being achieved. The final choice of floor slab type would depend on the foundation solution adopted and structural requirements. Based on the results of chemical testing, the required concrete class for the site is DS-2 assuming an Aggressive Chemical Environment for Concrete classification of AC-2 within the Made Ground and DS-1 AC-1s in the natural strata in accordance with the procedures outlined in BRE Special Digest 1. Interim Advice Note 73/06 Revision 1 Design Guidance for Road Pavement Foundations, suggest that a minimum permitted design CBR of 7.4% is used. It should be noted that proof rolling and / or ground improvement is likely to increase this.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Legal & General UK Property Fund ("The Client") has commissioned Jomas Associates Ltd to assess the risk of contamination posed by the ground conditions at a site referred to as North Hyde Gardens, Hayes and to provide indicative recommendations for foundation design prior to the redevelopment of the site.

1.1.2 It is understood that the existing buildings on site are to be demolished for the construction of new commercial units.

1.1.3 To this end a Desk Study has been produced for the site and issued separately (Jomas, April 2016), followed by an intrusive investigation (detailed in this report).

1.1.4 A full list of previous reports undertaken for the site by Jomas are detailed in Table 1.1:

Table 1.1: Previous Reports - Jomas

Title	Author	Reference	Date
Geo-environmental & Geotechnical Assessment Desk Study/Preliminary Risk Assessment Report for North Hyde Gardens, Hayes, UB3 4QR	Jomas Associates	P1470J1364/sl	April 2018

1.1.5 The intrusive investigation was undertaken in accordance with Jomas proposal dated 5th April 2018.

1.2 Proposed Development

1.2.1 The proposed development is to comprise the demolition of the existing buildings and the construction of new commercial units with associated offices, lorry docks, roadways and car parks.

1.2.2 For the purposes of the contamination risk assessment, the proposed development is classified as 'commercial'.

1.2.3 For the purpose of geotechnical assessment, it is considered that the project could be classified as a Geotechnical Category (GC) 2 site in accordance with BS EN 1997. GC 2 projects are defined as involving:

- Conventional structures.
- Quantitative investigation and analysis.
- Normal risk.
- No difficult soil and site conditions.
- No difficult loading conditions.
- Routine design and construction methods.

1.3 Objectives

1.3.1 The objectives of Jomas' investigation were as follows:

- ;
- To conduct an intrusive investigation, to determine the nature and extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within Part IIA of the Environmental Protection Act 1990, associated statutory guidance and current best practice including the EA report R&D CLR 11; and,
- To obtain geotechnical parameters to inform preliminary foundation design.

1.4 Scope of Works

1.4.1 The following tasks were undertaken to achieve the objectives listed above:

- Intrusive ground investigation to determine shallow ground conditions, and potential for contamination at the site;
- Undertaking of laboratory chemical and geotechnical testing upon samples obtained;
- The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations.

1.5 Supplied Documentation

1.5.1 A report previously prepared by a third party was supplied to Jomas Associates at the commencement of this investigation. Table 1.2 details the document supplied:

Table 1.2: Supplied Reports

Title	Author	Reference	Date
Environmental Site Assessment and Overall Site Remedial Strategy	ENSR	20161171/saw	30 March 2018

1.6 Limitations

1.6.1 Jomas Associates Ltd has prepared this report for the sole use of Legal & General UK Property Fund, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas Associates Limited. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

1.6.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas Associates Limited has actual knowledge to the contrary, information obtained from public sources or provided to Jomas Associates Limited by site personnel and other information sources, have been assumed to be correct. Jomas Associates Limited does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

1.6.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

1.6.4 Any reports provided to Jomas Associates Limited have been reviewed in good faith. Jomas Associates Limited cannot be held liable for any errors or omissions in these reports, or for any incorrect interpretation contained within them.

1.6.5 This investigation and report has been carried out in accordance with the relevant standards and guidance in place at the time of the works. Future changes to these may require a re-assessment of the recommendations made within this report.

1.6.6 This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.

2 SITE SETTING

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

Table 2.1: Site Information

Name of Site	-
Address of Site	North Hyde Gardens, Hyde, UB3 4QR
Approx. National Grid Ref.	510430,179316
Site Area (Approx)	3.10ha
Site Occupation	Vacant commercial
Local Authority	London Borough of Hillingdon
Proposed Site Use	Demolition of existing buildings for the construction of new commercial units.

2.2 Desk Study Overview

2.2.1 A Desk Study report has been produced for the site and issued separately (Jomas – April 2018). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.

2.2.2 A review of historical maps indicates that the site was undeveloped (with the exception of possible encroachment of neighbouring railway embankment) until 1935 when a creosoting works is shown on the site, with associated railway infrastructure and ground working features. A tank is also shown on site at this time. Only minor redevelopments are shown on site until the 1960s when the site is shown to be vacant, holding only ground working features. By the 1980 map a power station is shown on the western half of the site, with the eastern half undeveloped. No changes are shown until the 2002 map edition when the current structure is shown on site. No further changes are shown on site up to the most recent 2014 map edition.

2.2.3 The surrounding areas have seen largely commercial/industrial use, starting with brick fields in the late 1800s, followed by creosoting works, engineering works and factories amongst other commercial uses developed in the late 1800s up to 1920. Tanks are shown immediately adjacent to site on the 1935 map, when a large cocoa factory is also shown 100m south-west of site. The surrounding industrial sites remain up to the present day, having undergone various redevelopments throughout the mapped period.

2.2.4 The British Geological Survey indicates that the site is directly underlain by Langley Silt and Lynch Hill Gravel superficial deposits. These are underlain by solid deposits of the London Clay Formation. Artificial deposits are also reported within the site.

2.2.5 Historic borehole logs provided for the site and surrounding area show the ground conditions to comprise Made Ground to approximately 3.0-4.0mbgl, overlying sand and gravel to approximately 6.0-8.0mbgl, overlying grey brown clay to a maximum proven depth of 9.0mbgl.

2.2.6 The superficial deposits underlying the site are identified as a Principal Aquifer with the underlying solid deposits identified as Unproductive.

2.2.7 A review of the EnviroInsight Report indicates that there are no source protection zones within 500m of the site.

2.2.8 The nearest detailed river entry is reported 16m south east of the site, identified as a the Yeading Brook. The Grand Union Canal lies 30m south west of the site.

2.2.9 There are no Environment Agency Zone 2 or 3 floodplains reported within 250m of the site.

2.2.10 The conceptual site model provided within the report identifies the following potential sources, pathways and receptors. The report indicates the following potential sources of contamination:

- Potential for contaminated ground associated with previous site use (creosote works) – on site (S1)
- Potential for contaminated ground associated with previous site use (power station) – on site (S2)
- Potential for contaminated ground associated with previous site use (engineering works) – on site (S3)
- Potential for Made Ground associated with previous development operations – on site (S4)
- Current and previous industrial use – off site (S5)
- Potential asbestos containing materials within existing buildings – on site (S6)
- Potential asbestos impacted soils from demolition of previous buildings – on site (S7)
- Potential ground gas generation from infilled ground working features (S8)

2.2.11 The conceptual site model identifies the following potential pathways:

- Ingestion and dermal contact with contaminated soil (P1)
- Inhalation or contact with potentially contaminated dust and vapours (P2)
- Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff. (P3)
- Horizontal and vertical migration of contaminants within groundwater (P4)
- Accumulation and Migration of Soil Gases (P5)

2.2.12 The conceptual site model identifies the following potential receptors:

- Construction and maintenance workers,
- Neighbouring and future site users,
- Buried foundations and services,
- Controlled waters – Principal/Secondary A aquifer, Yeading Brook

3 GROUND INVESTIGATION

3.1 Rationale for Ground Investigation

3.1.1 The site investigation has been undertaken generally in accordance with Contaminated Land Report 11, BS10175, NHBC Standards Chapter 4.1, and other associated Statutory Guidance. If required, further targeted investigations and remedial option appraisal would be dependent on the findings of this site investigation.

3.1.2 The soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).

3.1.3 The sampling proposal was designed in order to gather data representative of the site conditions and to target the sources identified in the Preliminary Risk Assessment.

3.2 Scope of Ground Investigation

3.2.1 The ground investigation was undertaken on 23rd & 24th May 2018.

3.2.2 The work was undertaken in accordance with BS5930 'Code of Practice for Site Investigation' and BS10175 'Investigation of Potentially Contaminated Sites'. All works were completed without incident.

3.2.3 The investigation focused on collecting data on the following:

- Quality of Made Ground/ natural ground within the site boundaries;
- Presence of groundwater beneath the site (if any), perched or otherwise;
- Determination of the presence or absence of hazardous ground gases;
- Obtaining geotechnical parameters to allow initial design to take place.

3.2.4 A summary of the fieldwork carried out at the site, with justifications for exploratory hole positions, are offered in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
Window Sample Boreholes	7	WS1-5, WS7, WS9	Up to 6mbgl	Obtain shallow samples for laboratory contamination and geotechnical testing. To allow in-situ geotechnical testing. WS1 – Targeting previous creosote factory and power station. WS2 – In close proximity to reported above ground tank. WS3 – Targeting previous creosote factory and power station.

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
				WS4 – Targeting previous power station and engineering workshop. WS5 – Targeting ground working feature. WS7 – Targeting ground working feature. WS9 – Non-targeted, edge of ground working feature.
Cable Percussion Boreholes	3	BH1-BH3c (BH3a and BH3b refused on obstructions)	Up to 15.45mbgl	Obtain deeper samples for laboratory contamination and geotechnical testing. To allow in-situ geotechnical testing. BH1 – Targeting ground working feature. BH2 – Non-targeted. BH3 – Targeting former power station.
In-situ California Bearing Ratio Tests	8	WS1, WS2, WS3, WS5, WS6, WS7, WS9, WS10	-	Obtain data for road design
Monitoring Wells	8	WS1, WS2, WS4, WS7, WS9, BH1, BH2, BH3c	Up to 4.6mbgl	Combined soil gas and groundwater monitoring wells. WS1 – Response zone in Made Ground and sandy gravel. WS2 – Response zone in Made Ground. WS4 – Response zone in Made Ground. WS7 – Response zone in Made Ground. WS9 – Response zone Made Ground, sandy gravelly clay and sandy gravel. BH1 – Response zone in Made Ground. BH2 – Response zone in Made Ground, gravel and clay. BH3c – Response zone in Made Ground.

3.2.5 The exploratory holes were completed to allow soil samples to be taken in the areas of interest identified in Table 3.1 above. In all cases, all holes were logged in accordance with BS5930:2015.

3.2.6 Exploratory hole positions were located approximately with reference to known features on site as shown in the exploratory hole location plan presented in Appendix 1. The exploratory hole records are included in Appendix 2.

3.2.7 Where monitoring well installations were not installed, the exploratory holes were backfilled with the arisings (in the reverse order in which they were drilled) and the ground surface was reinstated so that no depression was left.

3.3 In-situ Geotechnical Testing

3.3.1 In-situ geotechnical testing included Standard Penetration Tests. The determined ‘N’ values have been used to determine the relative density of granular materials and have been used with standard correlations to infer various other derived geotechnical parameters including the undrained shear strength of the cohesive strata. The results of the individual tests are on the appropriate exploratory hole logs in Appendix 2.

3.3.2 In-situ California Bearing Ratio (CBRs) were determined across the site using the dynamic probe methodology using a Perth Penetrometer Probe and the methodology laid out in IAN 73/06. Copies of the results and calculations are provided in Appendix 7.

3.4 Sampling Rationale

3.4.1 Our soil sampling rationale for the site investigation was developed with reference to EA guidance ‘Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination’ (Technical Report P5-066/TR).

3.4.2 The exploratory holes were positioned by applying a combined non-targeted sampling strategy, as well as sample locations positioned with reference to sources identified from the desk study.

3.4.3 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs.

3.4.4 Jomas Associates Limited’s engineers normally collect samples at appropriate depths based on field observations such as:

- appearance, colour and odour of the strata and other materials, and changes in these;
- the presence or otherwise of sub-surface features such as pipework, tanks, foundations and walls; and,
- areas of obvious damage, e.g. to the building fabric.

3.4.5 A number of the samples were taken from the top 0-1m to aid in the assessment of the pollutant linkages identified at the site. In addition, some deeper samples were taken to aid in the interpretation of fate and transport of any contamination identified.

3.4.6 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs (copies of which are provided in Appendix 2). The methodology used and type of samples taken were chosen to allow the Sampling category to be A or B according to EN ISO 22475-1. This in turn allows suitable geotechnical testing to be carried out.

3.4.7 During return groundwater monitoring visits, where groundwater samples were taken, these were obtained by low flow methodology.

3.4.8 Groundwater strikes noted during drilling, are recorded within the exploratory hole records in Appendix 2.

3.4.9 Samples were stored in cool boxes (<4ºC) and preserved in accordance with laboratory guidance.

3.5 Sampling Limitations

3.5.1 WS6 was terminated at 0.4mbgl on a concrete slab.

3.5.2 WS8 was terminated at 0.35mbgl as the surface concrete could not be broken through.

3.5.3 WS10 was terminated at 0.55mbgl on a concrete slab that persisted from 0.35mbgl.

3.5.4 BH3 could not be completed in its original position due to a shallow obstruction, and was moved south to a new position, named BH3b. This in turn also terminated at 0.50mbgl on an unidentified obstruction. BH3c was completed adjacent to WS5.

3.5.5 The remaining boreholes were drilled to the proposed depths at the proposed locations.

3.6 Laboratory Analysis

3.6.1 A programme of laboratory testing, scheduled by Jomas Associates Limited, was carried out on selected samples of Made Ground and natural strata.

Chemical Testing

3.6.2 Soil samples were submitted to i2 Analytical (a UKAS and MCerts accredited laboratory), for analysis.

3.6.3 The samples were analysed for a wide range of contaminants as shown in Table 3.2 below:

Table 3.2: Chemical Tests Scheduled

	No. of tests	
Test Suite	**Made Ground / Topsoil**	**Natural**
Basic Suite 3	5	-
Basic Suite 5	4	-
Total Organic Carbon	5	-
Water Soluble Sulphate	9	5
Hydrocarbon suite	11	1
PCBs	3	-
Asbestos Screen & ID	9	-

3.6.4 The determinands contained in the basic suite are as detailed in Table 3.3 below:

Table 3.3: Basic Suite of Determinands

DETERMINAND	LIMIT OF DETECTION (mg/kg)	UKAS ACCREDITATION	TECHNIQUE
Arsenic	1	Y (MCERTS)	ICPMS
Cadmium	0.2	Y (MCERTS)	ICPMS
Chromium	1	Y (MCERTS)	ICPMS
Chromium (Hexavalent)	4	Y (MCERTS)	Colorimetry
Lead	1	Y (MCERTS)	ICPMS
Mercury	0.3	Y (MCERTS)	ICPMS
Nickel	1	Y (MCERTS)	ICPMS
Selenium	1	Y (MCERTS)	ICPMS
Copper	1	Y (MCERTS)	ICPMS
Zinc	1	Y (MCERTS)	ICPMS
Boron (Water Soluble)	0.2	Y (MCERTS)	ICPMS
pH Value	0.1 units	Y (MCERTS)	Electrometric
Sulphate (Water Soluble)	0.0125g/l	Y (MCERTS)	Ion Chromatography
Total Cyanide	1	Y (MCERTS)	Colorimetry
Speciated/Total PAH	0.05/0.80	Y (MCERTS)	GCFID
Phenols	1	Y (MCERTS)	HPLC
Total Petroleum Hydrocarbons (banded)	-	N Y (MCERTS)	Gas Chromatography

3.6.5 To support the selection of appropriate tier 1 screening values, 5No samples were also analysed for total organic carbon.

3.6.6 Seven samples of groundwater that were taken during the return groundwater monitoring were analysed for a similar suite to that given above.

3.6.7 Laboratory test results are summarised in Section 6, with raw laboratory data included in Appendix 3.

Geotechnical Laboratory Testing

3.6.8 In addition to the contamination assessment, soil samples were submitted to the UKAS Accredited laboratory of i2 Analytical Ltd. for a series of analysis.

3.6.9 This testing was specifically designed to:

- to classify the samples; and
- to obtain parameters (either directly or sufficient to allow relevant correlations to be used) relevant to the technical objectives of the investigation.

3.6.10 The following laboratory geotechnical testing (as summarised in Table 3.4) was carried out:

Table 3.4 Laboratory Geotechnical Analysis

BS 1377 (1990) Test Number	Test Description	Number of tests
Part 2		
3.2	Moisture Content Determination	7
4.3 and 5.3	Liquid and Plastic Limit Determination (Atterberg Limits)	7
9.2 and 9.3	Particle Size Distribution - Sieving	3
8	Determination of the undrained shear strength in triaxial compression with single stage loading and without measurement of pore pressure	8

3.6.11 The water soluble sulphate and pH results obtained as part of the chemical analysis was used in combination with BRE Special Digest 1 to allow buried concrete to be classified.

3.6.12 The results of the geotechnical laboratory testing are presented as Appendix 4 and discussed in Section 9 of this report.

4 GROUND CONDITIONS

4.1 Soil

4.1.1 Ground conditions were logged in accordance with the requirements of BS5930:2015. Detailed exploratory hole logs are provided in Appendix 2. The ground conditions encountered are summarised in Table 4.1 below, based on the strata observed during the investigation.

Table 4.1: Ground Conditions Encountered

Stratum and Description	Encountered from (mbgl)	Base of strata (mbgl)	Thickness range (m)
Concrete/Asphalt. (MADE GROUND).	GL	0.15-0.55	0.20-0.55
Brown to black sandy gravelly clay/clayey sandy gravel/gravelly sand. Gravel consists of fine to medium angular to sub-rounded flint, brick, ash and concrete/red brick gravel. (MADE GROUND).	0.2-0.55	>1.6-5.6	>1.15-5.05
Brown/light grey/black sandy sometimes clayey GRAVEL/gravelly SAND. Gravel consists of sub-angular to sub-rounded flint. (LYNCH HILLL GRAVEL MEMBER)	1.7-5.0	>3.0->6.0	>0.2-1.7
Soft consistency dark grey to black sandy CLAY. (WS9 only) (LYNCH HILL GRAVEL MEMBER)	3.1	3.5	0.40
Grey to dark brown high to very high strength CLAY. (LONDON CLAY FORMATION)	5.0-6.0	>15.45	>9.45->10.45

4.1.2 Given the likely ground strata profile identified in the Desk Study and the BGS descriptions of the materials given in Section 3 of the Desk Study, it is considered that the encountered strata represent Made Ground overlying the Lynch Hill Gravel Member, overlying the the London Clay Formation.

4.2 Hydrogeology

4.2.1 Groundwater strikes and groundwater monitoring are summarised below.

Table 4.2: Groundwater Strikes During Drilling

Exploratory Hole ID	Depth Encountered (mbgl)	Depth After 20mins (mbgl)	Stratum
WS1	2.00	1.70	Made Ground
WS2	2.00	-	Made Ground
WS3	2.60	-	Made Ground
WS4	No strike		
WS5	2.20	-	Made Ground
WS7	3.80	-	Made Ground
WS9	No strike		
BH1	5.20	4.70	Lynch hill Gravel (very clayey gravel)
BH2	2.00	1.40	Made Ground
BH3c	1.50	1.00	Made Ground

Table 4.3: Groundwater Monitoring Records

Exploratory Hole ID	Depth Encountered (mbgl)	Depth to Base of Well (mbgl)	Stratum
BH1	3.49-3.72	5.95	Made Ground
BH2	2.04-2.16	2.30	Made Ground
BH3c	1.77-1.80	4.88	Made Ground
WS1	1.80-1.89	2.95	Made Ground
WS2	1.88-2.01	2.49	Made Ground
WS4	Dry	1.16	-
WS7	1.83-2.05	4.24	Made Ground
WS9	1.80-2.23	3.65	Lynch hill Gravel

4.3 Physical and Olfactory Evidence of Contamination

4.3.1 The following evidence of contamination was recorded during the investigation:

- Hydrocarbon odour reported in WS2 from 3.8mbgl within the Made Ground;
- Hydrocarbon odour reported in WS7 from 2.3mbgl;
- Slight organic odour reported in WS9 from 1.4-3.5mbgl;
- Ash was reported in the Made Ground of BH1 between 0.3mbgl and 5.0mbgl and BH2 between 0.2-4.0mbgl.

4.3.2 During intrusive works, soil samples were screened with a photo-ionisation detector (PID). None of the screened samples were found to record a PID result above the limit of detection (0.1 parts per million).

5 RISK ASSESSMENT – ANALYTICAL FRAMEWORK

5.1 Context and Objectives

5.1.1 This section seeks to evaluate the level of risk pertaining to human health and the environment which may result from both the existing use and proposed future use of the site. It makes use of the site investigation findings, as described in the previous sections, to evaluate further the potential pollutant linkages identified in the desk study. A combination of qualitative and quantitative techniques is used, as described below.

5.1.2 The purpose of generic quantitative risk assessment is to compare concentrations of contaminants found on site against screening level generic assessment criteria (GAC) to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed assessment is required. The approaches detailed all broadly fit within a tiered assessment structure in line with the framework set out in the Department of Environment, Food and Rural Affairs (DEFRA), EA and Institute for Environment and Health Publication, Guidelines for Environmental Risk Assessment and Management.

5.1.3 It should be noted that the statistical tests carried out in this report in accordance with CL:AIRE and CIEH (2008) recommendations, are for guidance purposes only and the conclusions of this report should be approved by the local authority prior to any redevelopment works being undertaken.

5.2 Analytical Framework – Soils

5.2.1 There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source – Pathway – Receptor linkages.

5.2.2 The CLEA model provides a methodology for quantitative assessment of the long term risks posed to human health by exposure to contaminated soils. Toxicological data have been used to calculate Soil Guideline Values (SGV) for individual contaminants, based on the proposed site use; these represent minimal risk concentrations and may be used as screening values.

5.2.3 In the absence of any published SGVs for certain substances, or where the assumptions made in generating the SGVs do not apply to the site, Jomas Associates Limited have obtained Tier 1 screening values for initial assessment of the soil, based on available current UK guidance including the LQM/CIEH S4ULs and DEFRA C4SL. Site-specific assessments are undertaken wherever possible and/or applicable. All assessments are carried out in accordance with the CLEA protocol.

5.2.4 CLEA requires a statistical treatment of the test results to take into account the normal variations in concentration of potential contaminants in the soil and allow comparisons to be made with published guidance.

5.2.5 The assessment criteria used for the screening of determinands within soils are identified within Table 5.1.

Table 5.1: Selected Assessment Criteria – Contaminants in Soils

Substance Group	Determinand(s)	Assessment Criteria Selected
Organic Substances		
Non-halogenated Hydrocarbons	Total Petroleum Hydrocarbons (TPHCWG banded)	S4UL
	Total Phenols	S4UL
Polycyclic Aromatic Hydrocarbons (PAH-16)	Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene	S4UL
Volatile Organic Compounds (VOCs/sVOCs).	Toluene, Ethylbenzene, Benzene, Xylenes	S4UL
Inorganic Substances		
Heavy Metals and Metalloids	Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, Selenium, Copper, Zinc	S4UL
	Copper, Zinc, Nickel	BS: 3882 (2015).
Cyanides	Free Cyanide	CLEA v1.06
Sulphates	Water Soluble Sulphate	BRE Special Digest 1:2005

5.3 BRE

5.3.1 The BRE Special Digest 1:2005, 'Concrete in Aggressive Ground' is used with soluble sulphate and pH results to assess the aggressive chemical environment of future underground concrete structures at the site.

5.4 Analytical Framework – Groundwater and Leachate

5.4.1 The requirement to protect groundwater from pollution is outlined in Groundwater protection: Principles and practice (GP3, EA, August 2013, v1.1).

5.4.2 Where undertaken, the groundwater quality analysis comprises a Level 1 assessment in accordance with the EA Remedial Targets Methodology Document (EA, 2006).

5.4.3 The criteria used by Jomas' in the Level 1 assessment of groundwater and leachate quality are shown in Table 5.2.

Table 5.2: Selected Assessment Criteria – Contaminants in Water

Substance Group	Determinand(s)	Assessment Criteria Selected
Metals	Arsenic, Copper, Cyanide, Mercury, Nickel, Lead, Zinc, Chromium	EQS/DWS

Substance Group	Determinand(s)	Assessment Criteria Selected
	Selenium	DWS
PAHs	Sum of Four – benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene	DWS
PAHs	Benzo(a)pyrene,	DWS
PAHs	Remainder	LEC
Total Petroleum Hydrocarbons	Aliphatic C5-C6, Aliphatic >C6-C8, Aliphatic >C8-C10. Aliphatic >C10-C12, Aliphatic >C12-C16, Aliphatic >C16-C21, Aromatic C5-C7, Aromatic >C7-C8, Aromatic >C8-C10, Aromatic >C10-C12, Aromatic >C12-C16, Aromatic >C16-C21, Aromatic> C21-C35	DWS/WHO
Benzene	Benzene	DWS
Toluene	Toluene	EQS
Ethylbenzene	Ethylbenzene	EQS
Xylene	Xylene	EQS
Oxygen Demand	Chemical Oxygen Demand and Biological Oxygen Demand	Urban Waste Water Treatment (England and Wales) Regulations

Environmental Quality Standards EQS

Environmental Quality Standards (EQS) have been released by the EA for dangerous substances, as identified by the EC Dangerous Substances Directive. EQS can vary for each substance, for the hardness of the water and can be different for fresh, estuarine or coastal waters.

Lowest Effect Concentration (LEC)

These criteria relate to the concentration of PAHs in groundwater. They are taken from the EA R&D Technical Report P45 – Polycyclic Aromatic Hydrocarbons (PAH): Priorities for Environmental Quality Standard Development (2001).

WHO Health

These screening criteria have been taken from the World Health Organisation Guidelines for Drinking Water Quality (1984). The health value is a guideline value representing the concentration of a contaminant that does not result in any significant risk to the receptor over a lifetime of exposure.

Further criteria have been obtained from 'Petroleum Products in Drinking-water' - Background document for development of WHO Guidelines for Drinking-water Quality (2005).

UK Drinking Water Standards (DWS)

These comprise screening criteria provided by the Drinking Water Inspectorate (DWI) in the Water Supply (Water Quality) Regulations 2006,

Urban Waste Water Treatment (England and Wales) Regulations - UWWT Regs
The Urban Waste Water Treatment (England and Wales) Regulations SI/1994/2841 as amended by SI/2003/1788 sets down minimum standards for the discharge of treated effluent from waste water treatment works to inland surface waters, groundwater, estuaries or coastal waters. Standards of (125mg/L) COD and (25mg/L) BOD have been set.

5.5 Site Specific Criteria

5.5.1 The criteria adopted in the selection of correct screening criteria from published reports as previously described, are provided within Tables 5.3.

Table 5.3: Site Specific Data

Input Details	Value
Land Use Scenario	Commercial
Soil Organic Matter	2.5%

5.5.2 As the published reports only offer the option of selecting an SOM value of 1%, 2.5% or 6%, an SOM value of 2.5% has been used for the generation of generic assessment criteria, as 2.49% was the mean value obtained from laboratory analysis.

6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Screening of Soil Chemical Analysis Results – Human Health Risk Assessment

6.1.1 To focus on the contaminants of potential concern (COPC), the results have been compared with the respective SGV/GAC. Those contaminants which exceed the SGV/GAC are considered to be the COPC. Those which do not exceed the respective SGV/GAC are not considered to be COPC and as such do not require further assessment in relation to the proposed development of the site.

6.1.2 Laboratory analysis for soils are summarised in Tables 6.1 to 6.4. The laboratory certificates are included in Appendix 3.

Table 6.1: Soil Laboratory Analysis Results – Metals, Metalloids, Phenol, Cyanide

Determinand	Unit	No. samples tested	Screening Criteria		Min	Max	No. Exceeding
Arsenic	mg/kg	9	640	S4UL	12	34	0
Cadmium	mg/kg	9	190	S4UL	<0.2	4.3	0
Chromium	mg/kg	9	8600	S4UL	<4.0	<4.0	0
Lead	mg/kg	9	2330	C4SL	39	800	0
Mercury	mg/kg	9	58	S4UL	<0.3	0.9	0
Nickel	mg/kg	9	980	S4UL	17	210	0
Copper	mg/kg	9	68000	S4UL	42	320	0
Zinc	mg/kg	9	730000	S4UL	75	820	0
Total Cyanide [A]	mg/kg	9	33	CLEA v 1.06	<1	<1	0
Selenium	mg/kg	9	12000	S4UL	<1	1.6	0
Boron Water Soluble	mg/kg	9	240000	S4UL	0.9	4.1	0
Phenols	mg/kg	9	440	S4UL	<1	1.1	0

Notes:

[A] Generic assessment criteria derived for free inorganic cyanide.

Table 6.2: Soil Laboratory Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Naphthalene	mg/kg	17	S4UL	460	<0.05	11	0
Acenaphthylene	mg/kg	17	S4UL	97000	<0.05	1.2	0
Acenaphthene	mg/kg	17	S4UL	97000	<0.05	22	0
Fluorene	mg/kg	17	S4UL	68000	<0.05	28	0
Phenanthrene	mg/kg	17	S4UL	22000	<0.05	19	0
Anthracene	mg/kg	17	S4UL	540000	<0.05	18	0
Fluoranthene	mg/kg	17	S4UL	23000	<0.05	49	0
Pyrene	mg/kg	17	S4UL	54000	<0.05	34	0

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Benzo(a)anthracene	mg/kg	17	S4UL	170	<0.05	8.9	0
Chrysene	mg/kg	17	S4UL	350	<0.05	7.6	0
Benzo(b)fluoranthene	mg/kg	17	S4UL	44	<0.05	9.5	0
Benzo(k)fluoranthene	mg/kg	17	S4UL	1200	<0.05	3.4	0
Benzo(a)pyrene	mg/kg	17	S4UL	35	<0.05	7.9	0
Indeno(123-cd)pyrene	mg/kg	17	S4UL	510	<0.05	3.5	0
Dibenzo(ah)anthracene	mg/kg	17	S4UL	3.6	<0.05	0.88	0
Benzo(ghi)perylene	mg/kg	17	S4UL	4000	<0.05	3.8	0
Total PAH	mg/kg	17	-	-	<0.80	260	-

Table 6.3: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPH)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
C_8-C_{10}	mg/kg	5	S4UL	4800	<0.1	<0.1	0
>C_{10}-C_{12}	mg/kg	5	S4UL	2800	<2.0	9.3	0
>C_{12}-C_{16}	mg/kg	5	S4UL	37000	<4.0	76	0
>C_{16}-C_{21}	mg/kg	5	S4UL	28000	7.7	270	0
>C_{21}-C_{35}	mg/kg	5	S4UL	28000	58	4100	0
Total TPH	mg/kg	5	-	-	65.7	4449.4	-

Note: *The lower value of guidelines for Aromatic/Aliphatics has been selected

Table 6.4: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPHCWG)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
>C_5-C_6 Aliphatic	mg/kg	12	S4UL	5900	<0.001	<0.001	0
>C_6-C_8 Aliphatic	mg/kg	12	S4UL	17000	<0.001	<0.001	0
>C_8-C_{10} Aliphatic	mg/kg	12	S4UL	4800	<0.001	<0.001	0
>C_{10}-C_{12} Aliphatic	mg/kg	12	S4UL	23000	<1.0	6.8	0
>C_{12}-C_{16} Aliphatic	mg/kg	12	S4UL	82000	<2.0	42	0
>C_{16}-C_{35} Aliphatic	mg/kg	12	S4UL	1700000	<16.0	245	0
>C_5-C_7 Aromatic	mg/kg	12	S4UL	46000	<0.001	<0.001	0
>C_7-C_8 Aromatic	mg/kg	12	S4UL	110000	<0.001	<0.001	0
>C_8-C_{10} Aromatic	mg/kg	12	S4UL	8100	<0.001	<0.001	0
>C_{10}-C_{12} Aromatic	mg/kg	12	S4UL	2800	<1.0	20.0	0
>C_{12}-C_{16} Aromatic	mg/kg	12	S4UL	37000	<2.0	450	0
>C_{16}-C_{21} Aromatic	mg/kg	12	S4UL	28000	<10	790	0

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
>C_{21}-C_{35} Aromatic	mg/kg	12	S4UL	28000	<10	340	0
Total TPH (Ali/Aro)	mg/kg	12	-	-	<20.0	1800	0

6.2 Volatile Organic Compounds

6.2.1 In addition to the suites outlined previously, 12No samples were tested for the presence of volatile organic compounds including the BTEX compounds (benzene, toluene, ethylbenzene, xylene). No VOCs were reported above the laboratory detection limit within any tested sample.

6.3 Polychlorinated Biphenyl (PCB) Concentrations

6.3.1 In addition to the suites outlined previously, 4No. samples from the vicinity of electrical infrastructure were analysed for the presence of PCBs. No PCBs were reported above the laboratory method detection limit.

6.4 Asbestos in Soil

6.4.1 9No samples of the Made Ground were screened in the laboratory for the presence of asbestos. The results of the analyses are summarised below in Table 6.5 below:

Table 6.5: Asbestos Analysis – Summary

Sample	Screening result.	Quantification result (%)	Comments
WS1 – 0.50mbgl	Not detected	-	-
WS2 – 0.60mbgl	Not detected	-	-
WS5 – 0.50mbgl	Detected	<0.001	Amosite – loose fibres
WS7 – 0.50mbgl	Not detected	-	-
WS7 – 1.00mbgl	Detected	<0.001	Amosite – loose fibres
WS9 – 0.25mbgl	Not detected	-	-
BH1 – 0.50mbgl	Not detected	-	-
BH2 – 0.50mbgl	Not detected	-	-
BH3c – 0.50mbgl	Detected	<0.001	Chrysotile – loose fibres

6.4.2 The results reported an asbestos content of below 0.1%, the fibre content at which arisings are considered hazardous for the purpose of disposal.

6.4.3 It should be noted that for the purposes of human health assessment there is no level of asbestos below which it is deemed the materials are “safe”.

6.5 Screening of Groundwater Chemical Analysis Results

6.5.1 Samples of groundwater obtained from the borehole installations installed within exploratory locations BH1, BH2, BH3., WS1, WS2, WS7, WS9 were submitted for chemical analysis.

6.5.2 The samples were obtained by low flow methodology; low flow provides the most representative samples possible by minimising sediment content. The low flow methodology removed the static and stagnant water from within the wells and means that the sample is there more representative of the groundwater. The recorded results of the low flow monitoring are included in Appendix 6.

6.5.3 The results of the laboratory testing are summarised in Tables 6.6 to 6.8 below, with the raw chemical testing data presented in Appendix 3.

Table 6.6: Groundwater Laboratory Analysis Results

Determinand	Unit	No. samples tested	Screening Criteria		Min	Max	No of Exceedances
Arsenic	µg/l	6	10	DWS	<1.0	8.5	0
	µg/l	6	50	EQS	<1.0	8.5	0
Cadmium	µg/l	6	5	DWS	<0.008	0.08	0
Chromium	µg/l	6	50	DWS	<0.4	29	0
Lead	µg/l	6	10	DWS	<1.0	4.5	0
	µg/l	6	1.2*	EQS	<1.0	4.5	5No (BH1, BH3, WS1, WS2, WS7)
Nickel	µg/l	6	20	DWS	2.3	6.2	0
	µg/l	6	4*	EQS	2.3	6.2	4No (BH1, BH3, WS1, WS7)
Copper	µg/l	6	12	EQS	<0.7	26	1No (WS7)
			2000	DWS	<0.7	26	0
Zinc	µg/l	6	5000	DWS	1.7	41	0
	µg/l	6	12.9**	EQS	1.7	41	2No (BH1, BH3)
Mercury	µg/l	6	1	DWS	<0.5	1.4	1No (WS7)
Selenium	µg/l	6	10	DWS	<4.0	<4.0	0
Boron	µg/l	6	1000	DWS	79	200	0
	µg/l	6	2000	EQS	79	200	0
Cyanide (Total)	µg/l	6	50	DWS	<1.0	24	0
	µg/l	6	1	EQS	<1.0	24	3No (WS1, WS2, WS7)
Phenols (Total)	µg/l	6	7.7	EQS	<10	35	2No (WS7, BH2)

* bioavailable concentration

**bioavailable concentration + ambient background concentration dissolved for Thames Groundwater (2 µg/L)

6.5.4 It should be noted that the laboratory detection limit for phenol is higher than the EQS. However, it is assumed that only detected levels have failed the relevant criteria.

Table 6.7: Groundwater Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. samples tested	Screening Criteria		Min.	Max.	No. of Exceedances
Naphthalene	µg/l	6	2.4	EQS	<0.01	13.4	1No (WS1)
Acenaphthylene	µg/l	6	-	-	<0.01	0.26	-
Acenaphthene	µg/l	6	-	-	<0.01	12.7	-
Fluorene	µg/l	6	-	-	<0.01	7.55	-
Phenanthrene	µg/l	6	-	-	<0.01	7.23	-
Anthracene	µg/l	6	0.1	EQS	<0.01	3.10	2No (WS1, WS7)
Fluoranthene	µg/l	6	0.0063	EQS	<0.01	2.37	2No (WS1, WS7)
Pyrene	µg/l	6	-	-	<0.01	1.39	-
Benzo(a)anthracene	µg/l	6	-	-	<0.01	0.12	-
Chrysene	µg/l	6	-	-	<0.01	0.11	-
Sum of four Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(ghi)perylene Indeno(123-cd)pyrene	µg/l	6	0.1	DWS	<0.04	<0.04	0
Benzo(a)pyrene	µg/l	6	0.01	DWS	<0.01	<0.01	0
	µg/l	6	0.00017	EQS	<0.01	<0.01	0
Dibenzo(ah)anthracene	µg/l	6	-	-	<0.01	<0.01	-

***** Laboratory method detection limit exceeds the EQS.

Table 6.8: Groundwater Analysis Results – TPHCWG & BTEX compounds– Controlled Waters

Determinand	Unit	No. Samples tested	Screening Criteria		Min.	Max.	No. of Exceedances
Benzene	µg/l	7	10	EQS	<1.0	<1.0	0
	µg/l	7	1	DWS	<1.0	<1.0	0
Toluene	µg/l	7	700	DWS	<1.0	<1.0	0
	µg/l	7	74	EQS	<1.0	<1.0	0
Ethyl benzene	µg/l	7	300	DWS	<1.0	<1.0	0
Xylenes	µg/l	7	500	DWS	<1.0	<1.0	0
MTBE	µg/l	7	15	DWS	<1.0	<1.0	0
>C5-C6 Aliphatic	µg/l	7	15000	WHO	<1.0	<1.0	0
>C6-C8 Aliphatic	µg/l	7	15000	WHO	<1.0	<1.0	0
>C8-C10 Aliphatic	µg/l	7	300	WHO	<1.0	<1.0	0
>C10-C12 Aliphatic	µg/l	7	300	WHO	<10	<10	0
>C12-C16 Aliphatic	µg/l	7	300	WHO	<10	<10	0

Determinand	Unit	No. Samples tested	Screening Criteria		Min.	Max.	No. of Exceedances
>C16-C21 Aliphatic	µg/l	7	-	WHO	<10	<10	0
>C21-C35 Aliphatic	µg/l	7	90	WHO	<10	<10	0
>C5-C7 Aromatic	µg/l	7	10	WHO	<1.0	<1.0	0
>C7-C8 Aromatic	µg/l	7	700	WHO	<1.0	<1.0	0
>C8-C10 Aromatic	µg/l	7	300	WHO	<1.0	<1.0	0
>C10-C12 Aromatic	µg/l	7	90	WHO	<10	38	0
>C12-C16 Aromatic	µg/l	7	90	WHO	<10	69	0
>C16-C21 Aromatic	µg/l	7	90	WHO	<10	82	0
>C21-C35 Aromatic	µg/l	7	90	WHO	<10	<10	0

6.5.5 In addition to the suite outlined above, 7No water samples were also analysed for a suite of volatile organic compounds, including the BTEX compounds. None of the compounds analysed for were reported above the laboratory method detection limit.

6.5.6 As shown in the tables above, a number of contaminants have been detected in water above their respective screening criteria. With the exception of mercury, all other failures were recorded against environmental quality standards (EQS).

6.5.7 As only a single minor exceedance for mercury was reported against drinking water standards (DWS), and no potable abstraction is reported within 2km of the site, a pollutant linkage to potable drinking water is not considered to exist..

6.5.8 As reported in the Desk Study Report, the nearest potential surface water receptor is Yeading Brook located 16m south-east. Groundwater beneath the site is anticipated to flow in southerly/southeasterly direction, i.e. towards and in the direction of flow of the Yeading Brook.

6.5.9 Naphthalene was detected above the EQS in one well (WS1). However, exceedances were not detected in any other wells, including anticipated downgradient wells BH3, WS7 and BH1, and therefore the risk of naphthalene migrating from the area of recorded impact at WS1 to impact the brook is considered low.

6.5.10 The polyaromatic hydrocarbons anthracene and fluoranthene were detected in excess of the EQS in groundwater samples from WS1 and WS7. However, these PAHs have relatively low mobility in groundwater, and therefore are not considered to pose a significant risk to the Yeading Brook.

6.5.11 Elevated levels of total cyanide have been reported within water samples, most elevated within WS7 but also elevated above EQS in WS1 and WS2. No soil source of cyanide has been identified (all samples below detection limit) and the sample from BH1 (closest to the brook) reported cyanide below detection limit. In addition, the EQS standard is based on “free” cyanide, rather than the “total” cyanide reported by the laboratory; the quantity of free cyanide is likely to be lower than the reported total. On this basis, no further action is considered necessary with regards to cyanide levels.

6.5.12 Exceedances are reported for lead, nickel and zinc when compared against environmental quality standards; however, these standards are based on the bioavailable quantity of these metals, rather than the total level reported by the laboratory analysis. The bioavailable content would be expected to be lower than the total level reported. Significantly elevated concentrations of these determinands have not been detected in soils on site and given the marginal exceedances detected in groundwater, a pollutant linkage from these determinands to the Yeading Brook is not considered to exist.

6.6 Groundwater Vapour Risk Assessment

6.6.1 Due to the presence of contaminants in water samples on site, an assessment has been undertaken to determine whether these contaminants pose a risk in terms of vapour inhalation from a groundwater source.

6.6.2 Table 6.9 below compares the results of groundwater analysis with criteria produced by the Society for Brownfield Risk Assessment (SoBRA, 2017) for assessing vapour risks to human health from groundwater in a commercial setting. Only contaminants recorded above detection limits have been assessed.

6.6.3 The result of the assessment shows that no exceedances were detected and therefore no pollutant linkage is considered to exist in this regard.

Table 6.9: Groundwater Vapour Risk Analysis Results

Determinand	Unit	No. samples tested	Screening Criteria	Min.	Max.	No. of Exceedances
Naphthalene	µg/l	7	23000	<0.01	13.4	0
Acenaphthylene	µg/l	7	20000000	<0.01	0.26	0
Acenaphthene	µg/l	7	15000000	<0.01	12.7	0
Fluorene	µg/l	7	18000000	<0.01	7.55	0
Phenanthrene	µg/l	7	Insufficiently volatile	<0.01	7.23	-
Anthracene	µg/l	7	Insufficiently volatile	<0.01	3.10	-
Fluoranthene	µg/l	7	Insufficiently volatile	<0.01	2.37	-
Pyrene	µg/l	7	Insufficiently volatile	<0.01	1.39	-
Benzo(a)anthracene	µg/l	7	Insufficiently volatile	<0.01	0.12	-
Chrysene	µg/l	7	Insufficiently volatile	<0.01	0.11	-
Aromatic EC10-12	µg/l	7	660000	<10	38	0
Aromatic EC12-16	µg/l	7	3700000	<10	69	0
Aromatic EC16-21	µg/l	7	Insufficiently volatile	<10	82	-
Aromatic EC21-35	µg/l	7	Insufficiently volatile	<10	<10	-
Phenols*	µg/l	7	14000*	<10	35	0

*test result is for total phenols. Lowest screening criteria for any single phenol compound has been selected.

6.7 Screening of Soil Chemical Analysis Results – Potential Risks to Plant Growth

6.7.1 Zinc, copper and nickel are phytotoxins and could therefore inhibit plant growth in soft landscaped areas. Concentrations measured in soil for these determinands have been compared with the pH dependent values given in BS: 3882 (2015).

6.7.2 Adopting a pH value of greater than 7, as indicated by the results of the laboratory analysis, the following is noted;

Table 6.10: Soil Laboratory Analysis Results – Phytotoxic Determinands

Determinand	Threshold level (mg/kg)	Min (mgkg)	Max (mg/kg)	No. Exceeding
Zinc	300	75	820	3No (WS5@0.50mbgl, WS5@1.00mbgl, BH3c@0.50mbgl)
Copper	200	42	320	3No (WS5@0.50mbgl, WS5@1.00mbgl, BH3c@0.50mbgl)
Nickel	110	17	210	1No (WS5@1.00mbgl)

6.8 Screening for Water Pipes

6.8.1 Given the elevated levels of contaminants within soils, as reported above, it is anticipated that upgraded utility pipework will be required.

6.8.2 The water supply pipe requirements for this site should be discussed at an early stage with the relevant utility provider.

6.9 Waste Disposal

6.9.1 The classification of materials for waste disposal purposes was outside the scope of this report. Should quantities of material require off-site disposal, Waste Acceptance Criteria testing will be required.

6.9.2 It is noted that the asbestos content of the impacted soils has been quantified as <0.001%, and therefore the soils samples tested are unlikely to be classified as hazardous waste in terms of asbestos content.

7 SOIL GAS RISK ASSESSMENT

7.1 Soil Gas Results

7.1.1 Four return monitoring visits have been undertaken between 4th May 2018 and 23rd May 2018, to monitor wells installed within boreholes at the site for soil gas concentrations and groundwater levels.

7.1.2 During these visits pressure trends observed were static, rising and falling.

7.1.3 The results of the monitoring undertaken are summarised in Table 7.1 below, with the monitoring records presented in Appendix 5.

Table 7.1: Summary of Gas Monitoring Data

Hole No.	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	VOCs (ppm)	Peak Flow Rate (l/hr)	Depth to water (mbgl)	Depth of installation (mbgl)
BH1	0.0	0.0-0.2	16.4-21.7	0	1-2	0.0 - +0.3	3.49-3.72	5.95
BH2	0.0	0.1	13.2-18.5	0-2	1-2	0.0 - +0.2	2.04-2.16	2.30
BH3	0.0	0.2-0.8	16.4-21.2	0	1	-0.1- +0.2	1.77-1.80	5.72
WS1	0.0	0.3-0.9	18.3-21.3	0	1	0.0 - +0.4	1.80-1.89	2.95
WS2	0.0	0.1-0.3	20.0-21.1	0	1	0.0 - +0.2	1.88-2.01	2.49
WS4	0.0	0.0-0.1	21.1-21.8	0	1	0.0 - +0.2	Dry	1.16
WS7	0.0	0.0-0.1	16.4-19.2	0	1	0.0 - +0.3	1.83-2.05	4.24
WS9	0.0	0.7-2.2	19.5-20.6	0	1	0.0 - +0.3	1.80-2.23	3.64

7.2 Screening of Results

7.2.1 As shown in Table 7.1, no methane has been reported to date. Carbon dioxide has been reported to a maximum concentration of 2.2% v/v. Screening of the monitoring well headspaces with a photo-ionisation detector (PID) has detected volatile organic compound (VOC) concentrations to a maximum level of 2ppm. A maximum flow rate of +0.4l/hr has been reported.

7.2.2 In the assessment of risks posed by hazardous ground gases and selection of appropriate mitigation measures, BS8485 (2015) identifies four types of development, termed Type A to Type D.

7.2.3 Type D buildings are defined as

> *"industrial style building having large volume internal space(s) that are well ventilated. Corporate ownership with building management controls on alterations to the ground floor and basement areas of the building and on maintenance of ground gas protective measures. Probably civil engineering construction. Examples are retail park sales buildings, factory shop floor areas, warehouses. (Small rooms within these style buildings should be separately categorized as Type B or Type C)."*

7.2.4 Although the majority of the development is likely to fall under Type D, small office areas of the development should be separately characterised as the more sensitive Type B, therefore Type B has been adopted as the relevant category for the proposed development to provide an initially conservative assessment. If required, the large rooms may be separately assessed as lower sensitivity in future. Type B buildings are defined as

> *" private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels."*

7.2.5 The soil gas assessment method is based on that proposed by Wilson & Card (1999), which was a development of a method proposed in CIRIA publication R149 (CIRIA, 1995). The method uses both gas concentrations and borehole flow rates to define a characteristic situation based on the limiting borehole gas volume flow for methane and carbon dioxide. In both these methods, the limiting borehole gas volume flow is renamed as the Gas Screening Value (GSV).

7.2.6 The Gas Screening Value (litres of gas per hour) is calculated by using the following equation

GSV = (Concentration/100) X Flow rate

Where concentration is measured in percent (%)
and flow rate is measured in litres per hour (l/hr)

7.2.7 The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

7.2.8 To accord with C665, worst case conditions are used in the calculation of GSVs for the site.

7.2.9 A worst-case flow rate of 0.4l/hr (maximum reported) will be used in the calculation of GSVs for the site. The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

7.2.10 To accord with C665, worst case conditions are used in the calculation of GSVs for the site. These have been summarised below in Table 7.2

Table 7.2: Summary of Gas Monitoring Data

Gas	Concentration (v/v %)	Peak Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (after CIRIA C665)
CO_2	2.2	+0.4	0.0088	**1**
CH_4	<0.1	+0.4	0.0004	**1**

7.2.11 The methodology set out in BS 8485 (2015) has been used for determining the required gas protection measures. For a Type B development on a CS1 site, no formal gas protection measures are considered necessary.

7.2.12 BS 8576:2013 has been used to derived threshold levels for carbon monoxide and volatile organic compounds.

7.2.13 Although elevated carbon monoxide levels were recorded on the first two visits, the readings have been decreasing with each visit with the final 3No visits all below the reported threshold at which negative health implications are anticipated, as reported in BS8576. The elevated levels were also only recorded in a single monitoring well out of 8No monitored. On this basis it is not considered that additional protection measures need to be incorporated to protect end users from carbon monoxide.

7.2.14 PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 2ppm. Although some elevated levels of petroleum hydrocarbons have been reported in soils, none of these were found to exceed their respective screening criteria for the proposed end use, and no VOCs were detected by laboratory testing. Following generic quantitative risk assessment of vapour risk from a dissolved pahse (groundwater) source, no such pollutant linkage is considered to exist. Therefore, it is considered that the PID screening of monitoring well confirms the assessment that risks to human health receptors via vapour inhalation pathways are low.

8 SUMMARY OF RESULTS

8.1 Land Quality Impact Summary

8.1.1 Following the ground investigation, the following is noted:

- It is understood that the proposed development will comprise the demolition of the existing buildings and the construction of new commercial units with associates offices, lorry docks, roadways and car parks.

- Following generic risk assessments, no elevated levels of contaminants have been detected in soils when compared to generic screening criteria for a commercial end use.

- Asbestos fibres were detected in 3No samples out of 9No screened. Loose chrysotile and amosite fibres were detected and quantified as <0.001% asbestos by weight in all samples. On this basis the soils are not considered hazardous in terms of waste disposal; however there is no safe level of asbestos with regard to human health.

- The site proposal indicates that the majority of the site will remain covered by a combination of the proposed building footprint and hard surfacing. Where this is the case, no formal remedial measures are considered necessary in terms of human health, as the building and hard surfacing are expected to provide a barrier to potential receptors. In areas of soft landscaping, it would be prudent to replace the soils with approximately 450mm of imported clean subsoil and topsoil, placed on a membrane.

- Following groundwater sampling, analysis and generic quantitative risk assessment, a pollutant linkage to controlled waters is not considered to exist.

- Vapour risk assessment indicates that the levels of contaminants identified in groundwater do not pose a vapour risk to end users of a commercial development.

- Ground gas risk assessment using worst-case results indicates that the site may be considered Characteristic Situation 1, meaning no formal gas protection measures are considered necessary.

- It is noted that buried obstructions prevented advancement of several proposed borehole locations (WS2, WS6, BH3) in central and eastern areas of the site. Ground conditions could be present in these areas (and within the footprint of the existing building) that differ significantly from those identified within this investigation. It is therefore recommended that a trial pitting exercise be undertaken following demolition, in order to confirm the absence of gross contamination in these areas.

- As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.

8.1.2 The above conclusions are made subject to approval by the statutory regulatory bodies.

8.2 Review of Pollutant Linkages Following Site Investigation

8.2.1 The site CSM has been revised and updated from that suggested in the desk study in view of the ground investigation data, including soil laboratory analysis results. Table 8.1 highlights whether pollutant linkages identified in the original CSM are still relevant following the risk assessment, or whether pollutant linkages, not previously identified, exist.

Table 8.1: Plausible Pollutants Linkages Summary (Pre Remediation)

Potential Source (from desk study)	Pathway	Receptor	Relevant Pollutant Linkage?	Comment
• Potential for contaminated ground associated with previous site use (creosote works) – on site (S1) • Potential for contaminated ground associated with previous site use (power station) – on site (S2) • Potential for contaminated ground associated with previous site use (engineering works) – on site (S3) • Potential for Made Ground associated with previous development operations – on site (S4) • Current and previous industrial use – off site (S5) • Potential asbestos containing materials within existing buildings – on site (S6) • Potential asbestos impacted soils from demolition of previous buildings – on site (S7) • Potential ground gas generation from infilled ground working features (S8)	• Ingestion and dermal contact with contaminated soil (P1) • Inhalation or contact with potentially contaminated dust and vapours (P2) • Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6)	• Construction workers (R1) • Maintenance workers (R2) • Neighbouring site users (R3) • Future site users (R4) • Building foundations and on site buried services (water mains, electricity and sewer) (R5)	✓	Asbestos detected in soils. see 8.1 above for remedial measures. The findings of this report should be included in the construction health and safety file, with adequate measures put in place for the protection of construction and maintenance workers.
	• Accumulation and migration of soil gases (P5)		X	No gas protection measures are considered necessary for the proposed development.
	• Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff. (P3) • Horizontal and vertical migration of contaminants within groundwater (P4)	• Neighbouring site users (R3) • Building foundations and on site buried services (water mains, electricity and sewer) (R5) • Controlled waters – Principal/Secondary A aquifer, Yeading Brook (R6)	X	Contact should be made with relevant utility providers to confirm if upgraded materials are required.

9 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

9.1 Ground Investigation Summary

9.1.1 No detailed structural engineering design information, with respect to the type of construction and associated structural loadings, was provided at the time of preparing this report. Consequently, a detailed discussion of all the problems that may arise during the proposed redevelopment scheme is beyond the scope of this report.

9.1.2 Practical solutions to the difficulties encountered, both prior to, and during construction, are frequently decided by structural constraints or economic factors. For these reasons, this discussion is predominantly confined to remarks of a general nature, which are based on site conditions encountered during the intrusive investigations.

9.1.3 The proposed development is to comprise the demolition of the existing buildings and the construction of new commercial units with associated offices, lorry docks, roadways and car parks.

9.2 Geotechnical Classification

9.2.1 At the Desk Study stage this development was deemed to be a GC2 development in accordance with BS: 1997.

9.2.2 The findings of the investigation undertaken and discussed previously do not change this assessment.

9.3 Data Summary

9.3.1 The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground (up to 5.6mbgl depth), overlying sandy clayey gravel/gravelly sand to a maximum proven depth of 6.00mbgl, overlying clay to the base of the boreholes at a maximum proven depth of 15.45mbgl.

9.3.2 A summary of ground conditions obtained from the ground investigation and the derived geotechnical parameters, is provided in Table 9.1 below.

Table 9.1: Ground Conditions and Derived Geotechnical Parameters

Strata	Depth Encountered (from-to) (mbgl)	SPT 'N' Value*	Inferred Shear Strength (kPa)	Measured Shear Strength (kPa)	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (corrected plasticity) (%)	NHBC Volume Change Classification
Brown to black sandy gravelly clay/clayey sandy gravel/gravelly sand. Gravel consists of fine to medium angular to sub-rounded flint, brick, ash and concrete/red brick gravel. (MADE GROUND).	GL To 1.6-5.6	2 - 40	-	-	-	-	-	-	-
Brown/light grey/black sandy sometimes clayey GRAVEL/gravelly SAND. Gravel consists of sub-angular to sub-rounded flint. (LYNCH HILLL GRAVEL MEMBER)	1.7-5.6 To >3.0->6.0	7 - 29	-	-	-	-	-	-	-
Soft consistency dark grey to black sandy CLAY. (WS9 only) (LYNCH HILLL GRAVEL MEMBER)	3.1 To 3.5	112**	-	-	-	-	-	-	-
Grey to dark brown high to very high strength CLAY. (LONDON CLAY FORMATION)	5.0-6.0 To >15.45	22 - 43	99-193.5	66-240	7.7-31	23-74	25-29	33-46 (19.8-46)	Low-high

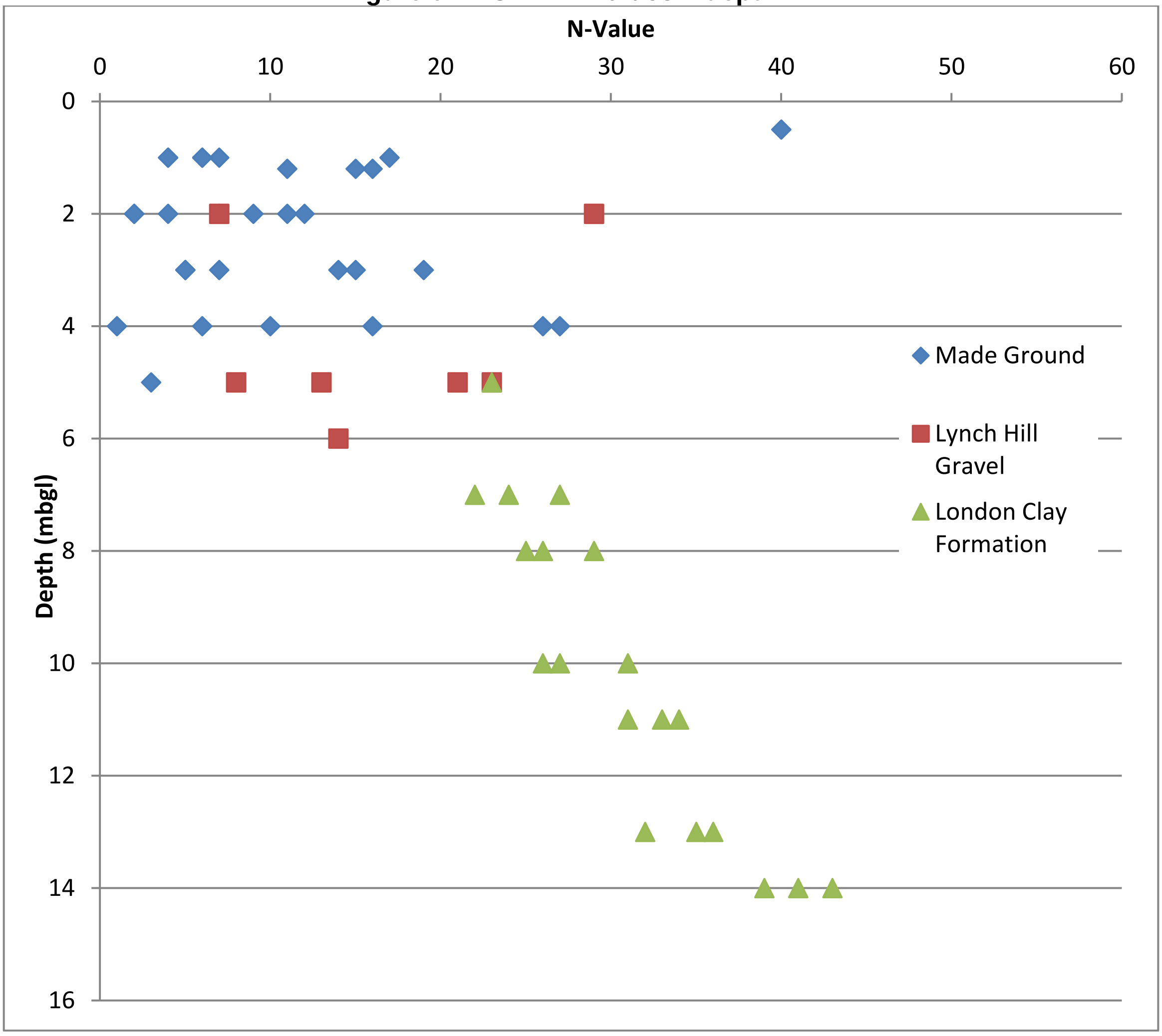
*anomalously high N-equis have been discounted
**N-equi – considered to be unrepresentative

9.4 Standard Penetration Tests

9.4.1 Standard Penetration Tests were undertaken at regular intervals throughout the window sampler and cable percussive boreholes. The results of the SPTs are plotted against depth in Figure 9.1 below.

9.4.2 The strata have been grouped into “Made Ground”, *Lynch Hill Gravel” and “London Clay”.

Figure 9.1: SPT ‘N’ values v depth



9.4.3 As shown on the graph above, the N-values are highly variable within the Made Ground and Lynch Hill Gravel, before a strong positive correlation between depth and N-value within the London Clay Formation.

9.4.4 It should also be noted that a result undertaken in the cohesive Lynch Hill Gravel calculated a N-equi of 120. Given the thickness of this material and the observed properties of the material this result is likely to have been affected by the underlying granular Lynch Hill Gravel or pushing a material from the Made Ground.

9.5 Undrained Shear Strength

9.5.1 As discussed above, the N values recorded in the London Clay Formation varies with depth. This infers that the undrained shear strength of the clay similarly varies. Figure 9.2 below shows the undrained shear strength inferred by the correlation suggested by Stroud (1974),

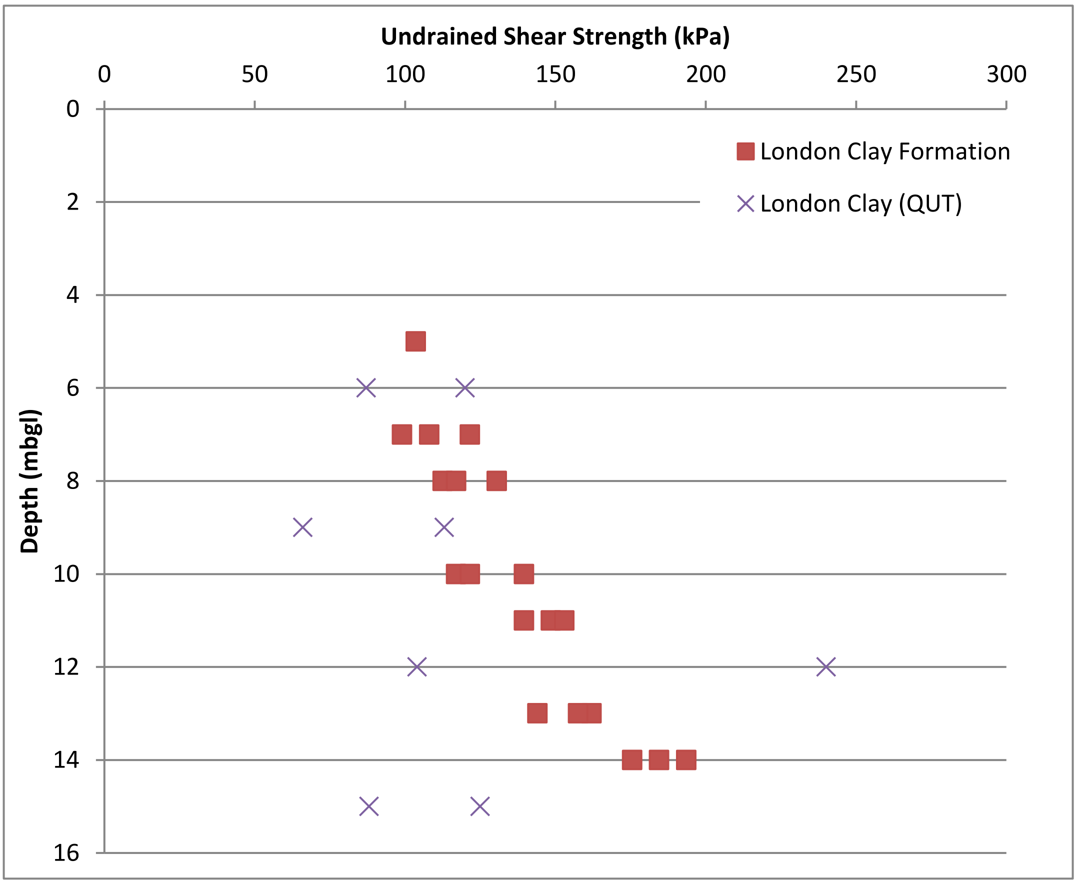
$c_u = f_1 \times N$ can be applied,

in which
c_u= mass shear strength (kN)
f_1 = constant
N= SPT Value achieved during boring operations

9.5.2 In the above equation f_1 is dependent on the plasticity of the material that the SPT is being carried out in. As the plasticity indices were shown to be greater than 27% a value for f_1 of 4.5 has been adopted after Tomlinson (2001).

9.5.3 The graph below shows the shear strength profile of the London Clay Formation encountered at the site, based on the SPT to shear strength correlation described above, as well as the results of undrained triaxial tests on undisturbed samples taken from the boreholes.

Figure 9.2: Undrained Shear Strength v Depth



9.6 Coefficient of Compressibility

9.6.1 Stroud and Butler (1974) developed a relationship between the coefficient of compressibility (m_v) and SPT 'N' value.

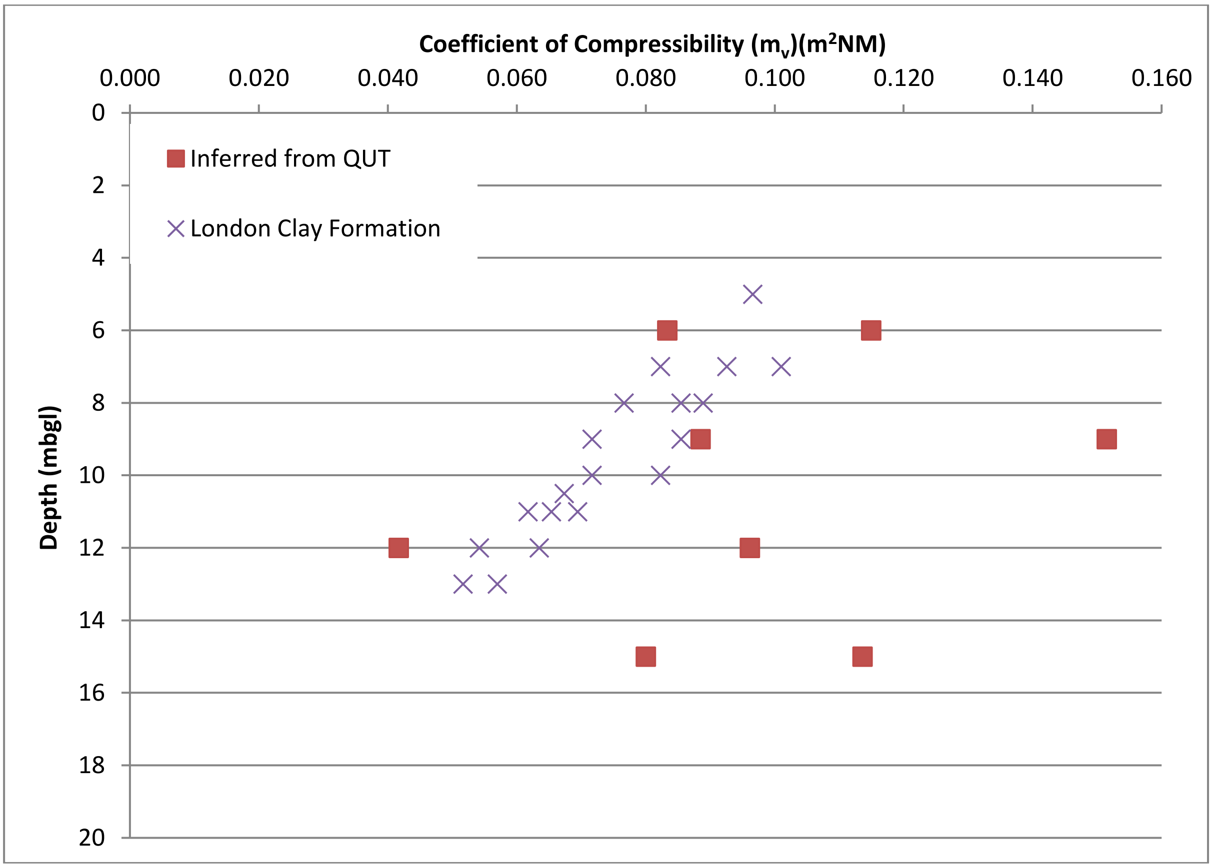
$m_v = 1/ f_2 \times N$ can be applied

in which
m_v = coefficient of compressibilty (m^2/MN)
f_2 = constant dependant on the plasticity index
N = SPT Value achieved during boring operations

9.6.2 Using the plasticity indices obtained (See Table 9.1) and the graphs provided in Tomlinson (2001) a value of f_2 of 0.45 has been taken and used with the SPT 'N' values to infer coefficient of compressibility (m_v).

9.6.3 Where the undrained shear strength of the clays was obtained using the quick undrained triaxial methodology, the m_v value was obtained by rearranging the equations for f_1 and f_2 and substituting in the measured undrained shear strength. The results are plotted against depth below in Figure 9.3.

Figure 9.3: Coefficient of Volume Compressibility (m_v) v Depth



9.6.4 As would be expected the inferred results generally reduce with depth as the clay increases in strength and the over burden increases, reducing the potential for compressibility.

9.6.5 Although this also appears to be the case for the samples where the results have been inferred from the quick undrained triaxial tests, the spread of the results mean that this cannot be said for certain,

9.6.6 As would be expected the results from of the London Clay are generally of low to medium compressibility.

9.7 Building Near Trees

9.7.1 The underlying soil conditions have been shown to be of a granular material (natural and Made Ground) with high volume change potential London Clay Formation at depth.

9.7.2 Given this it is considered that there is a sufficient thickness of granular material between the surface and the London Clay Formation to negate the requirement for special precautions to protect from movement induced by trees.

9.7.3 Guidance is also given in relation to other aspects of construction where the shrink/swell potential of the soils may be needed to take into consideration. This guidance is summarised in the appropriate sections below.

9.8 Foundations

General Comments

9.8.1 Foundations should not be formed in either the Made Ground (in its current state) due to the unacceptable risk of total and differential settlement.

9.8.2 It should be noted that the demolition and removal of existing structures, foundations and services may increase the depth of Made Ground on the site.

9.8.3 It should also be noted the following buried obstructions to borehole advancement were during the site investigation:

- WS6 was terminated at 0.4mbgl on a concrete slab.
- WS10 was terminated at 0.55mbgl on a concrete slab that persisted from 0.35mbgl.
- BH3 could not be completed in its original position due to a shallow obstruction, and was moved south to a new position, named BH3b. This in turn also terminated at 0.50mbgl on an unidentified obstruction. BH3c was completed adjacent to WS5.

9.8.4 The above comments are indicative only based on limited ground investigation data. Foundations should be designed by a suitably qualified Engineer. Once structural loads have been fully determined a full design check in accordance with BS EN 1997 should be undertaken to confirm suitability of foundation choice.

Traditional

9.8.5 Based upon the information obtained to date, due to the depth of the Made Ground encountered within the site, it is considered that conventional foundations will be unsuitable for the proposed development and a piled foundation solution within the underlying London Clay could be considered.

Piles

9.8.6 The piled foundations will carry their working load in a combination of skin friction along the sides of the pile and end bearing at the base of the pile. The piles should be designed by a suitably qualified and experienced piling specialist using a suitable factor of safety with the settlement at working load specified to meet any structural requirements. Table 9.2 provides some indicative capacities for a single pile for the diameter and depths shown.

9.8.7 Due to the varied depth and thickness of Made Ground and the Lynch Hill Gravel noted on site, the Neither the Made Ground nor the Lynch Hill Gravel has been incorporated into the model used to calculate the indicative allowable carrying capacities for the piles. Consequently, the values provided are conservative, where the Made Ground is thinner and there is a depth of Lynch Hill Gravels it is likely that a greater carrying capacity could be obtained.

Table 9.2: Indicative Piles Capacities (kN)

Pile toe depth (m bgl)	Pile diameter (m)				
	0.3	0.45	0.6	0.75	0.9
	Indicative Allowable Pile Capacity (kN)				
8	50	90	140	200	275
10	95	165	250	350	460
12	155	260	385	525	685

9.8.8 It should be noted that the above assumes a bored piling system. Other methods of piling and equipment may provide different results.

9.8.9 Should any loading be placed directly on the ground which cause the ground to settle relative to the piles then additional negative skin friction loads could be imposed on the piles.

9.8.10 If piling is adopted then a granular piling will need to be designed and emplaced in accordance with BRE 470.

Ground Improvement

9.8.11 Given the observed nature and depth of the Made Ground, an alternative approach to piling would be to consider ground improvement techniques.

9.8.12 It is considered likely that the use of vibro stone columns as a ground improvement method would likely to provide an allowable bearing capacity of 100 – 125kPa. This technique would reduce the potential of differential and total settlement allowing foundations to be formed within the Made Ground.

9.8.13 The design of the ground improvement should be undertaken by a suitably qualified and experienced specialist.

9.9 In-Situ CBR Measurements

9.9.1 California Bearing Ratio tests were undertaken using a perth penetrometer probe at the window sample hole positions. All positions are shown on a plan in Appendix 1.

9.9.2 The results have then been used to calculate CBR values using the methodology outlined in Interim Advice Notice 73/06.

9.9.3 The recorded penetration and the calculated CBR values from each position are provided in Appendix 7.

9.9.4 The results are summarised in the table below:

Table 9.3 – CBR Results

Position	Initial-Final Depth (mm bgl)	CBR (%)
WS1	200-450	60.9
	450-550	18.2
	550-600	302*
WS2	550-700	155.4
	700-1000	81.6
WS3	150-500	37
	500-750	64.5
	750-800	302*
WS5	150-500	69.3
	500-750	89.4
	750-1000	20.9
WS6	50-200	11.8
	200-300	75.7
	300-350	302*
WS7	800-1000	15.4
WS9	50-250	6.1
	250-600	46.8
	600-750	59
	750-1000	16.5
WS10	50-150	7.4
	150-250	34.9
	250-300	302*

9.9.5 It should be noted that there is a large difference between the highest and lowest CBR values reported, due to some tests refusing on concrete. Therefore, the results from of 302% calculated in WS1, WS3, WS6 and WS10 should be discounted.

9.9.6 It is recommended that a value of 7.4% is adopted for the purpose of road design. However, proof rolling of granular Made Ground materials or ground improvement techniques carried out as part of the foundation solution may provide a greater result.

9.9.7 Further CBR testing should be undertaken following proof rolling / ground improvement to confirm that suitable improvement was achieved.

9.10 Concrete in the Ground

9.10.1 Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.

9.10.2 In accordance with BRE Special Digest 1, as there are less than 10 results in the data set the highest value has been taken.

9.10.3 Table 9.4 summarises the analysis of the aggressive nature of the ground for each of the strata encountered within the ground investigation.

Table 9.4: Concrete in the Ground Classes

Stratum	No. Samples	pH range	Highest WS Sulphate (mg/l)	Design Sulphate Class	ACEC Class
Made Ground	9	9.7-11.3	531	DS2	AC-2
Natural	5	8.4-8.7	200	DS-1	AC-1s

9.11 Ground Floor Slabs

9.11.1 The depth and nature of the Made Ground in its current state would mean that the site would not be suitable for ground bearing floor slabs.

9.11.2 If a piled solution is adopted then a suspended floor slab would be recommended, however if this is not practical due to the construction and use of the proposed structure following proof rolling a lightly loaded ground bearing floor slab could be placed on the piling mat if the columns associated with the piles are made independent of the floor slab.

9.11.3 The loadings from the suspended floor slab will need to be carried by the foundations, which will need to be designed to not only carry the structural loadings but the additional floor loadings.

9.11.4 If ground improvement techniques are used then a well reinforced ground bearing floor slab could be used on completion of the improvement. It is likely that this would provide an allowable bearing pressure for a floor slab of between 30 and 50kPa.

9.11.5 Prior to construction of a ground bearing floor slab the founding strata should be inspected and any loose / soft spots removed and replaced with well compacted granular material or lean mix concrete.

9.12 Excavations

9.12.1 It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only.

9.12.2 The stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter, should be assessed and where necessary fully supported or battered back to a safe angle.

9.13 Groundwater Control

9.13.1 During the investigation groundwater was reported within Window Sample boreholes WS1, WS2, WS3, WS5 and WS7 at depths between 2.00mbgl and 3.80mbgl. Groundwater was also reported as being struck within cable percussive boreholes BH1, BH2 and BH3c at depths between 1.50mbgl and 5.20mbgl, rising to between 1.00mbgl and 4.70mbgl after 20 minutes monitoring. Groundwater was not reported within WS4 and WS9.

9.13.2 During return monitoring groundwater was reported at depths of between 1.77mbgl and 3.72mbgl.

9.13.3 Subject to seasonal variations, any groundwater encountered during site works could be readily dealt with by conventional pumping from a sump used to collate waters.

9.13.4 It is likely that surface or rainfall ingress into excavations would drain through the granular materials. If this does not occur then the water could be dealt with as above with conventional pumping from a sump used to collate waters.

10 REFERENCES

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British Standards Institution (2011) BS 10175:2011 *Code of practice for the investigation of potentially contaminated sites*. Milton Keynes: BSI

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Environment Agency (2004) *Model procedures for the management of land contamination*. CLR11. Bristol: Environment Agency

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CIRIA C665 (2007) *Assessing risks posed by hazardous ground gases to buildings London,* CIRIA

British Standards Institution (2015) BS 8485:2015 Incorporating corrigendum No.1 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* Milton Keynes: BSI

British Standards Institution (2013) BS 8576:2013 *Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOC's),* Milton Keynes: BSI

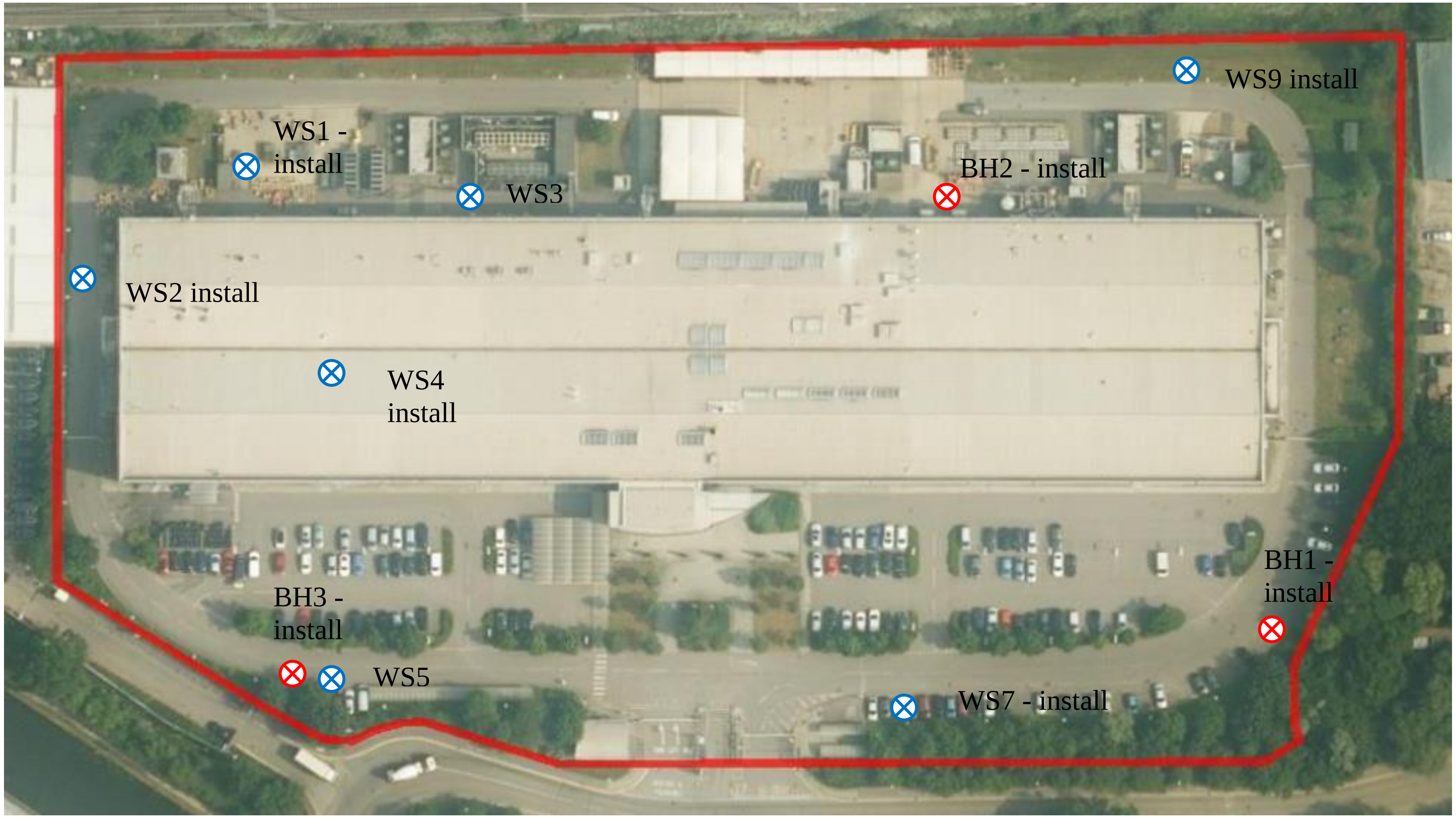
APPENDICES

APPENDIX 1 – FIGURES

JOMAS ASSOCIATES LTD
T: 0843 289 2187

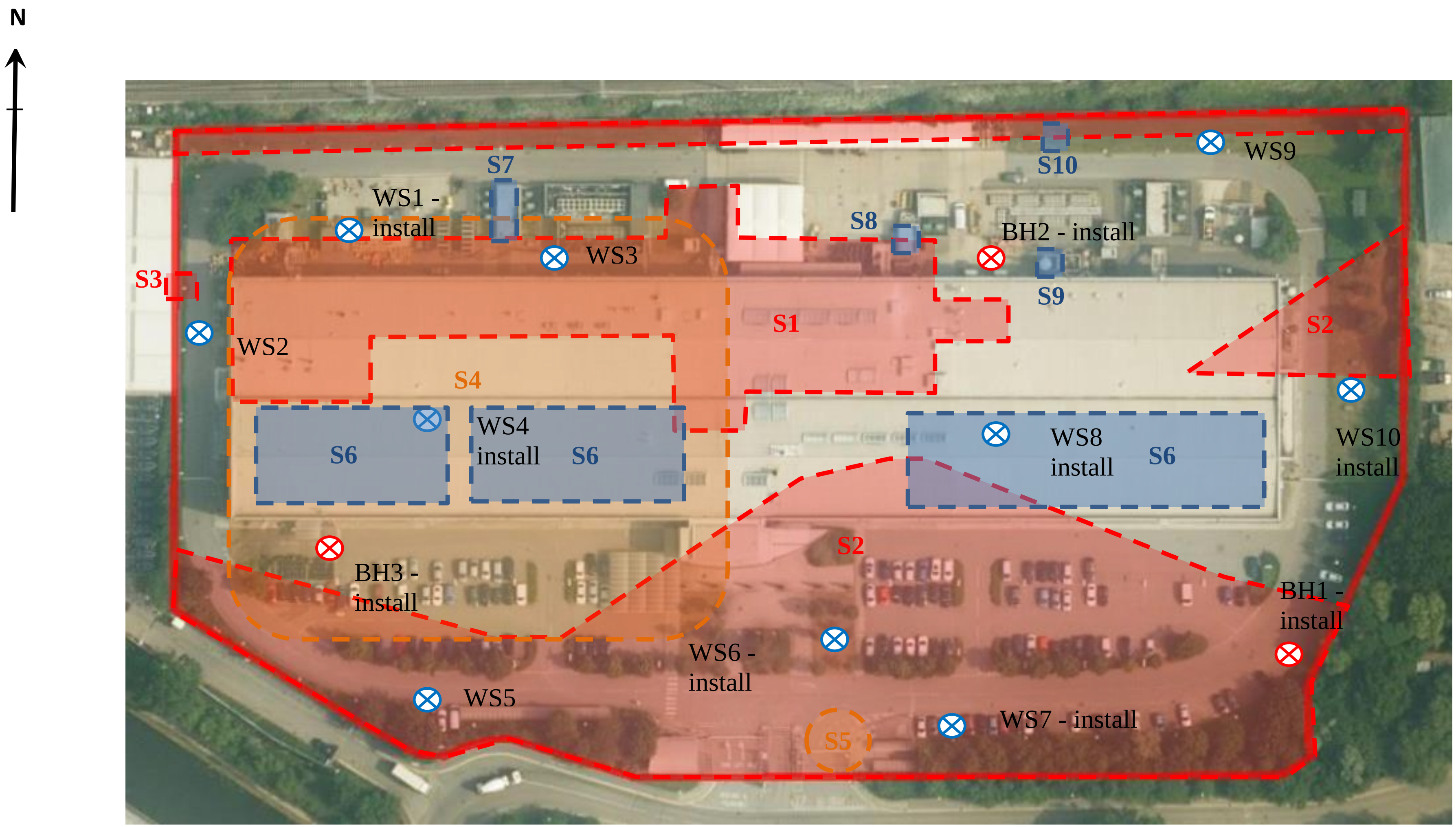
Project Name	North Hyde Gardens	**Client**	Legal & General UK Property Fund
Project No.	P1470J1364	**Date**	3/5/18
Title	Completed GI plan	**Prepared By**	SL

N



JOMAS ASSOCIATES LTD
T: 0843 289 2187

Project Name	North Hyde Gardens	**Client**	Legal & General UK Property Fund
Project No.	P1470J1364	**Date**	18/4/18
Title	Provisional proposed GI plan	**Prepared By**	TE



KEY

Red – Creosote works sources
Orange – Power station sources
Blue – current site use sources

S1 – Creosote factory
S2 – Ground working features
S3 – Tank
S4 – Power station
S5 – Tank
S6 – Engineering workshops
S7 – Sub-station and generator
S8 – Possible spray room
S9 – Tank and associated infrastructure (unknown use)
S10 – Sub-station

APPENDIX 2 – EXPLORATORY HOLE RECORDS

		WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD	
JOMAS		Exploratory Hole No:	WS1
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	23/05/2018
Checked By:	TE	Date Completed:	23/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	23/05/2018					
Hole depth:	3.00					
Casing depth:						
Level water on strike:	2.00					
Water Level after 20mins:	1.70					

Remarks

1: *Field description
2: Refusal at 3.00m.
3: PID: Photoionization detector, readings recorded in parts per million (ppm).
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N
P + J + V	0.25							
	PID = 0ppm							
P + J + V	0.50							
	PID = 0ppm							
P + J + V	1.00							
	PID = 0ppm							
CPT		2	1	2	1	2	2	7
P + J + V	2.00							
	PID = 0ppm							
CPT		1	1	2	2	1	2	7
P + J + V	2.40							
	PID = 0ppm							
P + J + V	3.00							
	PID = 0ppm							
CPT		19	24	26	24			50
	24 blows in R4 for 0mm.							

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.20		Concrete. (MADE GROUND).
2.10		Soft to firm consistency* brown sandy very gravelly clay with low cobble concrete. Gravel consists of fine to medium angular to sub-angular flint, brick and concrete fragments. Cobbles consist of concrete. (MADE GROUND).
2.80		Brown low strength slightly sandy gravelly clay. Gravel consists of fine to coarse angular to sub-rounded flint and occasional brick fragments. (MADE GROUND).
3.00		Brown sandy GRAVEL. Gravel consists of sub-angular to sub-rounded flint.

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Legend | Installation

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD

		Exploratory Hole No:	WS2
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 2

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	6.00						
Casing depth:							
Level water on strike:	2.00						
Water Level after 20mins:							

Remarks

1: Hydrocarbon odour noted from 3.80m.
2: PID: Photoionization detector, readings recorded in parts per million (ppm).
3:
4:

Sample or Tests

Type	Depth (mbgl)	75	75	75	75	75	75	N
CPT	0.50	22	20	15	10	8	7	40
P + J + V	0.60							
	PID = 0ppm							
P + J + V	1.00							
	PID = 0ppm							
CPT		4	4	3	5	4	5	17
P + J + V	1.50							
	PID = 0ppm							
P + J + V	2.00							
	PID = 0ppm							
CPT		1	1	0	1	0	1	2
P + J + V	3.00							
	PID = 0ppm							
CPT		1	1	2	1	0	2	5
P + J + V	4.00							
	PID = 0ppm							
CPT		0	1	0	1	0	0	1
P + J + V	5.00							
	PID = 0ppm							
CPT		0	1	1	0	1	1	3

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.55		Asphalt. (MADE GROUND).
2.00		Medium dense dark grey to black to brown slightly clayey sandy gravel. Gravel consists of fine to coarse angular to sub-rounded flint and occasional brick and concrete fragments. (MADE GROUND).
		Very loose to loose brown sandy gravel. Gravel consists of fine to coarse angular to sub-angular flint and brick fragments. Black staining and hydrocarbon odour noted from 3.80m. (MADE GROUND).

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Legend | Installation

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

JOMAS		WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD	
		Exploratory Hole No:	WS2
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	2 Of 2

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	6.00						
Casing depth:							
Level water on strike:	2.00						
Water Level after 20mins:							

Remarks

1: Hydrocarbon odour noted from 3.80m.
2: PID: Photoionization detector, readings recorded in parts per million (ppm).
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
P + J + V	5.00								5.00				Very loose to loose brown sandy gravel. Gravel consists of fine to coarse angular to sub-angular flint and brick fragments. Black staining and hydrocarbon odour noted from 3.80m. (MADE GROUND).	
	PID = 0ppm													
CPT		0	1	1	0	1	1	3						
									5.50		5.60			
													Brown to black slightly clayey very gravelly SAND. Gravel consists of fine angular to sub-rounded flint.	
P + J + V	6.00								6.00		6.00			
	PID = 0ppm													
CPT		2	2	3	4	3	4	14						
									6.50					
									7.00					
									7.50					
									8.00					
									8.50					
									9.00					
									9.50					
									10.00					

WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD	
Exploratory Hole No:	WS3

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	23/05/2018
Checked By:	TE	Date Completed:	23/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	23/05/2018					
Hole depth:	3.00					
Casing depth:						
Level water on strike:	2.60					
Water Level after 20mins:						

Remarks

1: Collapsed to 1.60m.

2: PID: Photoionization detector, readings recorded in parts per million (ppm).

3:

4:

Sample or Tests

Type	Depth (mbgl)	75	75	75	75	75	75	N
P + J + V	0.25							
	PID = 0ppm							
P + J + V	0.50							
	PID = 0ppm							
P + J + V	1.00							
	PID = 0ppm							
CPT		2	2	1	2	2	1	6
P + J + V	2.00							
	PID = 0ppm							
CPT		10	13	13	6	4	6	29
P + J + V	3.00							
	PID = 0ppm							

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.06		Asphalt. (MADE GROUND).
0.20		Concrete. (MADE GROUND).
1.20		Brown clayey sandy gravel. Gravel consists of fine to coarse angular to rounded flint, brick and concrete fragments. (MADE GROUND).
1.70		Brown low strength very sandy very gravelly clay. Sand is coarse. Gravel consists of fine to medium sub-angular to sub-rounded flint and occasional brick fragments. (MADE GROUND).
1.90		Light grey slightly sandy GRAVEL. Gravel consists of fine to coarse sub-angular to sub-rounded flint.
3.00		Light brown very gravelly SAND. Sand is coarse. Gravel consists of fine to medium sub-angular to rounded flint.

Installation

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS		WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD	
		Exploratory Hole No:	WS4
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: Refusal at 1.60m.
2: PID: Photoionization detector, readings recorded in parts per million (ppm).
3:
4:

Sample or Tests									
Type	Depth (mbgl)	Result							
		75	75	75	75	75	75	N	
P + J + V	0.80								
	PID = 0ppm								
CPT	1.00	9	12	14	9	12	13	48	
P + J + V	1.10								
	PID = 0ppm								
CPT	1.40	8	45	50				50	
P + J + V	1.50	50 blows in R3 for 20mm							
	PID = 0ppm								

Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.45		Concrete. (MADE GROUND).
0.55		Black very gravelly sand. Gravel consists of fine to coarse angular to rounded flint and concrete fragments. (MADE GROUND).
0.75		Concrete. (MADE GROUND).
1.10		Dense red gravel. Gravel consits of coarse brick fragments. (MADE GROUND).
1.60		Very dense light brown very gravelly sand. Gravel consists of fine to coarse angular to sub-rounded flint and concrete fragments. (MADE GROUND).

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Legend | Installation

JOMAS

WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD	
Exploratory Hole No:	WS5

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	5.00						
Casing depth:							
Level water on strike:	2.20						
Water Level after 20mins:							

Remarks

1: PID: Photoionization detector, readings recorded in parts per million (ppm).
2:
3:
4:

Sample or Tests

Type	Depth (mbgl)	75	75	75	75	75	75	N
P + J + V	0.25							
P + J + V	0.50							
P + J + V	1.00							
CPT		2	2	1	1	1	1	4
P + J + V	2.00							
CPT		0	1	1	0	0	1	2
P + J + V	3.00							
CPT		3	1	1	1	3	2	7
P + J + V	4.00							
CPT		1	2	2	1	2	1	6
P + J + V	5.00							
CPT		4	4	4	3	2	4	13

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.15		Asphalt. (MADE GROUND).
0.80		Brown clayey sandy gravel containing occasional rootlets. Gravel consists of abundant angular to sub-rounded flint and frequent brick fragments. (MADE GROUND).
4.70		Very loose to loose dark grey to black slightly clayey sandy gravel. Gravel consists of fine to medium flint and occasional brick fragments. (MADE GROUND).
5.00		Medium dense brown slightly sandy GRAVEL. Gravel consists of fine to medium angular to sub-angular flint.

Scale (mbgl): 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Legend | Installation

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD	
Exploratory Hole No:	WS7

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	5.00						
Casing depth:							
Level water on strike:	3.80						
Water Level after 20mins:							

Remarks

1: *Field description

2: Faint hydrocarbon odour noted from 2.30m.

3: PID: Photoionization detector, readings recorded in parts per million (ppm).

4:

Sample or Tests

Type	Depth (mbgl)	Result 75	75	75	75	75	75	N
P + J + V	0.25							
	PID = 0ppm							
P + J + V	0.50							
	PID = 0ppm							
P + J + V	1.00							
	PID = 0ppm							
CPT		1	1	2	1	2	1	6
P + J + V	2.00							
	PID = 0ppm							
CPT		2	2	3	2	3	3	11
P + J + V	3.00							
	PID = 0ppm							
CPT		2	3	4	4	5	6	19
P + J + V	4.00							
	PID = 0ppm							
CPT		2	4	6	7	6	8	27
P + J + V	5.00							
	PID = 0ppm							
CPT		3	2	2	2	2	2	8

Strata

Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
	0.15		Asphalt. (MADE GROUND).	
	0.80		Brown to grey gravelly sand. Gravel consists of concrete fragments. Drillers recorded as lean mix concrete (MADE GROUND).	
	4.60		Dark brown to black low to high strength sandy gravelly clay. Gravel consists of fine to medium flint and occasional brick and concrete fragments. Faint hydrocarbon odour noted. (MADE GROUND).7	
	5.00		Loose light brown sandy GRAVEL. Gravel consists of fine to coarse flint.	

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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WINDOW / WINDOWLESS SAMPLING BOREHOLE RECORD

		Exploratory Hole No:	WS9
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	JN	Date Commenced:	23/05/2018
Checked By:	TE	Date Completed:	23/05/2018
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							

Remarks

1: *Field description. No water reported.
2: Faint organic odour noted between 3.10m and 3.50m.
3: PID: Photoionization detector, readings recorded in parts per million (ppm).
4:

Sample or Tests

Type	Depth (mbgl)	75	75	75	75	75	75	N
P + J + V	0.25							
	PID = 0ppm							
P + J + V	0.50							
	PID = 0ppm							
P + J + V	1.00							
	PID = 0ppm							
CPT		2	1	1	1	1	1	4
P + J + V	2.00							
	PID = 0ppm							
CPT		2	1	2	2	1	2	7
P + J + V	3.00							
	PID = 0ppm							
CPT		11	17	27	28	29		84

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.30		Grass over soft consistency* sandy gravelly clay containing rootlets. Gravel consists of fine to coarse angular to rounded flint and occasional brick and concrete fragments. (MADE GROUND).
1.20		Loose dark grey to black very gravelly sand. Sand is coarse. Gravel consists of fine to coarse angular to sub-rounded flint and occasional brick fragments. (MADE GROUND).
1.40		Red gravel. Gravel consists of brick fragments. (MADE GROUND).
3.10		Loose yellowish-brown slightly clayey very gravelly SAND. Gravel consists of fine to medium sub-angular to sub-rounded flint. Black staining and slight organic odour noted.
3.50		Soft consistency* dark grey to black sandy CLAY. Slight organic odour noted.
3.90		Brown sandy GRAVEL. Gravel consists of fine to medium angular to sub-rounded flint.

Depth scale (mbgl): 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Columns: Legend | Installation

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CABLE PERCUSSION BOREHOLE RECORD	
Exploratory Hole No:	BH1

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	1 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	5.20						
Water Level after 20mins:	4.70						

Remarks

1:
2:
3:
4:

Sample or Tests

Type	Depth (mbgl)	75	75	75	75	75	75	N
P + J + V	0.10							
D								
P + J + V	0.25							
D								
P + J + V	0.50							
D								
B								
P + J + V	1.00							
D								
SPT	1.20	1	2	3	2	2	4	11
B								
P + J + V	2.00							
SPT		1	1	4	2	0	3	9
D	3.00							
P + J + V								
SPT		1	1	0	0	2	3	5
D	4.00							
P + J + V								
SPT		1	2	2	1	3	4	10
D	5.00							
CPT		2	3	4	5	5	7	21

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Strata

Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
	0.15		Asphalt. (MADE GROUND).	
	0.30		Gravel. Gravel consists of brick and concrete fragments. (MADE GROUND).	
	4.99		Loose to medium dense brown to black very clayey gravel. Gravel consists of brick fragments and ash. (MADE GROUND).	
			Medium dense very clayey GRAVEL. Gravel consists of flint.	

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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CABLE PERCUSSION BOREHOLE RECORD	
Exploratory Hole No:	BH1

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	2 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	5.20						
Water Level after 20mins:	4.70						

Remarks

1:
2:
3:
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N	Scale	Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description
D	5.00								5.00			Medium dense very clayey GRAVEL. Gravel consists of flint.
CPT		2	3	4	5	5	7	21				
									5.50			
D	6.00								6.00	6.00		Dark brown CLAY.
U												
	70 blows for 0.40m recovery											
									6.50			
D	7.00								7.00	7.00		Grey to brown high to very high strength CLAY.
SPT		3	4	4	5	6	7	22				
									7.50			
D	8.00								8.00			
SPT		4	4	5	6	6	8	25				
									8.50			
D	9.00								9.00			
U												
	90 blows for 0.40m recovery											
									9.50			
D	10.00								10.00			
SPT		3	5	5	6	7	8	26				

JOMAS		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	BH1
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	3 Of 4

Water levels recorded during boring, m

Date:	24/05/2018					
Hole depth:	15.45					
Casing depth:						
Level water on strike:	5.20					
Water Level after 20mins:	4.70					

Remarks

1:
2:
3:
4:

Type	Depth (mbgl)	Result 75	75	75	75	75	75	N	Depth scale	Legend	Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
D	10.00								10.00				Grey to brown high to very high strength CLAY.	
SPT		3	5	5	6	7	8	26						
									10.50					
D	11.00								11.00					
SPT		5	5	6	7	8	10	31						
									11.50					
D	12.00								12.00					
U														
90 blows for 0.33m recovery														
									12.50					
D	13.00								13.00					
SPT		5	6	6	7	9	10	32						
									13.50					
D	14.00								14.00					
SPT		6	6	8	9	10	12	39						
									14.50					
D	15.00								15.00					
U														
95 blows for 0.33m recovery														

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	BH1
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	4 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	5.20						
Water Level after 20mins:	4.70						

Remarks

1:
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
D	15.00								15.00				Grey to brown high to very high strength CLAY.	
U														
	95 blows for 0.33m recovery										15.45			
									15.50					
									16.00					
									16.50					
									17.00					
									17.50					
									18.00					
									18.50					
									19.00					
									19.50					
									20.00					

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CABLE PERCUSSION BOREHOLE RECORD

		Exploratory Hole No:	BH2
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	1 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	2.00						
Water Level after 20mins:	1.40						

Remarks

1:
2:
3:
4:

Sample or Tests

Type	Depth (mbgl)	75	75	75	75	75	75	N
D P + J + V	0.25							
B D P + J + V	0.50							
P + J + V D	1.00							
SPT	1.20	2	3	4	4	2	5	15
SPT P + J + V D	2.00	1	1	2	3	3	4	12
SPT P + J + V D	3.00	2	2	3	4	4	4	15
B CPT D	4.00	2	3	5	6	6	9	26
SPT D	5.00	3	4	4	5	7	7	23

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.20		Reinforced concrete. (MADE GROUND).
4.00		Medium dense black to red gravel. Gravel consists of ash and brick fragments. (MADE GROUND).
4.99		Medium dense GRAVEL.
		Grey to dark brown very high strength CLAY.

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS	CABLE PERCUSSION BOREHOLE RECORD	
	Exploratory Hole No:	BH2

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	2 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	2.00						
Water Level after 20mins:	1.40						

Remarks

1:
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT	5.00	3	4	4	5	7	7	23	5.00				Grey to dark brown very high strength CLAY.	
D														
									5.50					
U	6.00								6.00					
	75 blows for 45mm recovery													
D														
									6.50					
SPT	7.00	4	4	5	5	6	8	24	7.00					
D														
									7.50					
SPT	8.00	5	5	6	7	7	9	29	8.00					
D														
									8.50					
U	9.00								9.00					
	90 blows for 0.33m recovery													
D														
									9.50					
SPT	10.00	4	5	6	7	8	10	31	10.00					
D														

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS	CABLE PERCUSSION BOREHOLE RECORD	
	Exploratory Hole No:	BH2

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	3 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	2.00						
Water Level after 20mins:	1.40						

Remarks

1:
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT D	10.00	4	5	6	7	8	10	31	10.00				Grey to dark brown very high strength CLAY.	
									10.50					
SPT D	11.00	5	6	6	7	9	11	33	11.00					
									11.50					
U D	12.00								12.00					
									12.50					
SPT D	13.00	5	7	7	8	10	11	36	13.00					
									13.50					
S D	14.00	5	8	8	10	10	15	43	14.00					
									14.50					
U	15.00								15.00					
	100 blows for 0.40m recovery													
D														

		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	BH2
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	4 Of 4

Water levels recorded during boring, m						
Date:	24/05/2018					
Hole depth:	15.45					
Casing depth:						
Level water on strike:	2.00					
Water Level after 20mins:	1.40					

Remarks

1:

2:

3:

4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
U	15.00								15.00				Grey to dark brown very high strength CLAY.	
	100 blows for 0.40m recovery													
D											15.45			
									15.50					
									16.00					
									16.50					
									17.00					
									17.50					
									18.00					
									18.50					
									19.00					
									19.50					
									20.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

	CABLE PERCUSSION BOREHOLE RECORD	
JOMAS	Exploratory Hole No:	BH3B

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							

Remarks

1: No water reported.
2: Refusal at 0.50m.
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00		0.10		Asphalt. (MADE GROUND).	
P + J + V	0.10													
P + J + V	0.25										0.50		Slightly sandy gravel. Gravel consists of brick and concrete fragments. (MADE GROUND).	
									0.50					
									1.00					
									1.50					
									2.00					
									2.50					
									3.00					
									3.50					
									4.00					
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

		CABLE PERCUSSION BOREHOLE RECORD	
JOMAS		Exploratory Hole No:	BH3C
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	1 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	1.50						
Water Level after 20mins:	1.00						

Remarks

1:
2:
3:
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N
P + J + V	0.10							
D								
P + J + V	0.25							
D								
P + J + V	0.50							
D								
B								
P + J + V	1.00							
D								
SPT	1.20	1	2	3	4	4	5	16
B								
P + J + V	2.00							
D								
SPT		1	1	0	2	2	0	4
D	3.00							
P + J + V								
SPT		1	2	2	3	4	5	14
D	4.00							
P + J + V								
SPT		3	3	7	2	2	5	16
D	5.00							
SPT		2	2	4	5	5	9	23

Strata

Depth (mbgl)	Water Strikes (mbgl)	Strata Description
0.20		Asphalt. (MADE GROUND).
4.99		Loose to medium dense black slightly sandy gravel. Gravel consists of brick fragments. (MADE GROUND).
		Medium dense GRAVEL. Gravel consists of flint.

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Installation

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
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JOMAS	CABLE PERCUSSION BOREHOLE RECORD	
	Exploratory Hole No:	BH3C

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	2 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	1.50						
Water Level after 20mins:	1.00						

Remarks

1:
2:
3:
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N	Depth scale	Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
D	5.00								5.00			Medium dense GRAVEL. Gravel consists of flint.	
SPT		2	2	4	5	5	9	23					
									5.50				
D	6.00								6.00	6.00		Grey to dark brown high to very high strength CLAY.	
U													
70 blows for 0.40m recovery													
									6.50				
D	7.00								7.00				
SPT		4	4	6	6	7	8	27					
									7.50				
D	8.00								8.00				
SPT		4	5	5	5	7	9	26					
									8.50				
D	9.00								9.00				
U													
85 blows for 0.45m recovery													
									9.50				
D	10.00								10.00				
SPT		4	5	6	6	6	9	27					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

JOMAS

CABLE PERCUSSION BOREHOLE RECORD	
Exploratory Hole No:	BH3C

Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	3 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	1.50						
Water Level after 20mins:	1.00						

Remarks

1:
2:
3:
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N	Scale	Legend	Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
D	10.00								10.00				Grey to dark brown high to very high strength CLAY.	
SPT		4	5	6	6	6	9	27						
									10.50					
D	11.00								11.00					
SPT		5	5	7	8	9	10	34						
									11.50					
D	12.00								12.00					
U														
90 blows for 0.40m recovery														
									12.50					
D	13.00								13.00					
SPT		5	6	7	9	9	10	35						
									13.50					
D	14.00								14.00					
SPT		5	7	8	10	10	13	41						
									14.50					
D	15.00								15.00					
U														
95 blows for 0.40m recovery														

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	BH3C
Site Address:	North Hyde Gardens, Hayes, Middlesex, UB3 4QR	Project No:	P1470J1364
Client:	Legal & General UK Property Fund	Ground Level:	
Logged By:	RT	Date Commenced:	24/05/2018
Checked By:	TE	Date Completed:	24/05/2018
Type and diameter of equipment:	DANDO 3000	Sheet No:	4 Of 4

Water levels recorded during boring, m

Date:	24/05/2018						
Hole depth:	15.45						
Casing depth:							
Level water on strike:	1.50						
Water Level after 20mins:	1.00						

Remarks

1:
2:
3:
4:

Sample or Tests: Type	Depth (mbgl)	Result 75	75	75	75	75	75	N	Depth scale	Strata: Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
D	15.00								15.00		15.45		Grey to dark brown high to very high strength CLAY.	
U														
	95 blows for 0.40m recovery													
									15.50					
									16.00					
									16.50					
									17.00					
									17.50					
									18.00					
									18.50					
									19.00					
									19.50					
									20.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS

Emma Hucker
Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

e: Jomas Associates -

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 18-83574

Replaces Analytical Report Number : 18-83574, issue no. 1

Project / Site name:	North Hyde Gardens, Hayes, Middlesex	**Samples received on:**	25/04/2018
Your job number:	JJ1364	**Samples instructed on:**	26/04/2018
Your order number:	P1470JJ1364.7	**Analysis completed by:**	25/05/2018
Report Issue Number:	2	**Report issued on:**	25/05/2018
Samples Analysed:	23 soil samples		

Signed: ____________________

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951018	951019	951020	951021	951022
Sample Reference				WS1	WS2	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	4.00	0.60	2.00	1.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	29	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	7.4	13	9.0	8.9	17
Total mass of sample received	kg	0.001	NONE	2.0	2.0	1.1	1.3	1.3
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.7	-	10.4	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	-
Total Sulphate as SO_4	mg/kg	50	MCERTS	2600	-	3000	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.48	-	0.53	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	482	-	531	-	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.7	-	4.3	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	1.1	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	11	1.1	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.94	0.40	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	22	3.1	< 0.05	0.21
Fluorene	mg/kg	0.05	MCERTS	< 0.05	28	3.6	< 0.05	0.14
Phenanthrene	mg/kg	0.05	MCERTS	1.0	67	19	< 0.05	1.8
Anthracene	mg/kg	0.05	MCERTS	0.31	18	5.7	< 0.05	0.44
Fluoranthene	mg/kg	0.05	MCERTS	1.7	49	22	< 0.05	3.4
Pyrene	mg/kg	0.05	MCERTS	1.5	34	17	< 0.05	3.0
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.76	8.9	8.2	< 0.05	1.5
Chrysene	mg/kg	0.05	MCERTS	0.67	7.6	7.2	< 0.05	1.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.83	5.8	9.5	< 0.05	1.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.49	1.5	3.4	< 0.05	0.61
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.68	3.5	7.9	< 0.05	1.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.42	1.0	3.5	< 0.05	0.70
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.27	0.88	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.48	1.0	3.8	< 0.05	0.82
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	8.89	260	116	< 0.80	17.2

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951018	951019	951020	951021	951022
Sample Reference				WS1	WS2	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	4.00	0.60	2.00	1.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	-	12	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	3.2	-	3.3	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	-	39	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	46	-	48	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	86	-	39	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	-	< 0.3	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	-	19	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	80	-	75	-	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	3.8	-	< 1.0	6.5
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	42	-	< 2.0	17
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	68	-	< 8.0	35
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	87	-	< 8.0	180
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	200	-	< 10	240
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	20	-	< 1.0	1.4
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	450	-	< 2.0	9.7
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	790	-	< 10	26
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	340	-	< 10	180
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	1600	-	< 10	210
TPH (C10 - C12)	mg/kg	2	MCERTS	3.2	-	3.4	-	-
TPH (C12 - C16)	mg/kg	4	MCERTS	21	-	76	-	-
TPH (C16 - C21)	mg/kg	1	MCERTS	69	-	270	-	-
TPH (C21 - C40)	mg/kg	10	MCERTS	310	-	4100	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951018	951019	951020	951021	951022
Sample Reference				WS1	WS2	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	4.00	0.60	2.00	1.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951018	951019	951020	951021	951022
Sample Reference				WS1	WS2	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	4.00	0.60	2.00	1.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007	-	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951023	951024	951025	951026	951027
Sample Reference				WS5	WS5	WS7	WS7	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	3.00	0.50	1.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
Moisture Content	%	N/A	NONE	16	14	19	-	16
Total mass of sample received	kg	0.001	NONE	1.2	1.1	1.2	-	1.1
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Amosite	-	-	Amosite
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	-	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	-	< 0.001
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.8	8.8	-	-	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	-	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	1100	980	-	-	1700
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.071	0.083	-	-	0.34
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	71.4	83.3	-	-	343
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.3	-	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.76	0.69	0.78	-	2.3
Acenaphthylene	mg/kg	0.05	MCERTS	0.12	< 0.05	< 0.05	-	0.29
Acenaphthene	mg/kg	0.05	MCERTS	0.13	< 0.05	0.76	-	2.6
Fluorene	mg/kg	0.05	MCERTS	0.16	0.19	0.87	-	3.2
Phenanthrene	mg/kg	0.05	MCERTS	2.2	1.8	3.4	-	15
Anthracene	mg/kg	0.05	MCERTS	0.53	0.47	2.5	-	14
Fluoranthene	mg/kg	0.05	MCERTS	3.1	2.4	5.2	-	17
Pyrene	mg/kg	0.05	MCERTS	2.7	2.0	4.9	-	14
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	1.4	1.7	-	4.8
Chrysene	mg/kg	0.05	MCERTS	1.7	1.4	1.6	-	4.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.7	2.2	2.0	-	4.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.80	0.57	0.53	-	1.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.6	1.4	1.1	-	2.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.85	0.85	0.48	-	1.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05	-	0.30
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.0	0.86	0.52	-	1.2
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	20.3	16.4	26.4	-	89.7

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951023	951024	951025	951026	951027
Sample Reference				WS5	WS5	WS7	WS7	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	3.00	0.50	1.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	29	20	-	-	18
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	1.0	-	-	4.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.0	1.4	-	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	99	70	-	-	43
Copper (aqua regia extractable)	mg/kg	1	MCERTS	240	250	-	-	120
Lead (aqua regia extractable)	mg/kg	1	MCERTS	270	800	-	-	150
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	0.6	-	-	0.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	210	72	-	-	40
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.6	1.2	-	-	1.2
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	430	480	-	-	190
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	6.8	-	1.6	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	16	-	7.9	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	35	-	17	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	210	-	67	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	270	-	94	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.6	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	11	-	7.8	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	34	-	24	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	130	-	64	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	180	-	96	-	-
TPH (C10 - C12)	mg/kg	2	MCERTS	-	9.3	-	-	7.2
TPH (C12 - C16)	mg/kg	4	MCERTS	-	25	-	-	40
TPH (C16 - C21)	mg/kg	1	MCERTS	-	64	-	-	120
TPH (C21 - C40)	mg/kg	10	MCERTS	-	320	-	-	260

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951023	951024	951025	951026	951027
Sample Reference				WS5	WS5	WS7	WS7	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	3.00	0.50	1.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951023	951024	951025	951026	951027
Sample Reference				WS5	WS5	WS7	WS7	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	3.00	0.50	1.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951028	951029	951030	951031	951032
Sample Reference				WS9	WS9	BH1	BH1	BH2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.00	0.50	2.00	0.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	14	10	12	11
Total mass of sample received	kg	0.001	NONE	1.3	1.5	1.6	1.0	1.1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	-	10.5	-	11.2
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	590	-	2500	-	3200
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014	-	0.30	-	0.24
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	14.1	-	302	-	239
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.2	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.20	0.37	0.30	0.20
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.40	0.16	0.17
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.35	< 0.05	0.23
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.40	0.13	0.24
Phenanthrene	mg/kg	0.05	MCERTS	0.97	0.57	4.5	1.2	2.5
Anthracene	mg/kg	0.05	MCERTS	0.30	0.27	1.2	0.88	0.71
Fluoranthene	mg/kg	0.05	MCERTS	2.7	1.2	8.9	2.6	5.0
Pyrene	mg/kg	0.05	MCERTS	2.4	1.1	7.9	2.5	4.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.5	0.62	4.2	1.3	2.3
Chrysene	mg/kg	0.05	MCERTS	1.4	0.61	3.7	1.3	1.9
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.0	0.87	6.3	2.2	3.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.1	0.51	1.7	0.59	0.87
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.8	0.52	4.6	1.4	2.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.94	0.33	2.3	0.80	1.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.22	< 0.05	0.58	0.20	0.30
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	0.40	2.7	0.96	1.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	16.3	7.15	50.1	16.5	26.7

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951028	951029	951030	951031	951032
Sample Reference				WS9	WS9	BH1	BH1	BH2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.00	0.50	2.00	0.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	-	13	-	17
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	-	1.8	-	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	-	25	-	34
Copper (aqua regia extractable)	mg/kg	1	MCERTS	42	-	46	-	52
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	-	120	-	180
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.8	-	0.5	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	-	20	-	25
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	-	130	-	140
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	3.4	2.9	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	17	12	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	50	53	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	19	190	120	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	20	260	190	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	3.8	1.9	2.3
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	5.3	15	12	7.1
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	11	69	46	18
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	46	290	160	60
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	62	380	220	87
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	-	-	-	-
TPH (C16 - C21)	mg/kg	1	MCERTS	7.7	-	-	-	-
TPH (C21 - C40)	mg/kg	10	MCERTS	58	-	-	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951028	951029	951030	951031	951032
Sample Reference				WS9	WS9	BH1	BH1	BH2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.00	0.50	2.00	0.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951028	951029	951030	951031	951032
Sample Reference				WS9	WS9	BH1	BH1	BH2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.00	0.50	2.00	0.50
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007	-	< 0.007	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951033	951034	951035	952205	952206
Sample Reference				BH2	BH3c	BH3c	BH3C	BH3C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.00	7.00	14.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	24	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	17	20	21	20
Total mass of sample received	kg	0.001	NONE	0.98	1.2	1.2	1.1	1.0
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	-	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	11.3	-	8.4	8.7
Total Cyanide	mg/kg	1	MCERTS	-	< 1	-	-	-
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	2200	-	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.34	-	0.20	0.16
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	336	-	-	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	1.9	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.99	0.30	0.55	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.36	-	-
Acenaphthene	mg/kg	0.05	MCERTS	2.2	< 0.05	0.18	-	-
Fluorene	mg/kg	0.05	MCERTS	1.7	0.16	0.30	-	-
Phenanthrene	mg/kg	0.05	MCERTS	13	1.8	5.4	-	-
Anthracene	mg/kg	0.05	MCERTS	3.8	0.48	1.6	-	-
Fluoranthene	mg/kg	0.05	MCERTS	19	2.5	17	-	-
Pyrene	mg/kg	0.05	MCERTS	15	2.0	15	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.9	1.3	6.7	-	-
Chrysene	mg/kg	0.05	MCERTS	5.0	1.2	5.0	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	8.7	2.1	8.3	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.4	0.56	2.2	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.8	1.2	4.8	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.0	0.61	3.0	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.57	< 0.05	0.63	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.1	0.71	3.3	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	88.8	14.9	73.9	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951033	951034	951035	952205	952206
Sample Reference				BH2	BH3c	BH3c	BH3C	BH3C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.00	7.00	14.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	34	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	1.0	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	4.3	-	-	-
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	130	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	320	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	580	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	64	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	1.4	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	820	-	-	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	3.3	2.8	2.5	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	25	14	13	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	57	30	37	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	83	110	140	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	170	150	190	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	5.5	3.0	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	25	11	5.1	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	120	30	45	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	260	95	120	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	410	140	170	-	-
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-	-	-	-
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-	-	-	-
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-	-	-	-
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				951033	951034	951035	952205	952206
Sample Reference				BH2	BH3c	BH3c	BH3C	BH3C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.00	7.00	14.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	-

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Your Order No: P1470JJ1364.7

Lab Sample Number				951033	951034	951035	952205	952206
Sample Reference				BH2	BH3c	BH3c	BH3C	BH3C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.00	7.00	14.00
Date Sampled				23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	< 0.007	-	-

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Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				952207	952208	952209		
Sample Reference				BH2	BH2	BH1		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				10.00	12.00	8.00		
Date Sampled				23/04/2018	23/04/2018	23/04/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	19	20	19		
Total mass of sample received	kg	0.001	NONE	1.2	1.1	1.3		
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-		
Asbestos in Soil	Type	N/A	ISO 17025	-	-	-		
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-		
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.4	8.6	8.7		
Total Cyanide	mg/kg	1	MCERTS	-	-	-		
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	-	-		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.16	0.086	0.13		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-		
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	-	-		
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-		
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-		
Fluorene	mg/kg	0.05	MCERTS	-	-	-		
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-		
Anthracene	mg/kg	0.05	MCERTS	-	-	-		
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-		
Pyrene	mg/kg	0.05	MCERTS	-	-	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-		
Chrysene	mg/kg	0.05	MCERTS	-	-	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	-		

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Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				952207	952208	952209		
Sample Reference				BH2	BH2	BH1		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				10.00	12.00	8.00		
Date Sampled				23/04/2018	23/04/2018	23/04/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-		
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	-		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-		
Monoaromatics								
Benzene	µg/kg	1	MCERTS	-	-	-		
Toluene	µg/kg	1	MCERTS	-	-	-		
Ethylbenzene	µg/kg	1	MCERTS	-	-	-		
p & m-xylene	µg/kg	1	MCERTS	-	-	-		
o-xylene	µg/kg	1	MCERTS	-	-	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-		
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-		
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-	-		
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-	-		
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-	-		
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-	-		

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Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				952207	952208	952209		
Sample Reference				BH2	BH2	BH1		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				10.00	12.00	8.00		
Date Sampled				23/04/2018	23/04/2018	23/04/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-		
Chloroethane	µg/kg	1	NONE	-	-	-		
Bromomethane	µg/kg	1	ISO 17025	-	-	-		
Vinyl Chloride	µg/kg	1	NONE	-	-	-		
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-		
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-		
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-		
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-		
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-		
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-		
Trichloromethane	µg/kg	1	MCERTS	-	-	-		
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-		
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-		
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-		
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-		
Benzene	µg/kg	1	MCERTS	-	-	-		
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-		
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-		
Trichloroethene	µg/kg	1	MCERTS	-	-	-		
Dibromomethane	µg/kg	1	MCERTS	-	-	-		
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-		
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-		
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-		
Toluene	µg/kg	1	MCERTS	-	-	-		
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-		
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-		
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-		
Tetrachloroethene	µg/kg	1	NONE	-	-	-		
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-		
Chlorobenzene	µg/kg	1	MCERTS	-	-	-		
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-		
Ethylbenzene	µg/kg	1	MCERTS	-	-	-		
p & m-Xylene	µg/kg	1	MCERTS	-	-	-		
Styrene	µg/kg	1	MCERTS	-	-	-		
Tribromomethane	µg/kg	1	NONE	-	-	-		
o-Xylene	µg/kg	1	MCERTS	-	-	-		
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-		
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-		
Bromobenzene	µg/kg	1	MCERTS	-	-	-		
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-		
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-		
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-		
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-		
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-		
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-		
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-		
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-		
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-		
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-		
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-		
Butylbenzene	µg/kg	1	MCERTS	-	-	-		
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-		
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-		
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-		
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-		

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Project / Site name: North Hyde Gardens, Hayes, Middlesex
Your Order No: P1470JJ1364.7

Lab Sample Number				952207	952208	952209		
Sample Reference				BH2	BH2	BH1		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				10.00	12.00	8.00		
Date Sampled				23/04/2018	23/04/2018	23/04/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-		
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-		
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-		
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-		
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-		
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-		
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-		

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	-		

Analytical Report Number:	**18-83574**
Project / Site name:	**North Hyde Gardens, Hayes, Middlesex**
Your Order No:	**P1470JJ1364.7**

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
951024	WS5	0.50	147	Loose Fibres	**Amosite**	< 0.001	**< 0.001**
951027	WS7	1.00	145	Loose Fibres	**Amosite**	< 0.001	**< 0.001**
951034	BH3c	0.50	120	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
951018	WS1	None Supplied	0.50	Brown clay with stones.
951019	WS2	None Supplied	4.00	Brown sand with gravel and oil / petroleum.
951020	WS2	None Supplied	0.60	Brown clay and sand with gravel.
951021	WS3	None Supplied	2.00	Light brown sand with gravel.
951022	WS4	None Supplied	1.50	Grey clay and sand with rubble.
951023	WS5	None Supplied	1.00	Brown clay and sand with gravel.
951024	WS5	None Supplied	0.50	Brown clay and sand with gravel and rubble.
951025	WS7	None Supplied	3.00	Brown clay and sand.
951026	WS7	None Supplied	0.50	-
951027	WS7	None Supplied	1.00	Brown clay with gravel.
951028	WS9	None Supplied	0.25	Brown loam and clay with vegetation and gravel
951029	WS9	None Supplied	1.00	Brown gravely sand with rubble and clinker
951030	BH1	None Supplied	0.50	Brown clay and sand with rubble.
951031	BH1	None Supplied	2.00	Brown clay and sand.
951032	BH2	None Supplied	0.50	Brown loam and clay with gravel.
951033	BH2	None Supplied	1.00	Brown loam and gravel.
951034	BH3c	None Supplied	0.50	Brown gravelly clay with stones.
951035	BH3c	None Supplied	1.00	Brown gravelly sand.
952205	BH3C	None Supplied	7.00	Brown clay.
952206	BH3C	None Supplied	14.00	Brown clay.
952207	BH2	None Supplied	10.00	Brown clay.
952208	BH2	None Supplied	12.00	Brown clay.
952209	BH1	None Supplied	8.00	Brown clay.

Analytical Report Number : 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS

Analytical Report Number : 18-83574

Project / Site name: North Hyde Gardens, Hayes, Middlesex

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX 4 – GEOTECHNICAL LABORATORY TEST RESULTS

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

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

4041

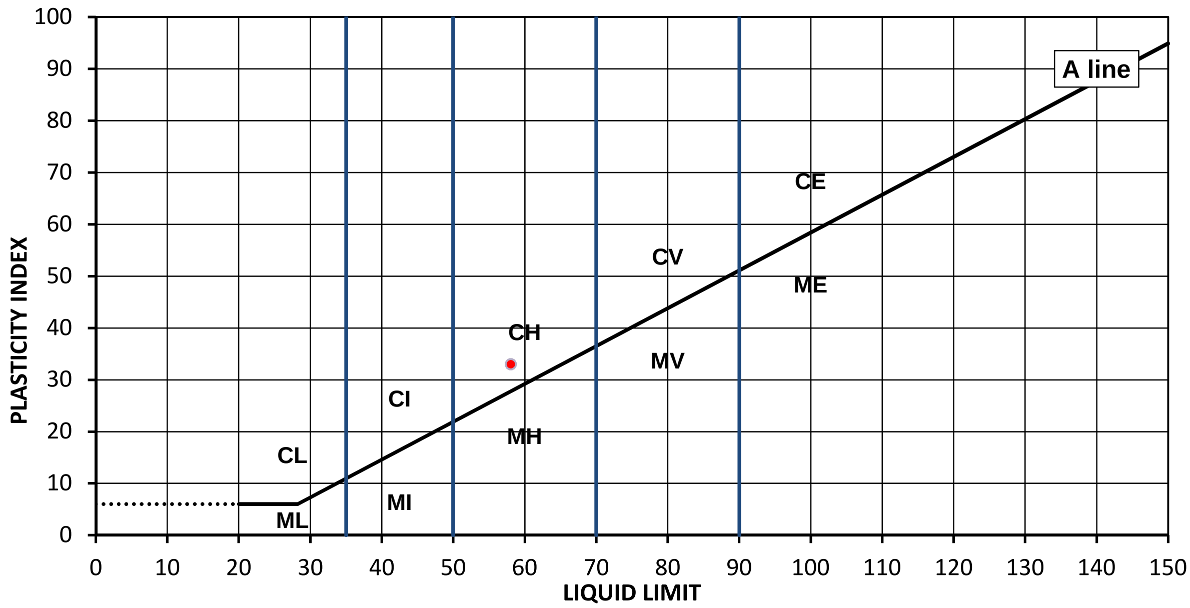
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	05/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Results

Laboratory Reference:	951425	Depth Top [m]:	2.40
Hole No.:	WS1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown gravelly slightly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
31	58	25	33	60



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

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

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Date Reported: 11/05/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.
The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

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

UKAS TESTING 4041

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

Client:	Jomas Associates Ltd
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD
Contact:	Emma Hucker
Site Name:	North Hyde Gardens, Hayes, Middlesex
Site Address:	North Hyde Gardens, Hayes, Middlesex

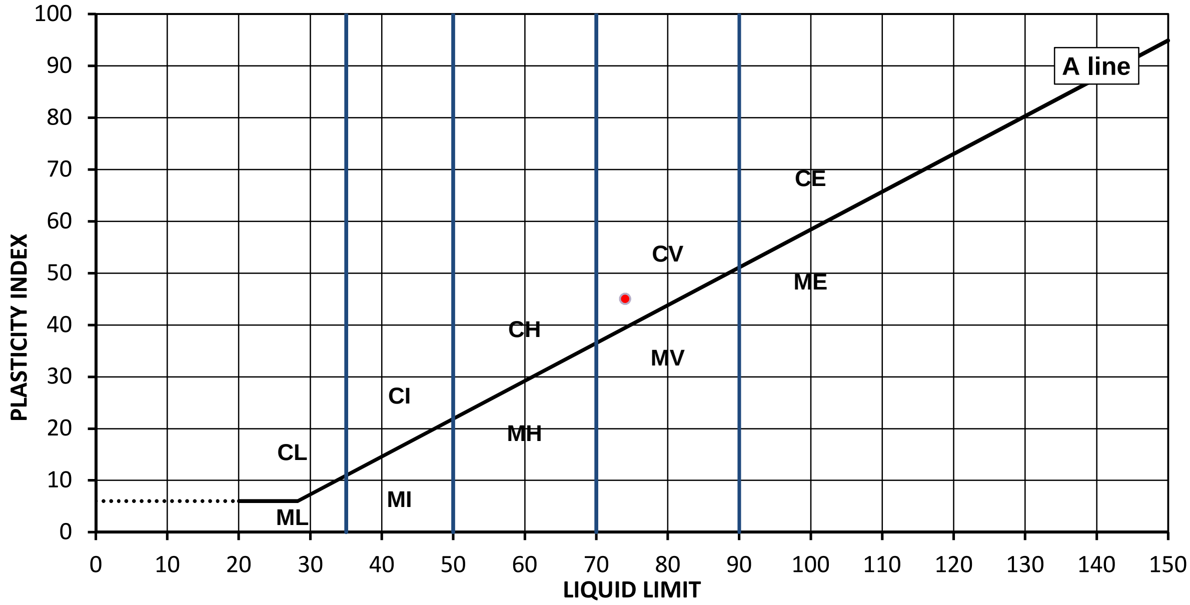
Client Reference:	JJ1364
Job Number:	18-83651
Date Sampled:	23/04/2018
Date Received:	25/04/2018
Date Tested:	05/05/2018
Sampled By:	Not Given

Test Results

Laboratory Reference:	951427
Hole No.:	BH2
Sample Reference:	Not Given
Soil Description:	Dark brown CLAY
Sample Preparation:	Tested in natural condition

Depth Top [m]:	11.00
Depth Base [m]:	Not Given
Sample Type:	B

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
30	74	29	45	100



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

				Plasticity	Liquid Limit
C	Clay	L	Low		below 35
M	Silt	I	Medium		35 to 50
		H	High		50 to 70
		V	Very high		70 to 90
		E	Extremely high		exceeding 90

Organic O append to classification for organic material (eg CHO)

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Piotrowski

Date Reported: 11/05/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

UKAS TESTING 4041

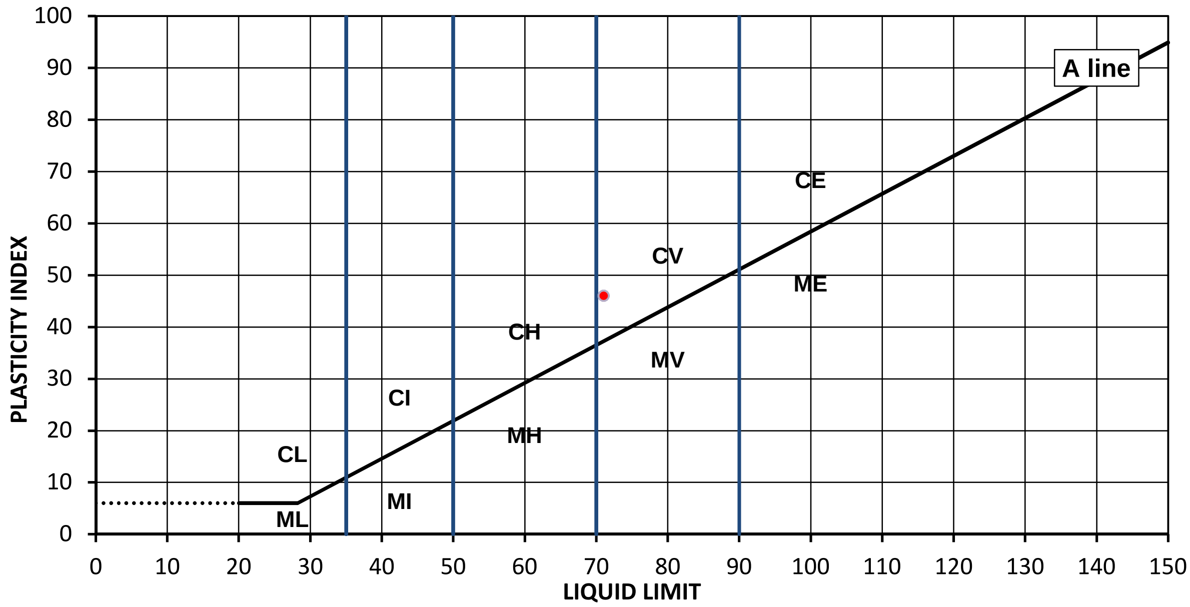
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	05/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Results

Laboratory Reference:	951423	Depth Top [m]:	6.00
Hole No.:	BH3C	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark brown CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
28	71	25	46	100



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

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

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Date Reported: 11/05/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

UKAS TESTING 4041

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

Client:	Jomas Associates Ltd
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD
Contact:	Emma Hucker
Site Name:	North Hyde Gardens, Hayes, Middlesex
Site Address:	North Hyde Gardens, Hayes, Middlesex

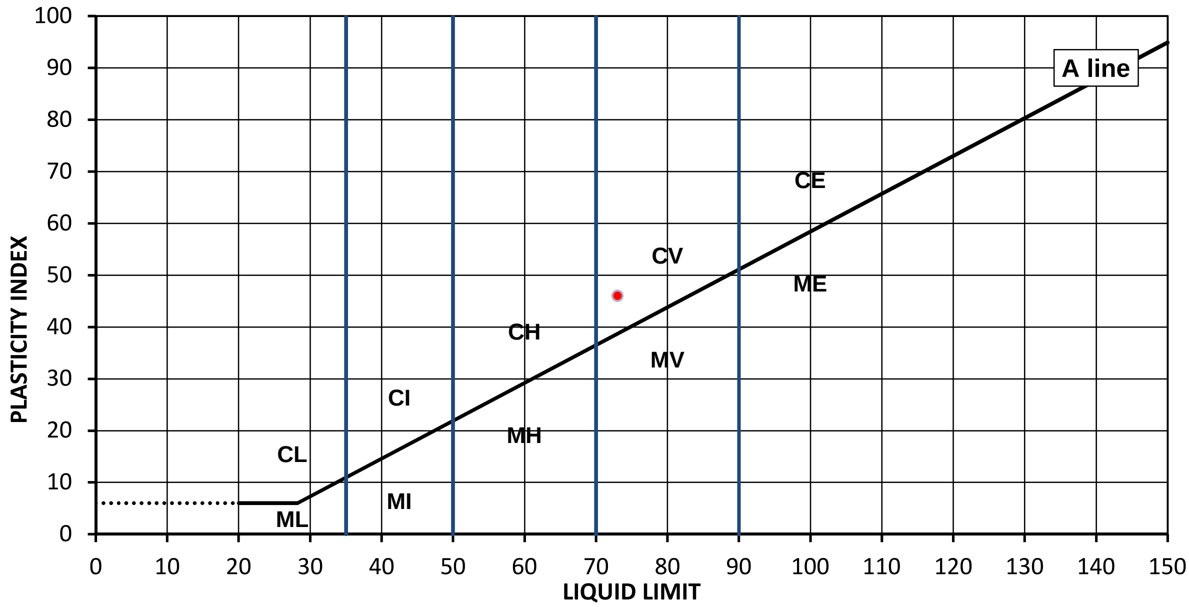
Client Reference:	JJ1364
Job Number:	18-83651
Date Sampled:	23/04/2018
Date Received:	25/04/2018
Date Tested:	05/05/2018
Sampled By:	Not Given

Test Results

Laboratory Reference:	951424
Hole No.:	BH3C
Sample Reference:	Not Given
Soil Description:	Dark brown CLAY
Sample Preparation:	Tested in natural condition

Depth Top [m]:	10.00
Depth Base [m]:	Not Given
Sample Type:	B

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	73	27	46	100



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

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

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Date Reported: 11/05/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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

GF 236.1

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

UKAS TESTING 4041

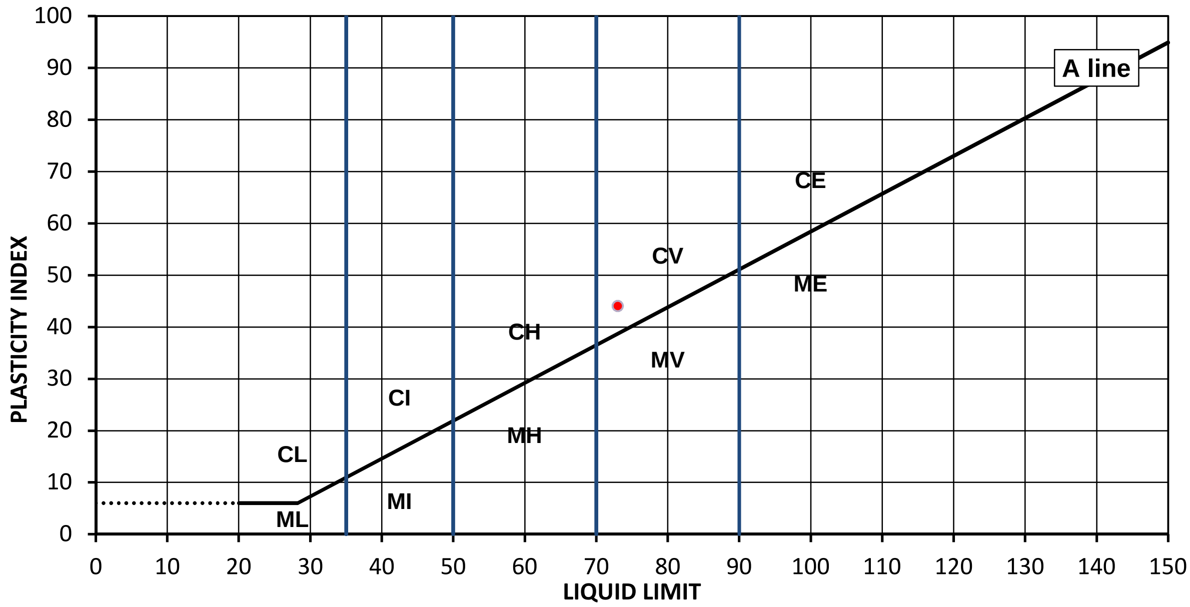
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	05/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Results

Laboratory Reference:	951426	Depth Top [m]:	8.00
Hole No.:	BH2	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark brown CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
30	73	29	44	100



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

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

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Date Reported: 11/05/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

UKAS TESTING 4041

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

Client: Jomas Associates Ltd
Client Address: Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD
Contact: Emma Hucker
Site Name: North Hyde Gardens, Hayes, Middlesex
Site Address: North Hyde Gardens, Hayes, Middlesex

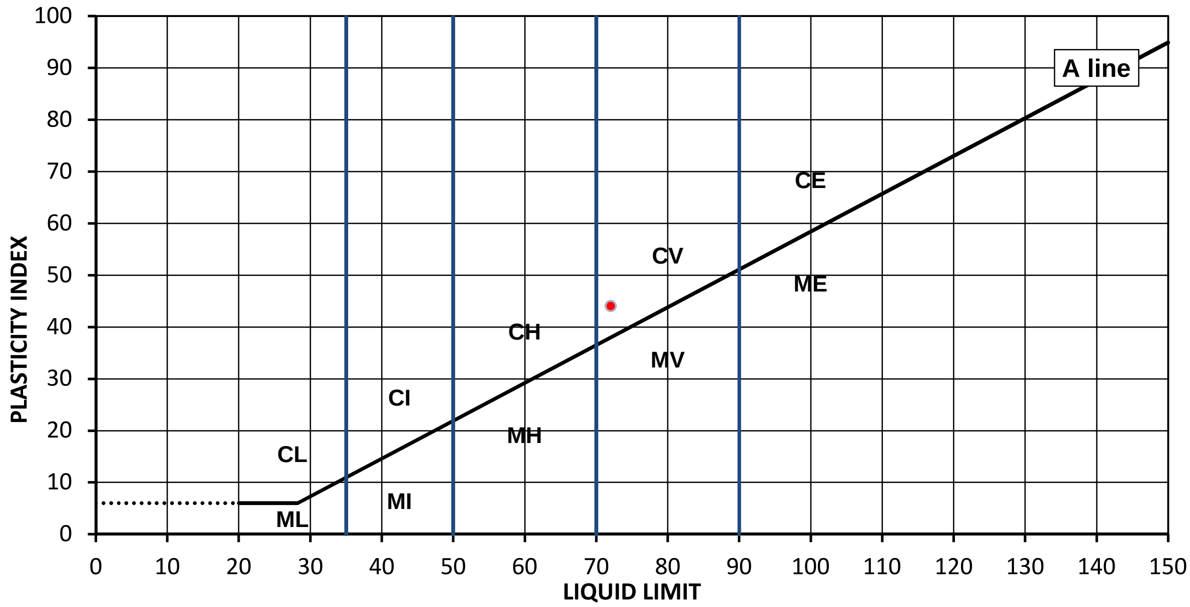
Client Reference: JJ1364
Job Number: 18-83651
Date Sampled: 23/04/2018
Date Received: 25/04/2018
Date Tested: 05/05/2018
Sampled By: Not Given

Test Results

Laboratory Reference: 951428
Hole No.: BH1
Sample Reference: Not Given
Soil Description: Dark brown CLAY
Sample Preparation: Tested in natural condition

Depth Top [m]: 7.00
Depth Base [m]: Not Given
Sample Type: B

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
29	72	28	44	100



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

				Plasticity		Liquid Limit
C	Clay		L	Low		below 35
M	Silt		I	Medium		35 to 50
			H	High		50 to 70
			V	Very high		70 to 90
			E	Extremely high		exceeding 90

Organic O append to classification for organic material (eg CHO)

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Date Reported: 11/05/2018

Signed:

Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

UKAS TESTING 4041

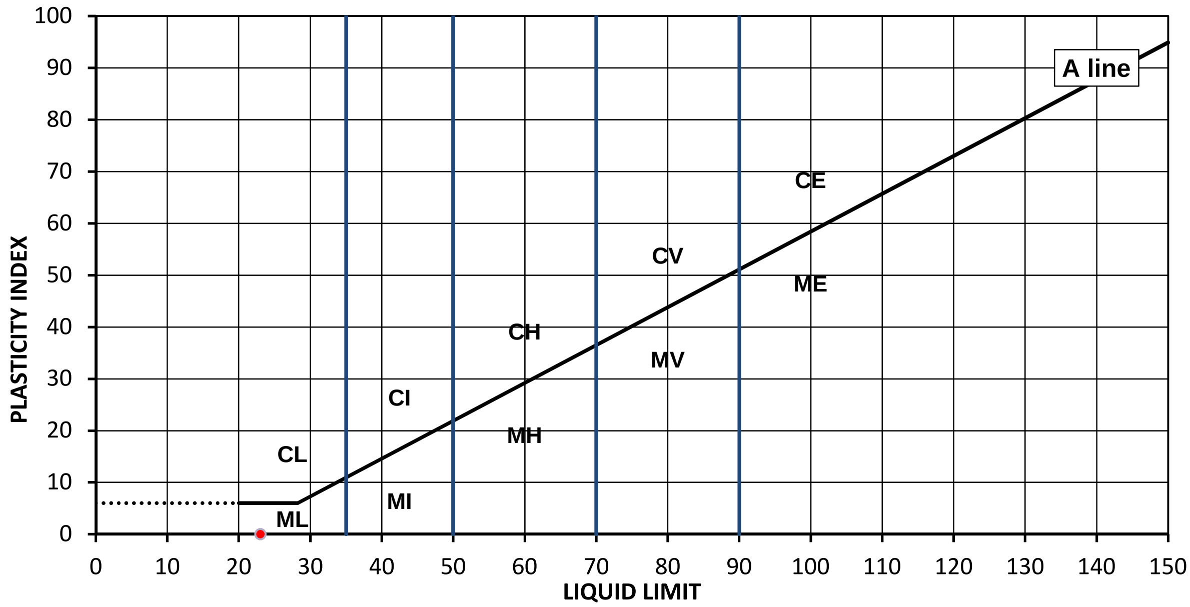
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	05/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Results

Laboratory Reference:	951429	Depth Top [m]:	3.00
Hole No.:	WS9	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Yellowish brown very gravelly slightly clayey SAND		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
7.7	23	NP	NP	31



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

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

Remarks: NP – non plastic

Approved:

Dariusz Piotrowski
PL Laboratory Manager

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Summary of Classification Test Results

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

Client: Jomas Associates Ltd
Client Address: Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD
Contact: Emma Hucker
Site Name: North Hyde Gardens, Hayes, Middlesex
Site Address: North Hyde Gardens, Hayes, Middlesex

Client Reference: JJ1364
Job Number: 18-83651
Date Sampled: 23/04/2018
Date Received: 25/04/2018
Date Tested: 05/05/2018
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	M/C	Atterberg				Density		Total Porosity
		Reference	Top depth [m]	Base depth [m]	Type			% Passing 425um	LL	PL	PI	bulk	PD	
							%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3
951428	BH1	Not Given	7.00	Not Given	B	Dark brown CLAY	29	100	72	28	44			
951426	BH2	Not Given	8.00	Not Given	B	Dark brown CLAY	30	100	73	29	44			
951427	BH2	Not Given	11.00	Not Given	B	Dark brown CLAY	30	100	74	29	45			
951423	BH3C	Not Given	6.00	Not Given	B	Dark brown CLAY	28	100	71	25	46			
951424	BH3C	Not Given	10.00	Not Given	B	Dark brown CLAY	26	100	73	27	46			
951425	WS1	Not Given	2.40	Not Given	D	Brown gravelly slightly sandy CLAY	31	60	58	25	33			
951429	WS9	Not Given	3.00	Not Given	D	Yellowish brown very gravelly slightly clayey SAND	7.7	31	23	NP	NP			

Comments: NP - non plastic

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Particle Size Distribution

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

4041

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

Client: Jomas Associates Ltd

Client Address: Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD

Contact: Emma Hucker

Site Name: North Hyde Gardens, Hayes, Middlesex

Site Address: North Hyde Gardens, Hayes, Middlesex

Client Reference: JJ1364
Job Number: 18-83651
Date Sampled: 23/04/2018
Date Received: 25/04/2018
Date Tested: 05/05/2018
Sampled By: Not Given

TEST RESULTS Laboratory Reference: 951430

Sample Reference: Not Given

Sample description: Yellowish brown slightly clayey very sandy GRAVEL

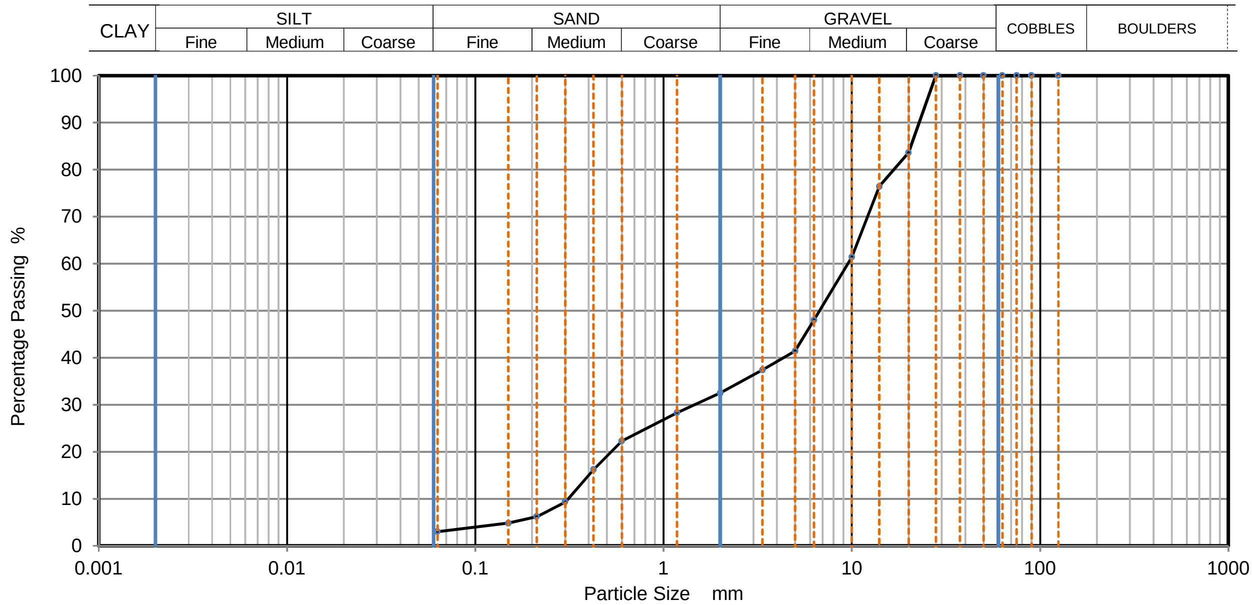
Sample Type: D

Location: WS9

Supplier: Not Given

Depth Top [m]: 4.00

Depth Base [m]: Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	84		
14	76		
10	61		
6.3	48		
5	41		
3.35	37		
2	33		
1.18	28		
0.6	22		
0.425	16		
0.3	9		
0.212	6		
0.15	5		
0.063	4		

Dry Mass of sample [g]: 558

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	67.50
Sand	28.60
Fines <0.063mm	3.90

Grading Analysis		
D100	mm	28
D60	mm	9.53
D30	mm	1.46
D10	mm	0.311
Uniformity Coefficient		31
Curvature Coefficient		0.72

Remarks

Preparation and testing in accordance with BS1377 unless noted below
The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Particle Size Distribution

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

UKAS TESTING 4041

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

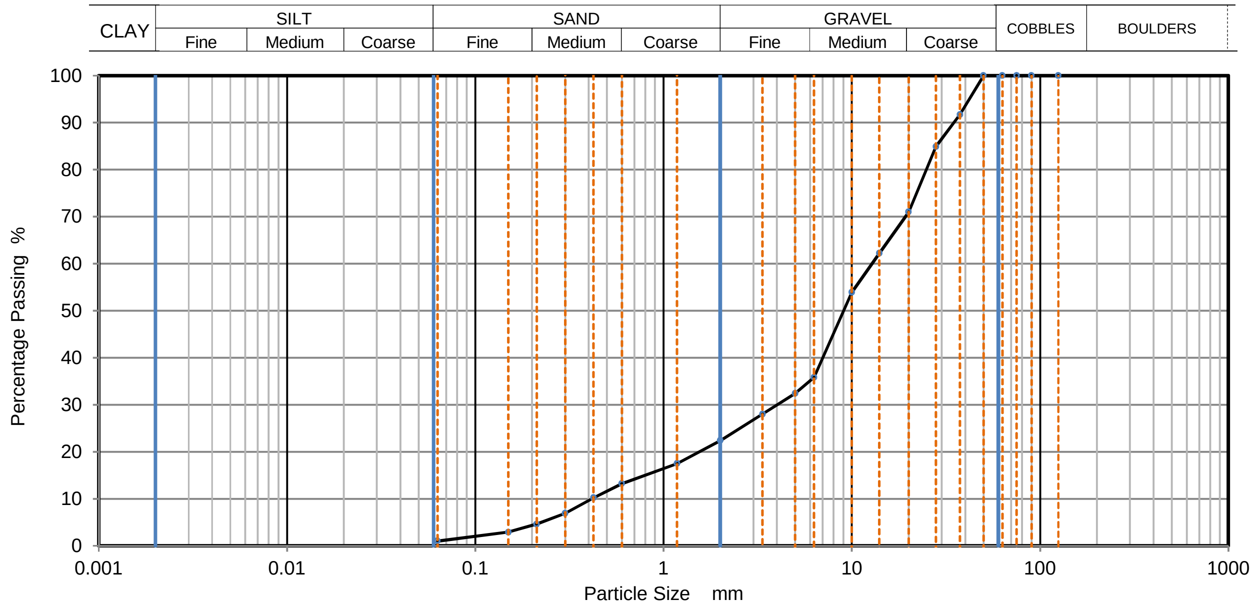
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	05/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

TEST RESULTS Laboratory Reference: 951431 — Sample Reference: Not Given

Sample description: Yellowish brown slightly clayey very sandy GRAVEL — Sample Type: B

Location: BH2 — Depth Top [m]: 4.00

Supplier: Not Given — Depth Base [m]: 4.45



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	92		
28	85		
20	71		
14	62		
10	54		
6.3	36		
5	32		
3.35	28		
2	22		
1.18	18		
0.6	13		
0.425	10		
0.3	7		
0.212	5		
0.15	3		
0.063	2		

Dry Mass of sample [g]: 6568

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	77.60
Sand	20.70
Fines <0.063mm	1.80

Grading Analysis		
D100	mm	50
D60	mm	12.8
D30	mm	4.01
D10	mm	0.415
Uniformity Coefficient		31
Curvature Coefficient		3

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Particle Size Distribution

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

4041

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

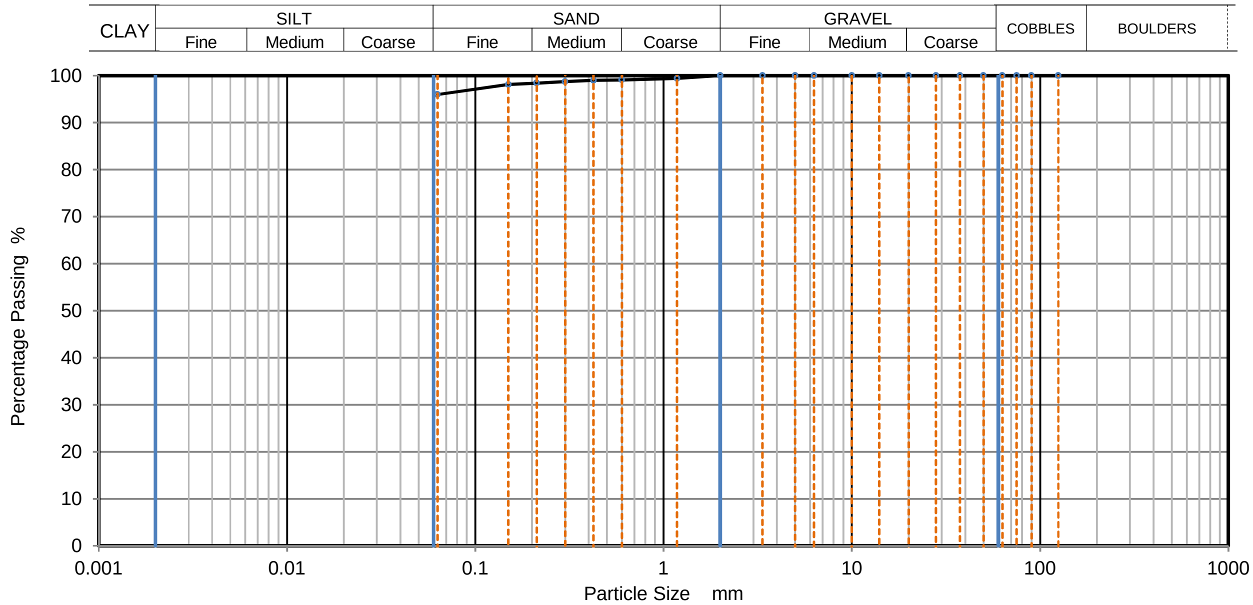
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	05/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

TEST RESULTS Laboratory Reference: 951432 Sample Reference: Not Given

Sample description: Brownish grey slightly sandy CLAY Sample Type: B

Location: BH2 Depth Top [m]: 5.00

Supplier: Not Given Depth Base [m]: Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	98		
0.15	98		
0.063	97		

Dry Mass of sample [g]: 278

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	3.10
Fines <0.063mm	96.90

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.
The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

GF 100.8

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

UKAS TESTING 4041

TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

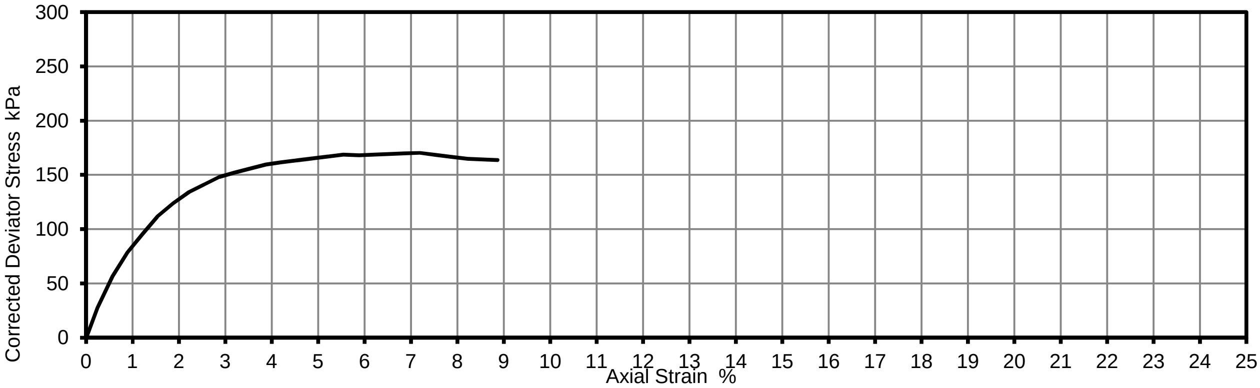
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

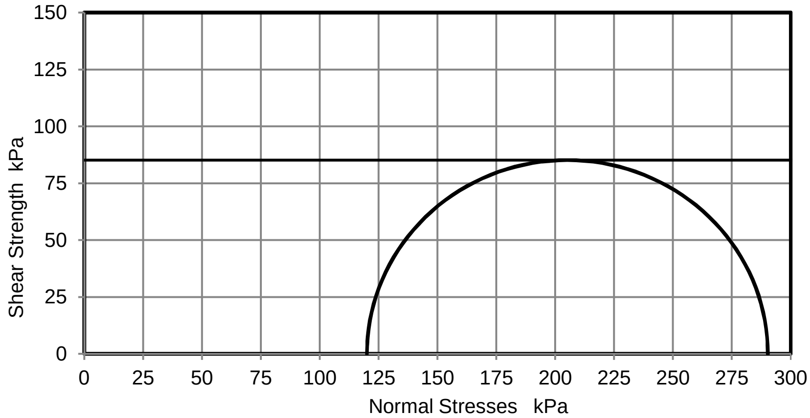
Laboratory Reference:	951415	Depth Top [m]:	6.00
Hole No.:	BH1	Depth Base [m]:	6.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown slightly sandy CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	198.61	mm	Cell Pressure	120	kPa	
Diameter	100.52	mm	Axial Strain at failure	7.2	%	
Bulk Density	1.93	Mg/m3	Deviator Stress, (σ1 - σ3)f	170	kPa	
Moisture Content	31	%	Undrained Shear Strength, cu	85	kPa	½(σ1 - σ3)f
Dry Density	1.48	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.46	kPa	Membrane thickness	0.26	mm	

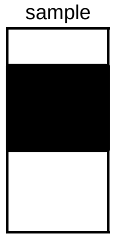
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:	Signed:
Dariusz Piotrowski PL Laboratory Manager Geotechnical Section	Darren Berrill Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

UKAS TESTING 4041

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

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

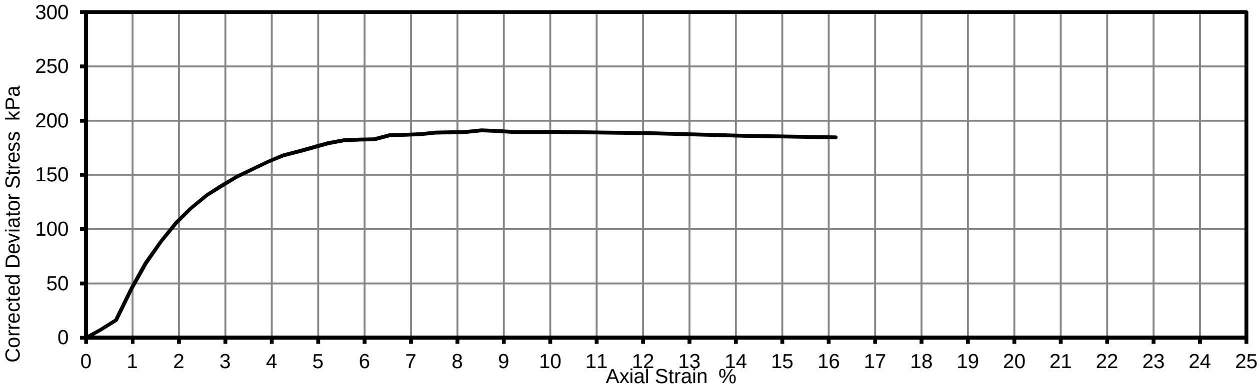
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

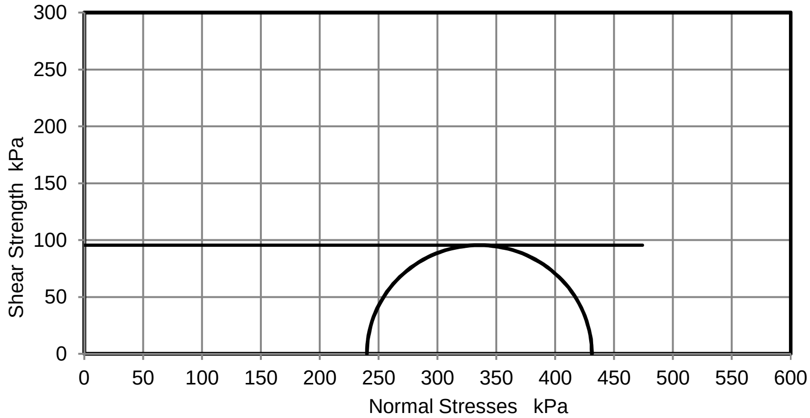
Laboratory Reference:	951416	Depth Top [m]:	12.00
Hole No.:	BH1	Depth Base [m]:	12.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	1.98	%/min	
Length	201.83	mm	Cell Pressure	240	kPa	
Diameter	104.63	mm	Axial Strain at failure	8.5	%	
Bulk Density	1.88	Mg/m3	Deviator Stress, (σ1 - σ3)f	191	kPa	
Moisture Content	29	%	Undrained Shear Strength, cu	96	kPa	½(σ1 - σ3)f
Dry Density	1.46	Mg/m3	Mode of Failure	Brittle		
Membrane Correction	0.46	kPa	Membrane thickness	0.24	mm	

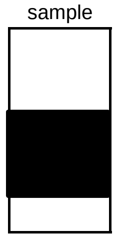
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

UKAS TESTING 4041

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

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

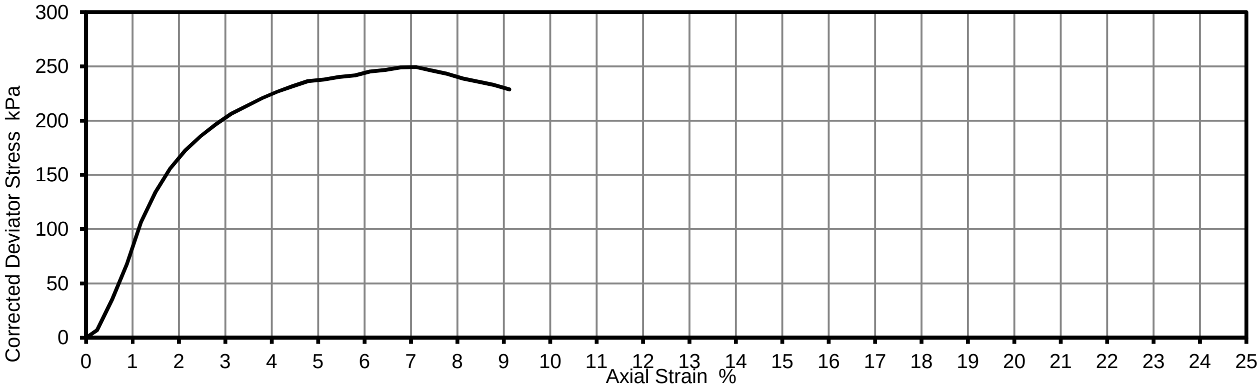
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

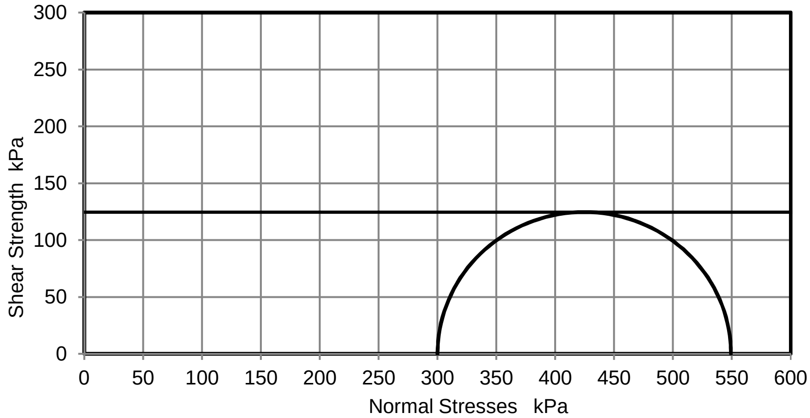
Laboratory Reference:	951417	Depth Top [m]:	15.00
Hole No.:	BH1	Depth Base [m]:	15.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	1.99	%/min	
Length	200.87	mm	Cell Pressure	300	kPa	
Diameter	103.70	mm	Axial Strain at failure	7.1	%	
Bulk Density	1.96	Mg/m3	Deviator Stress, (σ1 - σ3)f	249	kPa	
Moisture Content	26	%	Undrained Shear Strength, cu	125	kPa	½(σ1 - σ3)f
Dry Density	1.55	Mg/m3	Mode of Failure	Brittle		
Membrane Correction	0.42	kPa	Membrane thickness	0.25	mm	

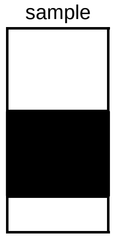
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

UKAS TESTING 4041

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

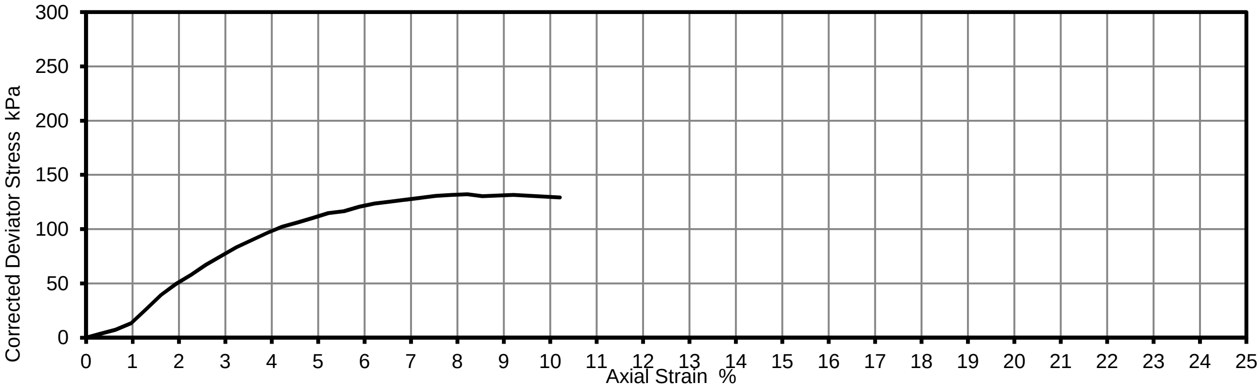
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

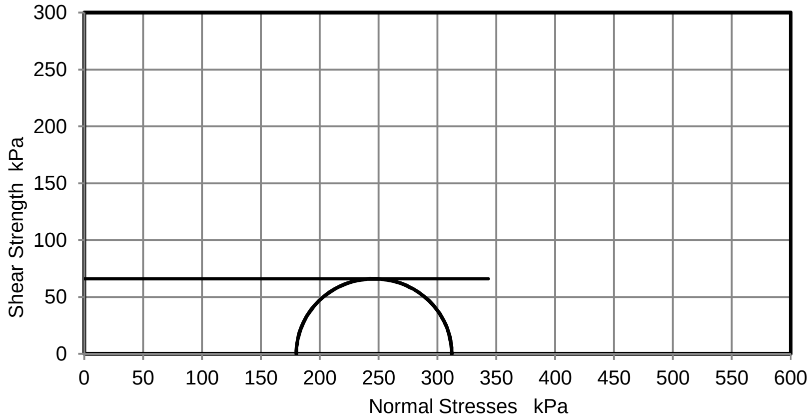
Laboratory Reference:	951418	Depth Top [m]:	9.00
Hole No.:	BH2	Depth Base [m]:	9.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	189.67	mm	Cell Pressure	180	kPa
Diameter	102.43	mm	Axial Strain at failure	8.2	%
Bulk Density	1.85	Mg/m3	Deviator Stress, (σ1 - σ3)f	132	kPa
Moisture Content	30	%	Undrained Shear Strength, cu	66	kPa ½(σ1 - σ3)f
Dry Density	1.43	Mg/m3	Mode of Failure	Brittle	
Membrane Correction	0.49	kPa	Membrane thickness	0.26	mm

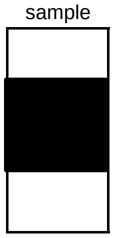
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

UKAS TESTING 4041

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

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

Environmental Science

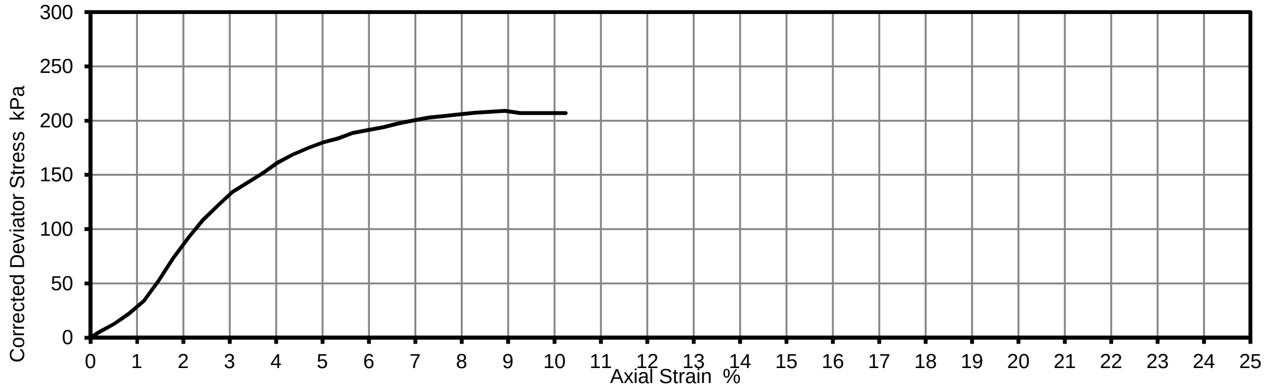
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

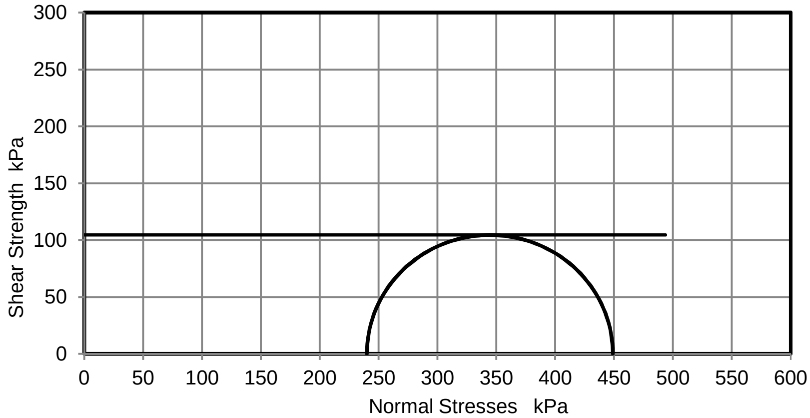
Laboratory Reference:	951419	Depth Top [m]:	12.00
Hole No.:	BH2	Depth Base [m]:	12.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown gravelly CLAY		

Test Number	1		Rate of Strain	1.96	%/min	
Length	203.68	mm	Cell Pressure	240	kPa	
Diameter	103.66	mm	Axial Strain at failure	8.9	%	
Bulk Density	1.91	Mg/m3	Deviator Stress, (σ1 - σ3)f	209	kPa	
Moisture Content	27	%	Undrained Shear Strength, cu	104	kPa	½(σ1 - σ3)f
Dry Density	1.50	Mg/m3	Mode of Failure	Brittle		
Membrane Correction	0.46	kPa	Membrane thickness	0.23	mm	

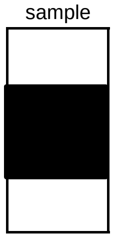
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

UKAS TESTING 4041

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

Environmental Science

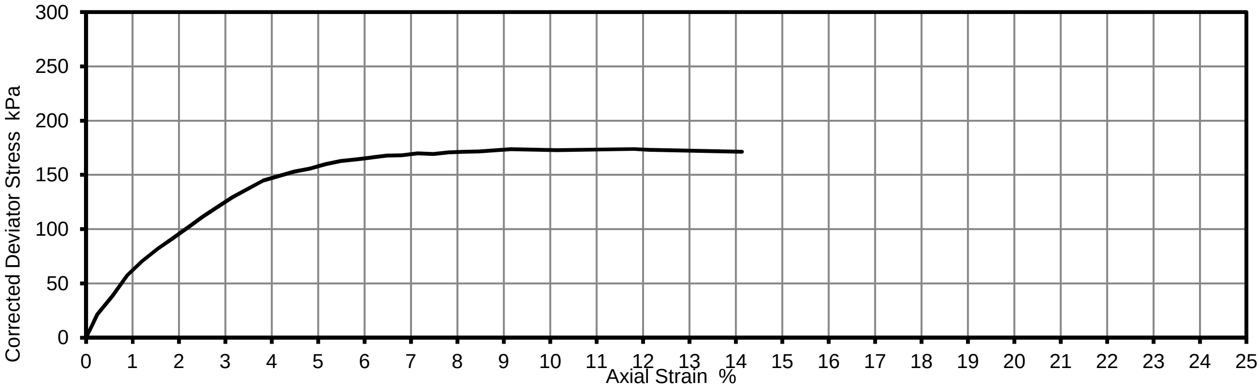
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

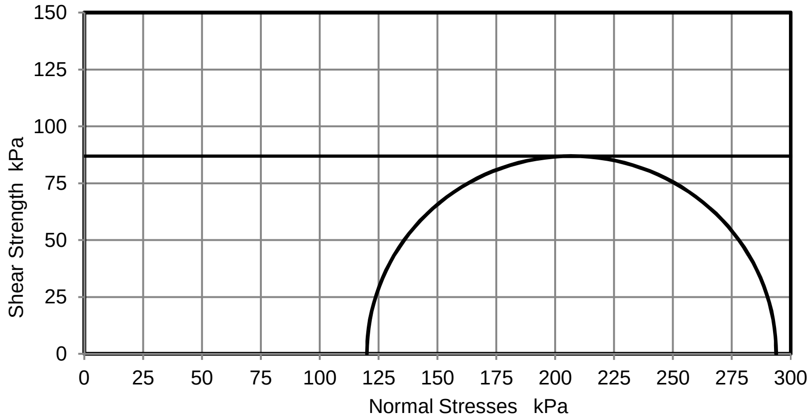
Laboratory Reference:	951420	Depth Top [m]:	6.00
Hole No.:	BH3C	Depth Base [m]:	6.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown sandy CLAY		

Test Number	1		Rate of Strain	2.00	%/min	
Length	193.67	mm	Cell Pressure	120	kPa	
Diameter	102.74	mm	Axial Strain at failure	11.8	%	
Bulk Density	1.92	Mg/m3	Deviator Stress, (σ1 - σ3)f	174	kPa	
Moisture Content	26	%	Undrained Shear Strength, cu	87	kPa	½(σ1 - σ3)f
Dry Density	1.53	Mg/m3	Mode of Failure	Compound		
Membrane Correction	0.66	kPa	Membrane thickness	0.27	mm	

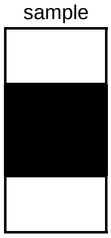
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

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

UKAS TESTING 4041

TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

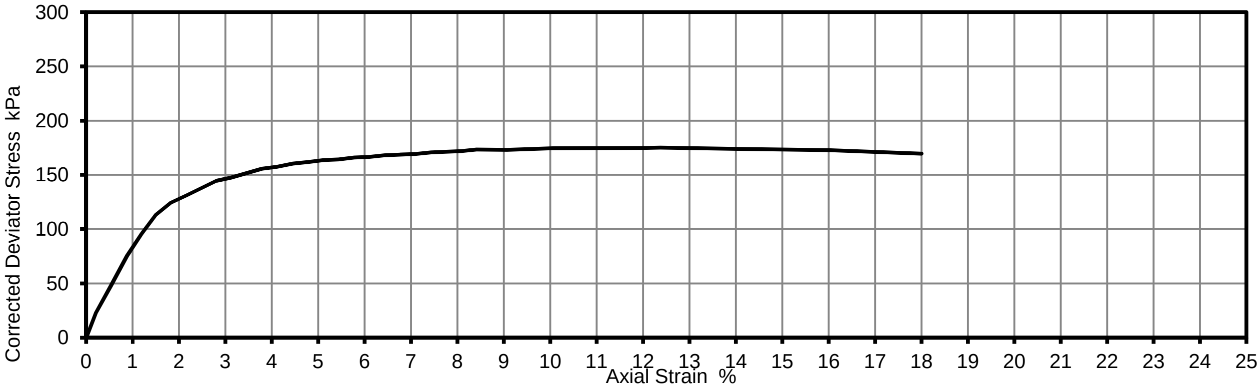
Client:	Jomas Associates Ltd	Client Reference:	JJ1364
Client Address:	Lakeside House 1 Furzeground Way Stockley Park UB11 1BD	Job Number:	18-83651
		Date Sampled:	23/04/2018
		Date Received:	25/04/2018
Contact:	Emma Hucker	Date Tested:	07/05/2018
Site Name:	North Hyde Gardens, Hayes, Middlesex	Sampled By:	Not Given
Site Address:	North Hyde Gardens, Hayes, Middlesex		

Test Result

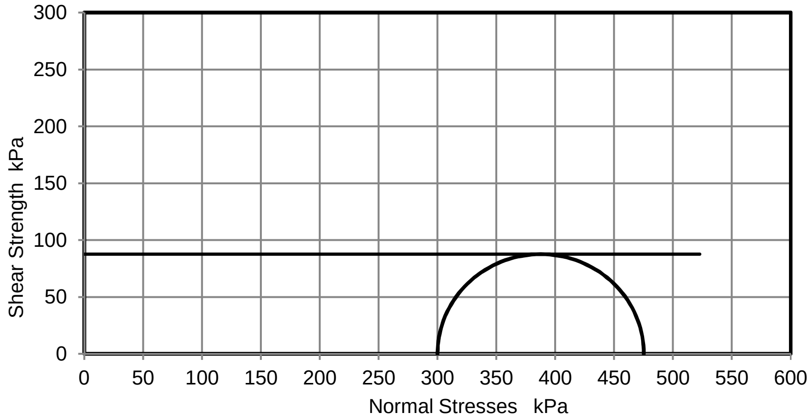
Laboratory Reference:	951421	Depth Top [m]:	15.00
Hole No.:	BH3C	Depth Base [m]:	15.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		

Test Number	1		Rate of Strain	1.98	%/min	
Length	201.84	mm	Cell Pressure	300	kPa	
Diameter	102.61	mm	Axial Strain at failure	12.4	%	
Bulk Density	1.95	Mg/m3	Deviator Stress, (σ1 - σ3)f	175	kPa	
Moisture Content	30	%	Undrained Shear Strength, cu	88	kPa	½(σ1 - σ3)f
Dry Density	1.49	Mg/m3	Mode of Failure	Brittle		
Membrane Correction	0.71	kPa	Membrane thickness	0.28	mm	

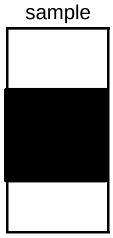
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

UKAS TESTING 4041

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

Analytical i2 Environmental Science

Client: Jomas Associates Ltd

Client Address: Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

Contact: Emma Hucker

Site Name: North Hyde Gardens, Hayes, Middlesex

Site Address: North Hyde Gardens, Hayes, Middlesex

Client Reference: JJ1364

Job Number: 18-83651

Date Sampled: 23/04/2018

Date Received: 25/04/2018

Date Tested: 07/05/2018

Sampled By: Not Given

Test Result

Laboratory Reference: 951422

Hole No.: BH3C

Sample Reference: Not Given

Sample Description: Brown CLAY

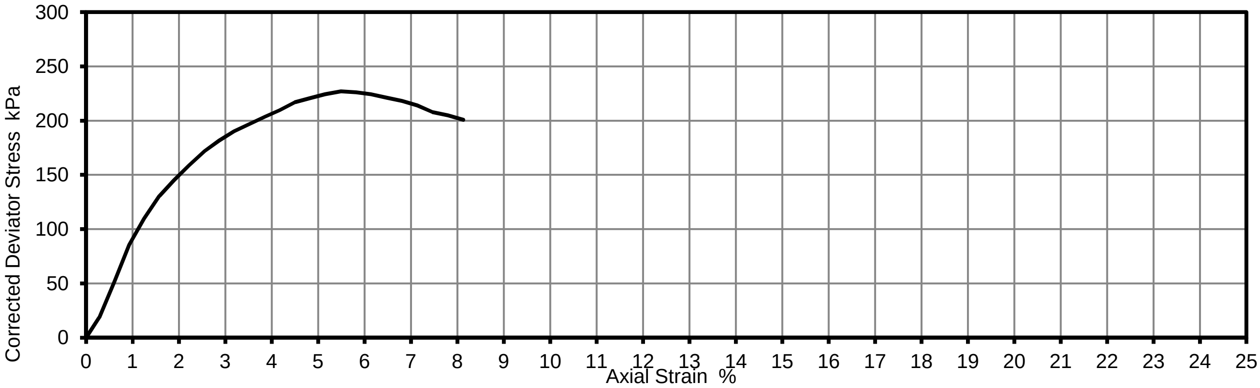
Depth Top [m]: 9.00

Depth Base [m]: 9.45

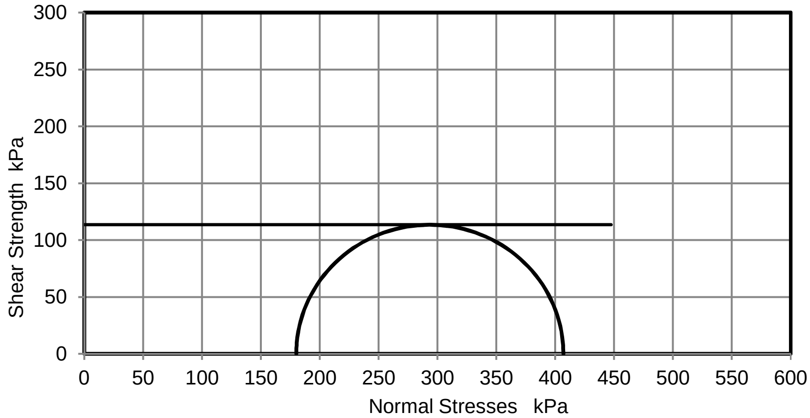
Sample Type: U

Test Number	1		Rate of Strain	1.97	%/min
Length	202.62	mm	Cell Pressure	180	kPa
Diameter	103.68	mm	Axial Strain at failure	5.5	%
Bulk Density	1.93	Mg/m3	Deviator Stress, (σ1 - σ3)f	227	kPa
Moisture Content	27	%	Undrained Shear Strength, cu	113	kPa ½(σ1 - σ3)f
Dry Density	1.52	Mg/m3	Mode of Failure	Brittle	
Membrane Correction	0.38	kPa	Membrane thickness	0.26	mm

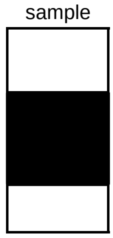
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Piotrowski

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 11/05/2018

for and on behalf of i2 Analytical Ltd

APPENDIX 5 – SOIL GAS MONITORING TEST RESULTS

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: North Hyde Gardens	**Operative(s):** AJH	**Date:** 04/05/2018	**Time:** 09:00	**Round: 1**	**Page:** 1

MONITORING EQUIPMENT

Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	10/01/2018
PID	Phocheck tiger	T-106448	03/10/2017
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Sunny	**Ground Conditions: Dry**	**Temperature**: 14°C
Barometric Pressure (mbar): 1021	**Barometric Pressure Trend (24hr):** Steady	**Ambient Concentration: 0.0** %CH_4,0.1 %CO_2, 20.1 %O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	+0.2	+0.2	1021	0.0	-	0.0	16.4	1	1	0	1	-	3.49	5.95
BH2	+0.1	+0.1	1021	0.0	-	0.1	15.2	2	2	2	>>>>	-	2.04	2.30
BH3	+0.1	+0.1	1021	0.0	-	0.3	19.8	1	1	0	0	-	1.77	4.88
WS1	+0.2	+0.2	1021	0.0	-	0.3	20.8	1	1	0	3	-	1.80	2.95
WS2	+0.1	+0.1	1022	0.0	-	0.1	21.0	1	1	0	0	-	1.88	2.49
WS4	+0.2	+0.2	1021	0.0	-	0.1	21.1	1	1	0	2	-	Dry	1.16
WS7	+0.1	+0.1	1021	0.0	-	0.0	16.4	1	1	0	4	-	1.83	4.24
WS9	+0.2	+0.2	1021	0.0	-	0.79	20.6	1	1	0	1	-	1.80	2.95

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET					
Site: North Hyde Gardens	**Operative(s):** AM	**Date:** 08/05/2018	**Time:** 10:00	**Round: 2**	**Page:** 1

MONITORING EQUIPMENT			
Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	10/01/2018
PID	Phocheck tiger	T-106448	03/10/2017
Dip Meter	GeoTech		

MONITORING CONDITIONS		
Weather Conditions: Sunny	**Ground Conditions: Dry**	**Temperature**: 20°C
Barometric Pressure (mbar): 1008	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration: 0.0** %CH_4,0.1 %CO_2, 20.1 %O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	+0.3	+0.3	1008	0.0	/	0.2	21.0	2	1	0	0	/	3.57	5.95
BH2	+0.2	+0.2	1008	0.0	/	0.1	18.0	1	1	0	26	/	2.15	2.30
BH3	+0.2	+0.2	1008	0.0	/	0.8	16.4	1	1	0	1	/	1.79	4.88
WS1	+0.4	+0.4	1008	0.0	/	0.8	18.3	1	1	0	0	/	1.80	2.95
WS2	+0.2	+0.2	1008	0.0	/	0.2	20.0	1	1	0	0	/	1.91	2.49
WS4	+0.1	+0.1	1008	0.0	/	0.1	19.8	1	1	0	1	/	Dry	1.16
WS7	+0.1	+0.1	1008	0.0	/	0.1	17.8	1	1	0	1	/	1.90	4.24
WS9	+0.3	+0.3	1008	0.0	/	1.4	19.5	1	1	0	0	/	2.13	3.65

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET					
Site: North Hyde Gardens	**Operative(s):** JLW, JT	**Date:** 16/05/2018	**Time:** 11:55	**Round: 3**	**Page:** 1

MONITORING EQUIPMENT			
Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	10/01/2018
PID	Phocheck tiger	T-106448	03/10/2017
Dip Meter	GeoTech		

MONITORING CONDITIONS		
Weather Conditions: Overcast	**Ground Conditions: Dry**	**Temperature**: 11°C
Barometric Pressure (mbar): 1024	**Barometric Pressure Trend (24hr):** Rising	**Ambient Concentration:** 0.0%CH_4, 0.2%CO_2, 20.1%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	+0.2	+0.2	1024	0	/	0.2	21.7	0	0	0	1	/	3.71	5.97
BH2	0	0	1024	0	/	0.1	18.5	1.0	1.0	0	5	/	2.12	2.23
BH3	-0.1	-0.1	1023	0	/	0.6	20.2	0	0	0	0	/	1.79	5.72
WS1	0	0	1024	0	/	0.9	21.3	0	0	0	0	/	1.84	2.94
WS2	+0.1	+0.1	1024	0	/	0.3	21.1	0	0	0	0	/	1.96	2.49
WS4	+0.1	+0.1	1024	0	/	0.1	21.8	0	0	0	1	/	Dry	1.17
WS7	-0.3	-0.3	1024	0	/	0.1	19.2	0	0	0	1	/	1.99	4.27
WS9	0	0	1024	0	/	2.2	19.6	0	0	0	0	/	2.19	3.64

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET					
Site: North Hyde Gardens	**Operative(s):** CLP	**Date:** 23/05/2018	**Time:** 12:45	**Round: 4**	**Page:** 1

MONITORING EQUIPMENT			
Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	10/01/2018
PID	Phocheck tiger	T-106448	03/10/2017
Dip Meter	GeoTech		

MONITORING CONDITIONS		
Weather Conditions: Sunny	**Ground Conditions: Dry**	**Temperature**: 14°C
Barometric Pressure (mbar): 1022	**Barometric Pressure Trend (24hr):** Rising	**Ambient Concentration:** 0.0%CH_4, 0.2%CO_2, 21.4%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	0.0	0.0	1022	0.0	/	0.2	21.2	/	/	0	1	/	3.72	5.97
BH2	0.0	0.0	1022	0.0	/	0.1	13.2	/	/	0	7	/	2.16	2.18
BH3	0.0	0.0	1022	0.0	/	0.2	21.2	/	/	0	1	/	1.80	5.75
WS1	+0.1	+0.1	1022	0.0	/	0.9	20.7	/	/	0	2	/	1.89	2.96
WS2	0.0	0.0	1022	0.0	/	0.2	21.0	/	/	0	1	/	2.01	2.50
WS4	0.0	0.0	1022	0.0	/	0.0	21.6	/	/	0	2	/	Dry	1.17
WS7	0.0	0.0	1022	0.0	/	0.1	19.2	/	/	0	1	/	2.05	4.27
WS9	0.0	0.0	1022	0.0	/	1.9	19.5	/	/	0	1	/	2.23	3.65

APPENDIX 6 – LOW FLOW MONITORING DATA SHEETS

LOW FLOW GROUNDWATER MONITORING BOREHOLE RECORD SHEET					
Site: North Hyde Gardens	**Operative(s):** AJH	**Date:** 04/05/2018	**Time:** 09:00	**Round:** 1	**Page:** 1 of 1

MONITORING EQUIPMENT			
Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
SmarTROLL MP	In-Situ		
Dip Meter	In-Situ		

MONITORING CONDITIONS		
Weather Conditions: Sunny	**Ground Conditions:** Dry	**Temperature**: 14°C

Hole ID	Temperature (°C)	Specific Conductivity (µS/cm)	pH	(ORP) Oxidation-Reduction Potential (mV)	(RDO) Rugged Dissolved Oxygen Concentration (mg/L)	Water Level (Start of testing)	Water Level (End of testing)	Hole Depth	Comments
BH1	13.39	1049.7	7.93	197.1	3.47	3.49	3.50	5.95	Sampled @ 4.00m, stabilised after 12 mins, clear, no odour, no sheen.
BH2	-	-	-	-	-	2.04	2.30	2.30	Silted up, grab sample taken, very turbid, minimal recovery (1 x vial)
BH3	11.42	881.80	7.87	201.6	0.82	1.77	1.27	4.88	Sampled @ 2.27m, stabilised after 12 mins, clear, no odour, no sheen.
WS1	13.03	1406.3	10.36	489.9	0.68	1.80	1.84	2.95	Sampled @ 2.34m, stabilised after 12 mins, slight turbidity, no odour, no sheen.
WS2	12.49	1129.7	8.58	196.6	0.45	1.88	1.88	2.44	Sampled @ 2.38m, stabilised after 12 mins, clear, no odour, no sheen.
WS7	12.81	8703.9	9.99	188.7	3.63	1.83	2.00	4.24	Sampled @ 2.50m, stabilised after 12 mins, slight turbidity, no odour, no sheen.

Hole ID	Temperature (°C)	Specific Conductivity (µS/cm)	pH	(ORP) Oxidation-Reduction Potential (mV)	(RDO) Rugged Dissolved Oxygen Concentration (mg/L)	Water Level (Start of testing)	Water Level (End of testing)	Hole Depth	Comments
WS9	10.21	2176.1	7.53	206.6	1.43	2.08	2.40	3.65	Sampled @ 2.90m, did not stabilise after 15 mins, turbid, no odour, no sheen.

Specific Conductivity (µS/cm)

This is a measure of the capability of a solution such as water in a stream to pass an electric current. This is an indicator of the concentration of dissolved electrolyte ions in the water. It doesn't identify the specific ions in the water. However, significant increases in conductivity may be an indicator that polluting discharges have entered the water.

Every creek will have a baseline conductivity depending on the local geology and soils. Higher conductivity will result from the presence of various ions including nitrate, phosphate, and sodium.

The basic unit of measurement for conductivity is micromhos per centimeter (µmhos/cm) or microsiemens per centimeter (µS/cm). Either can be used, they are the same. It is a measure of the inverse of the amount of resistance an electric charge meets in traveling through the water. Distilled water has a conductivity ranging from 0.5 to 3 µS/cm, while most streams range between 50 to 1500 µS/cm. Freshwater streams ideally should have a conductivity between 150 to 500 µS/cm to support diverse aquatic life.

pH

A measure of a solution's acidity. In water, small numbers of water molecules (H2O) will break apart or disassociate into hydrogen ions (H+) and hydroxide ions (OH-). Other compounds entering the water may react with these, leaving an imbalance in the numbers of hydrogen and hydroxide ions. When more hydrogen ions react, more hydroxide ions are left in solution and the water is basic; when more hydroxide ions react, more hydrogen ions are left and the water is acidic. pH is a measure of the number of hydrogen ions and thus a measure of acidity.

pH is measured on a logarithmic scale between 1 and 14 with 1 being extremely acid, 7 neutral, and 14 extremely basic. Because it is a logarithmic scale there is a ten fold increase in acidity for a change of one unit of pH, e.g. 5 is 100 times more acid than 7 on the pH scale. The largest variety of freshwater aquatic organisms prefer a pH range between 6.5 to 8.0.

(RDO) Rugged Dissolved Oxygen Concentration (mg/L)

Dissolved oxygen is oxygen gas molecules (O2) present in the water. Plants and animals cannot directly use the oxygen that is part of the water molecule (H2O), instead depending on dissolved oxygen for respiration. Oxygen enters streams from the surrounding air and as a product of photosynthesis from aquatic plants. Consistently high levels of dissolved oxygen are best for a healthy ecosystem.

Levels of dissolved oxygen vary depending on factors including water temperature, time of day, season, depth, altitude, and rate of flow. Water at higher temperatures and altitudes will have less dissolved oxygen. Dissolved oxygen reaches its peak during the day. At night, it decreases as photosynthesis has stopped while oxygen consuming processes such as respiration, oxidation, and respiration continue, until shortly before dawn.

Human factors that affect dissolved oxygen in streams include addition of oxygen consuming organic wastes such as sewage, addition of nutrients, changing the flow of water, raising the water temperature, and the addition of chemicals.

Dissolved oxygen is measured in mg/L.

0-2 mg/L: not enough oxygen to support life.
2-4 mg/L: only a few fish and aquatic insects can survive.
4-7 mg/L: good for many aquatic animals, low for cold water fish
7-11 mg/L: very good for most stream fish

(ORP) Oxidation- Reduction Potential (mV)

ORP is a measure of the cleanliness of thewater & its ability to break down contaminants”. It has a range of –2,000 to + 2,000 and units are in “mV” (millivolts).

APPENDIX 7 – CBR CALCULATIONS

CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS1
Date of test: 24/04/2018

Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

Depth (mm)	Nr Blow	Cumulative blows
50	0	0
100	0	0
150	0	0
200	0	0
250	9	9
300	11	20
350	11	31
400	15	46
450	9	55
500	4	59
550	3	62
600	50	112
650		
700		
750		
800		
850		
900		
950		
1000		

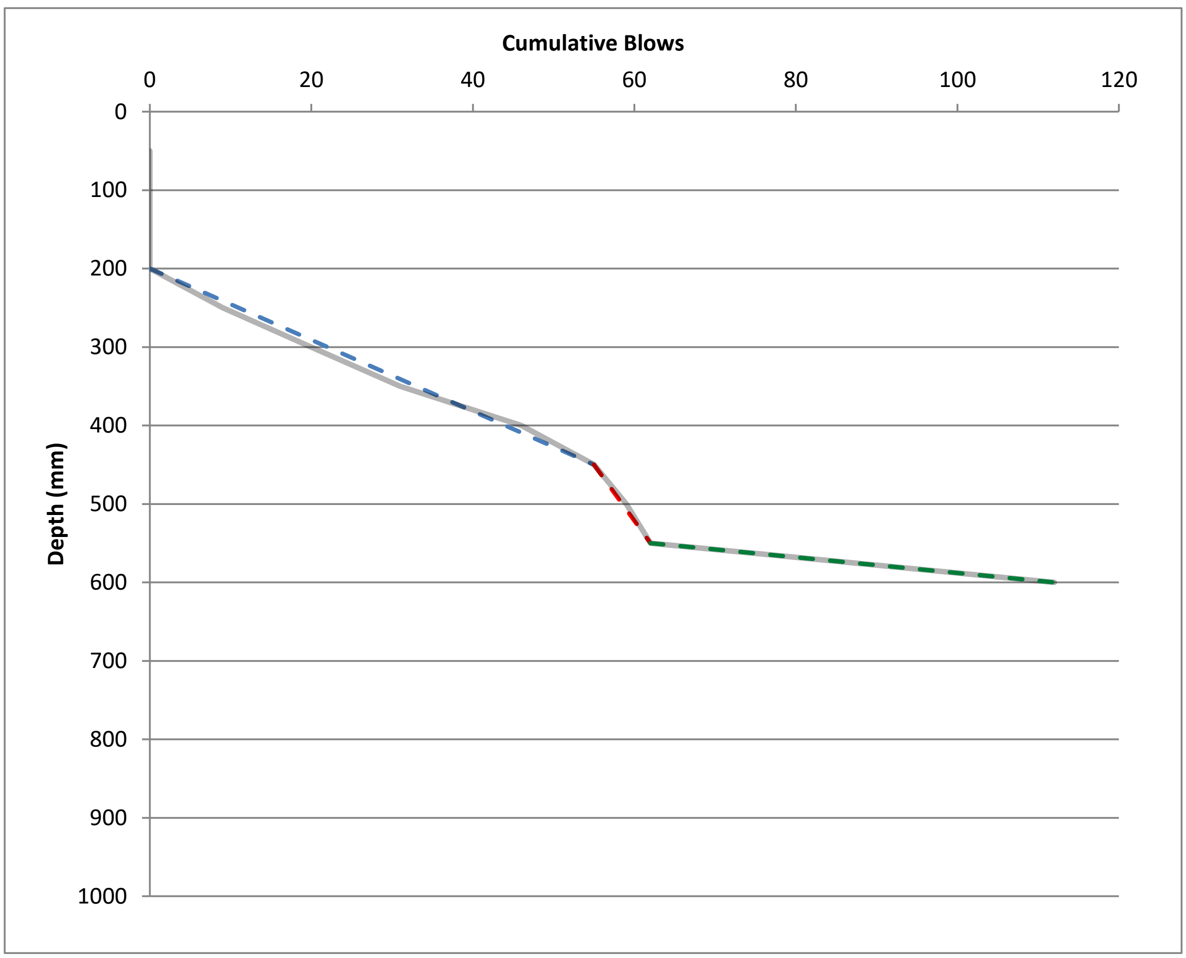
Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS1-Test 1	200	450	4.5	60.9	244.16
WS1-Test 2	450	550	14.3	18.2	112.71
WS1-Test 3	550	600	1.0	302	680.33

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.20m: Concrete. (MADE GROUND).
0.20 - 1.00m: Soft to firm consistency* brown sandy very gravelly clay. Gravel consists of fine to medium angular to sub-angular flint, brick and concrete fragments. (MADE GROUND).

*Field description



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS2
Date of test: 24/04/2018

Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

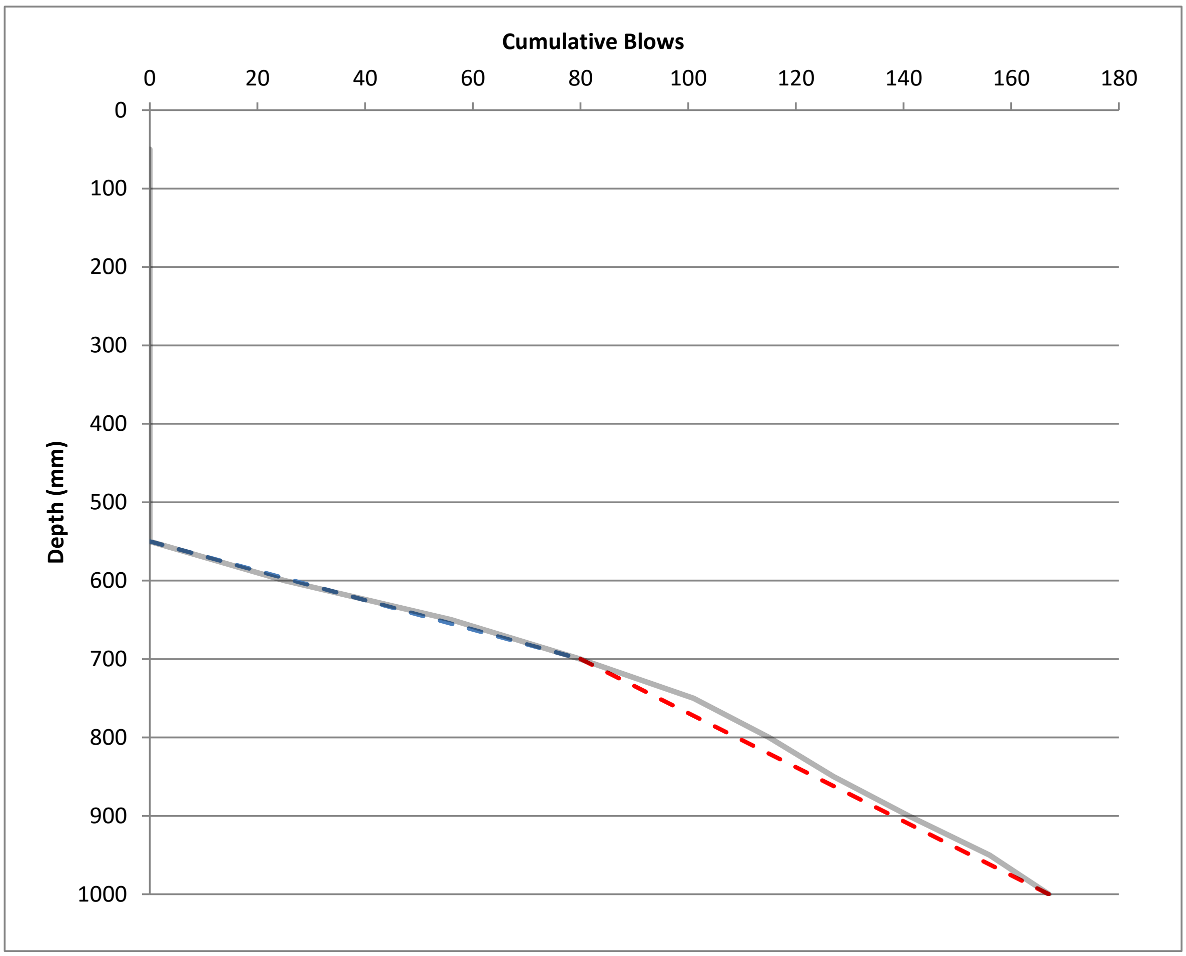
Depth (mm)	Nr Blow	Cumulative blows
50	0	0
100	0	0
150	0	0
200	0	0
250	0	0
300	0	0
350	0	0
400	0	0
450	0	0
500	0	0
550	0	0
600	25	25
650	31	56
700	24	80
750	21	101
800	14	115
850	12	127
900	14	141
950	15	156
1000	11	167

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS2-Test 1	550	700	1.9	155.4	444.67
WS2-Test 2	700	1000	3.4	81.6	294.44

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.55m: Asphalt. (MADE GROUND).
0.55 - 1.00m: Medium dense dark grey to black to brown slightly clayey sandy gravel. Gravel consists of fine to coarse angular to sub-rounded flint and occasional brick and concrete fragments. (MADE GROUND).



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS3
Date of test: 24/04/2018

Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

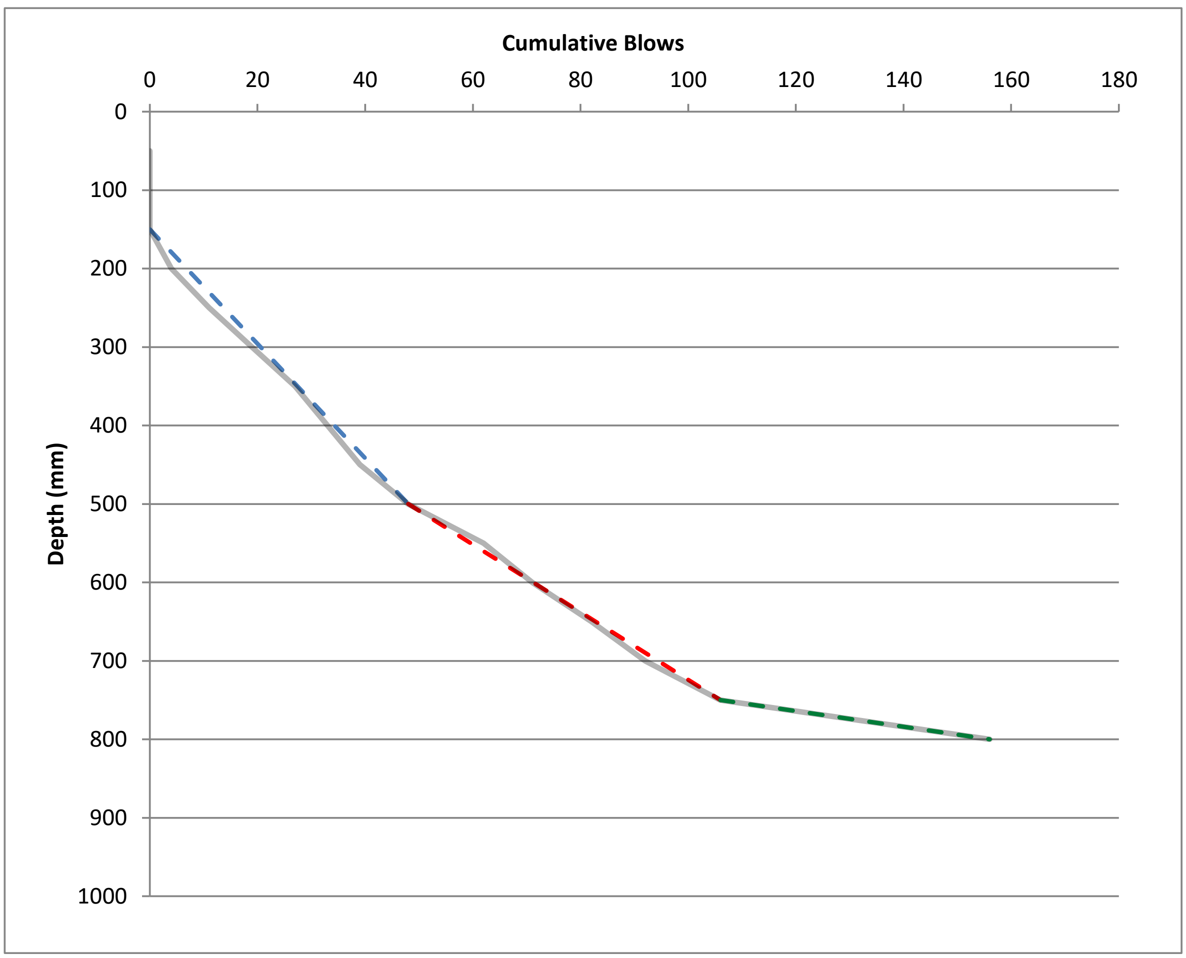
Depth (mm)	Nr Blow	Cumulative blows
50	0	0
100	0	0
150	0	0
200	4	4
250	7	11
300	8	19
350	8	27
400	6	33
450	6	39
500	9	48
550	14	62
600	9	71
650	11	82
700	10	92
750	14	106
800	50	156
850		
900		
950		
1000		

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS3-Test 1	150	500	7.3	37	177.49
WS3-Test 2	500	750	4.3	64.5	253.3
WS3-Test 3	750	800	1.0	302	680.33

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.06m: Asphalt. (MADE GROUND).
0.06 - 0.20m: Concrete. (MADE GROUND).
0.20 - 1.00m: Brown clayey sandy gravel. Gravel consists of fine to coarse angular to rounded flint, brick and concrete fragments. (MADE GROUND).



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS5
Date of test: 24/04/2018

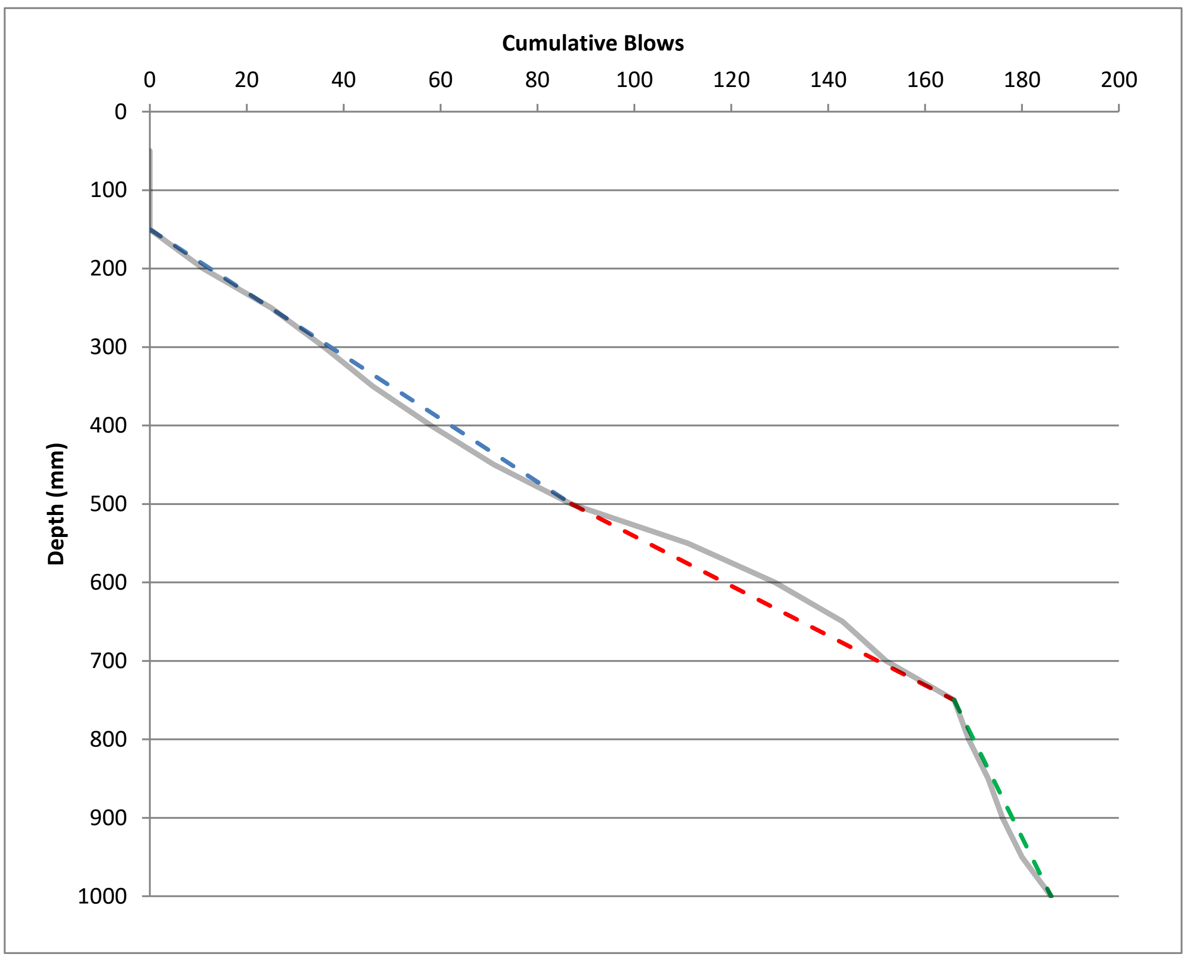
Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

Depth (mm)	Nr Blow	Cumulative blows
50	0	0
100	0	0
150	0	0
200	11	11
250	14	25
300	11	36
350	10	46
400	12	58
450	13	71
500	16	87
550	24	111
600	18	129
650	14	143
700	9	152
750	14	166
800	3	169
850	4	173
900	3	176
950	4	180
1000	6	186

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS5-Test 1	150	500	4.0	69.3	265.21
WS5-Test 2	500	750	3.2	89.4	312.15
WS5-Test 3	750	1000	12.5	20.9	123.14

* CBR calculated using method outlined in IAN 73/06

Test Notes:
Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.15m: Asphalt. (MADE GROUND).
0.15 - 0.80m: Brown clayey sandy gravel containing occasional rootlets. Gravel consists of abundant angular to sub-rounded flint and frequent brick fragments. (MADE GROUND).
0.80 - 1.00m: Very loose to loose dark grey to black slightly clayey sandy gravel. Gravel consists of fine to medium flint and occasional brick fragments. (MADE GROUND).



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS6
Date of test: 24/04/2018

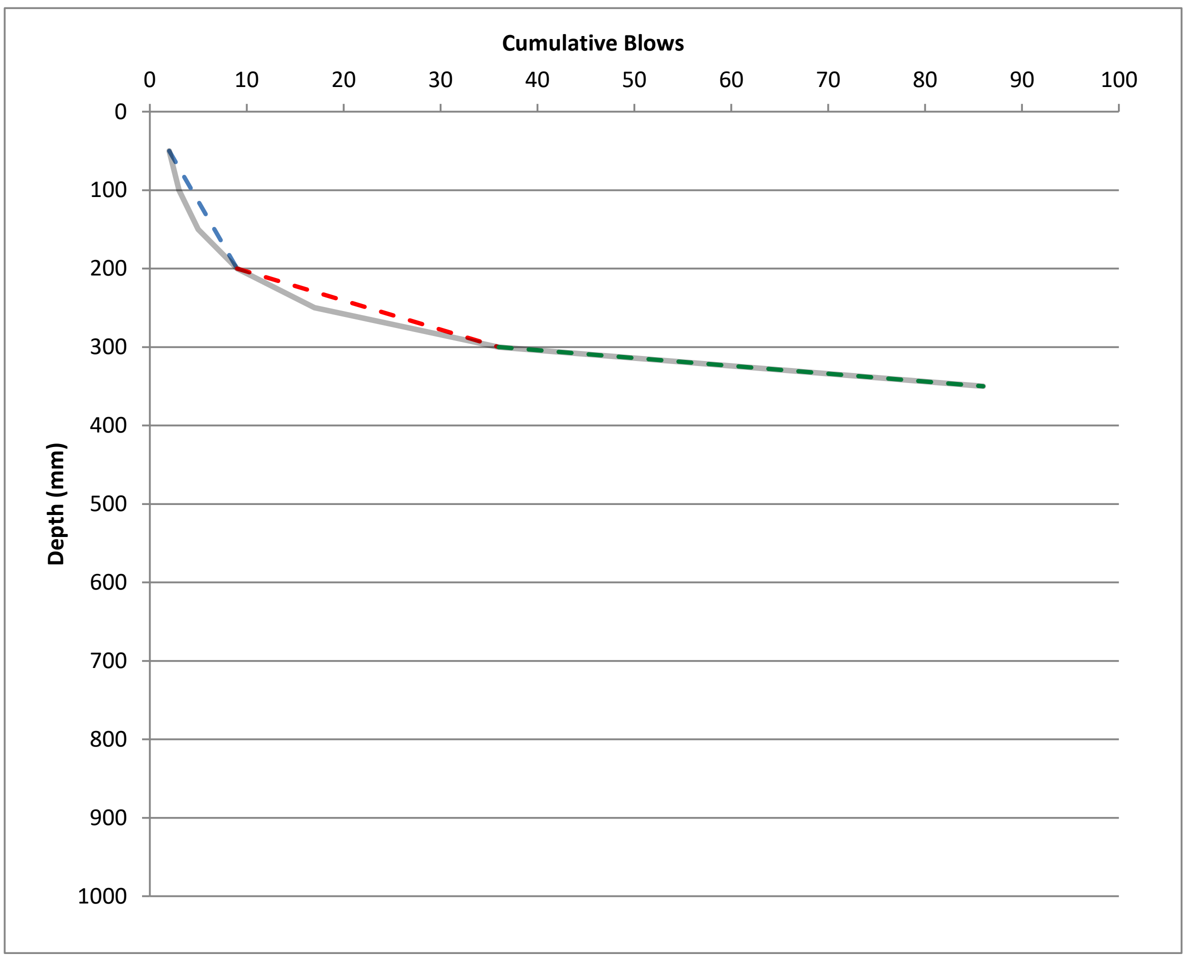
Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

Depth (mm)	Nr Blow	Cumulative blows
50	2	2
100	1	3
150	2	5
200	4	9
250	8	17
300	19	36
350	50	86
400		
450		
500		
550		
600		
650		
700		
750		
800		
850		
900		
950		
1000		

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS6-Test 1	50	200	21.4	11.8	85.41
WS6-Test 2	200	300	3.7	75.7	280.63
WS6-Test 3	300	350	1.0	302	680.33

* CBR calculated using method outlined in IAN 73/06

Test Notes:
Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS7
Date of test: 24/04/2018

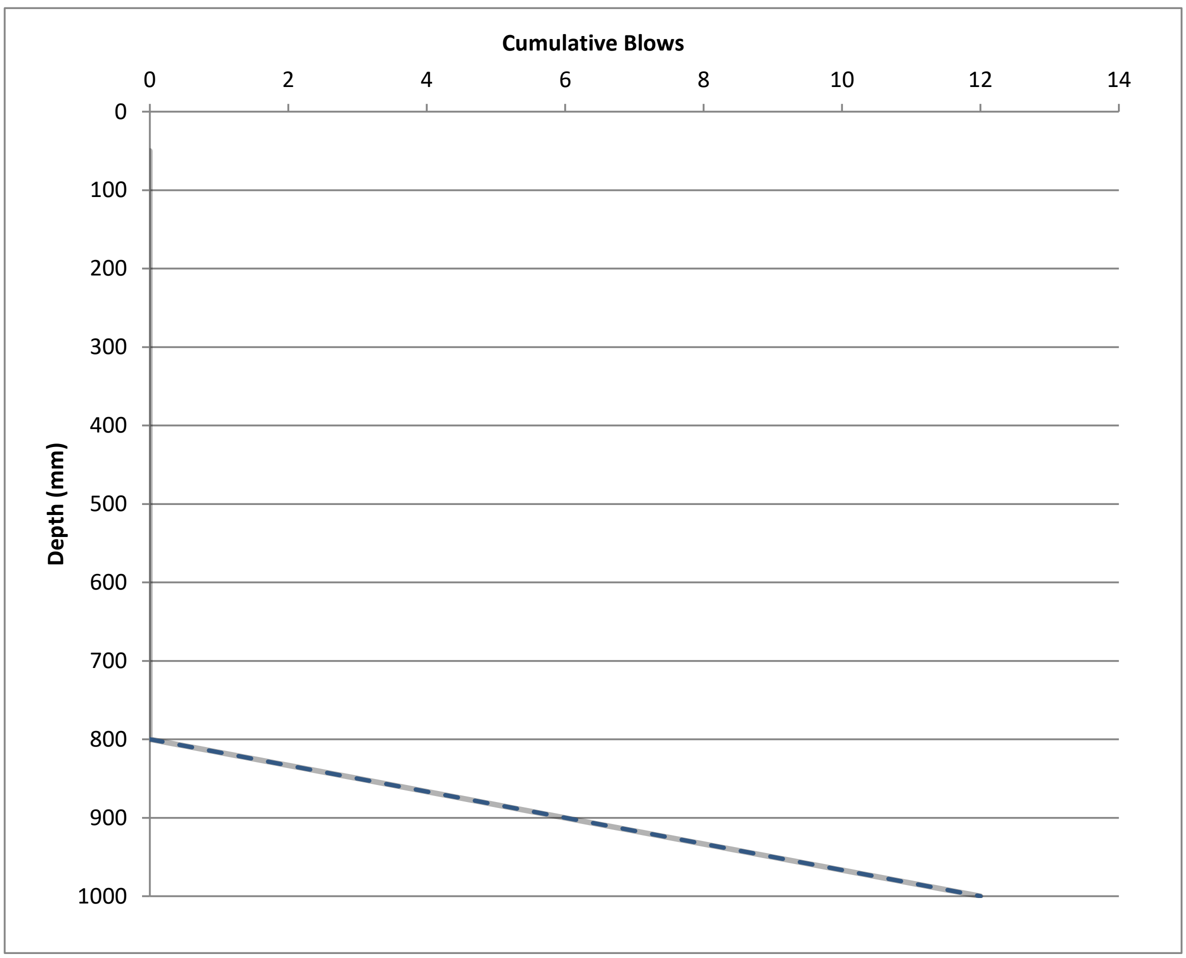
Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

Depth (mm)	Nr Blow	Cumulative blows
50	0	0
100	0	0
150	0	0
200	0	0
250	0	0
300	0	0
350	0	0
400	0	0
450	0	0
500	0	0
550	0	0
600	0	0
650	0	0
700	0	0
750	0	0
800	0	0
850	3	3
900	3	6
950	3	9
1000	3	12

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS7-Test 1	800	1000	16.7	15.4	101.28

* CBR calculated using method outlined in IAN 73/06

Test Notes:
Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.15m: Asphalt. (MADE GROUND).
0.15 - 0.80m: Brown to grey gravelly sand. Gravel consists of concrete fragments. (MADE GROUND).
0.80 - 1.00m: Dark brown to black high strength sandy gravelly clay. Gravel consists of fine to medium flint and occasional brick and concrete fragments. (MADE GROUND).



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS9
Date of test: 24/04/2018

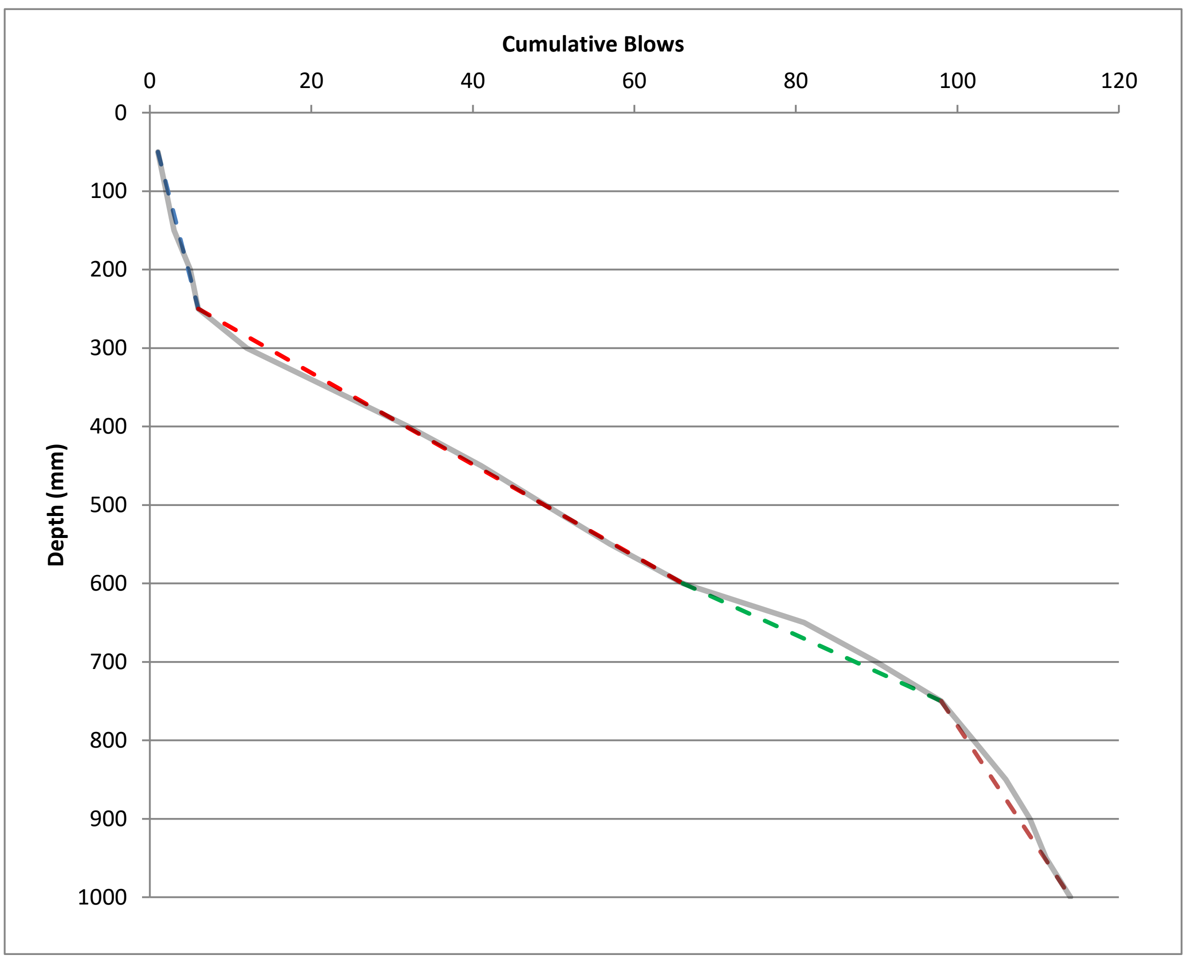
Calculating Engineer: AMM **Date:** 08/05/2018
Approved by PS **Date:** 29/05/2018

Depth (mm)	Nr Blow	Cumulative blows
50	1	1
100	1	2
150	1	3
200	2	5
250	1	6
300	6	12
350	10	22
400	10	32
450	9	41
500	8	49
550	8	57
600	9	66
650	15	81
700	9	90
750	8	98
800	4	102
850	4	106
900	3	109
950	2	111
1000	3	114

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS9-Test 1	50	250	40.0	6.1	55.99
WS9-Test 2	250	600	5.8	46.8	206.29
WS9-Test 3	600	750	4.7	59	239.25
WS9-Test 4	750	1000	15.6	16.5	105.85

* CBR calculated using method outlined in IAN 73/06

Test Notes:
Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.30m: Grass over soft consistency* sandy gravelly clay containing rootlets. Gravel consists of fine to coarse angular to rounded flint and occasional brick and concrete
0.30 - 1.00m: Dark grey to black very gravelly sand. Sand is coarse. Gravel consists of fine to coarse angular to sub-rounded flint and occasional brick fragments. (MADE GROUND).
*Field description



CBR Calculation

Specialists in the investigation & reclamation of brownfield sites

Jomas Job: North Hyde Gardens
Jomas Job No.: P1470J1364

Test Location: WS10
Date of test: 24/04/2018

Calculating Engineer: AMM
Approved by PS

Date: 08/05/2018
Date: 29/05/2018

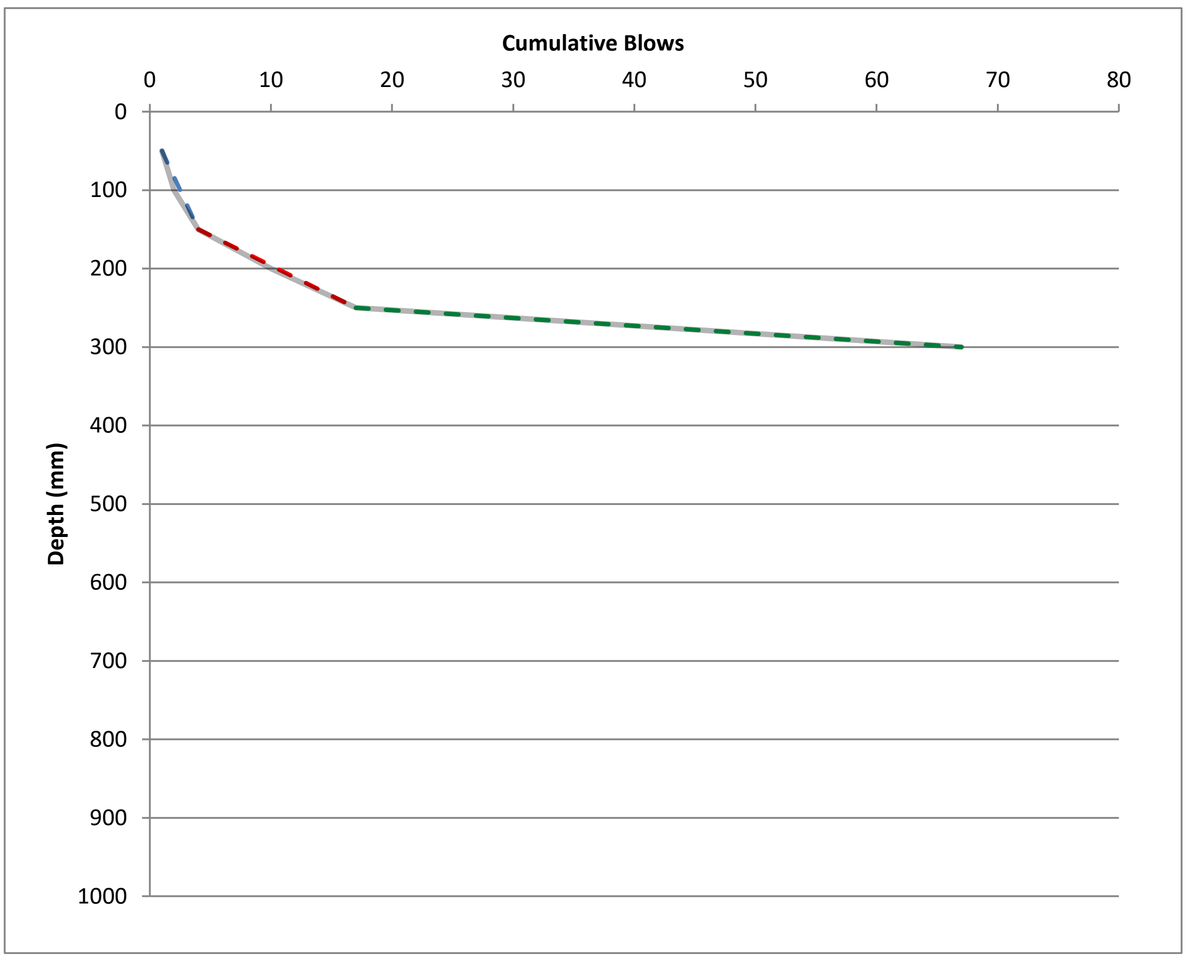
Depth (mm)	Nr Blow	Cumulative blows
50	1	1
100	1	2
150	2	4
200	6	10
250	7	17
300	50	67
350		
400		
450		
500		
550		
600		
650		
700		
750		
800		
850		
900		
950		
1000		

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
WS10-Test 1	50	150	33.3	7.4	63.36
WS10-Test 2	150	250	7.7	34.9	170.97
WS10-Test 3	250	300	1.0	302	680.33

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below



APPENDIX 13: EXTENT OF SURVEY LIMITATIONS AND DEFINITIONS

EXTENT OF SURVEY AND LIMITATIONS

This report is for your sole use, and consequently no responsibility whatsoever is undertaken or accepted to any third party for the whole or any part of its contents. Paragon accept no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned or a third party with whom an agreement has not been executed. Should any third party which to use or rely upon the contents of the report, written approval must be sought from Paragon, a charge may be levied against such approval.

The report has been designed to address potential source, pathway and receptor pollutant linkages associated with the proposed development, by means of intrusive investigation. The content and findings of the report are based on data obtained by employing site assessment methods and techniques, considered appropriate to the site as far as can be interpreted from desk-based materials and a visual walkover of the site. Such techniques and methods are subject to limitations and constraints set out in the report. The findings and opinions are relevant at the time of writing, and should not be relied upon at a substantially later date as site conditions can changes. For example, seasonal groundwater levels, natural degradation of contaminants etc.

No liability can be accepted for the conditions that have not been revealed by the exploratory hole locations, or those which occur between each location. Whilst every effort will be made to interpolate the conditions between exploratory locations, such information is only indicative and liability cannot be accepted for its accuracy. By their nature, exploratory holes provide a relatively small and localised snapshot of the ground conditions relative to the size of the site.

Specific comment is made regarding the site’s status under Part 2A of the Environmental Protection Act (EPA) 1990, which provides a statutory definition of Contaminated Land and as revised under The Contaminated Land (England) (Amendment) Regulations 2012. Unless specifically stated as relating to this definition, references to ‘contamination’ and ‘contaminants’ relate in general terms to the presence of potentially hazardous substances in, on or under the site.

The opinions given within this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. If additional information or data becomes available which may affect the opinions expressed in this report, Paragon reserves the right to review such information and, if warranted, to modify the opinions accordingly. Paragon reserves the right to charge additional fees for; un-anticipated second opinion reviewing of previous reports.

Paragon has prepared this report with reasonable skill, care and diligence. The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources. We cannot provide guarantees or warranties for the accuracy of third-party data, which is reviewed in good faith and assumed to be representative and accurate.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed. No liability can be accepted for the effects of any future changes to such guidelines and legislation. In the event that guidance / legislation changes it may be necessary for Paragon to update or modify reports. The risk assessment is completed in line with the relevant land use agreed for the site and the time of completing the works. Changes to site conditions or land use may require a reassessment.

DEFINITIONS

For the avoidance of doubt, Paragon Building Consultancy Limited (Paragon) has prepared the following alphabetical list of definitions and reservations to aid the client in understanding the content of our advice and or written reports(s):

Accuracy	Level of agreement between true value and observed value.
ACM's	Asbestos Containing Materials
Conceptual site model	Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the base of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. **Note 1:** The conceptual exposure model is initially derived from the information obtained by the preliminary investigation. This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model.
Contamination	Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water. **Note 1:** There is no assumption in this definition that harm results from the presence of the contamination. **Note 2:** Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. **Note 3:** Contamination may relate to soils, groundwater or ground gas.
Controlled water	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three-mile limit of territorial waters. **Note 1:** See Section 104 of The Water Resources Act 1991.
Enquiries	Any enquiries undertaken by Paragon of local authorities and statutory undertakers are made verbally in respect of environmental issues. Local searches are not undertaken and no responsibility is accepted for any inaccurate information provided. It is further assumed unless otherwise stated that all necessary licences, permits etc either run with the property or are transferable to a new occupier as appropriate.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property.
Hazard	Inherently dangerous quality of a substance, procedure or event.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
Precision	Level of agreement within a series of measurements of a parameter.
Receptor	Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).

Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
Soil	Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter.
	Note 1: In general accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms.
Source	Location from which contamination is, or was, derived.
	Note 1: This could be the location of the highest soil or groundwater concentration of the contaminant(s).
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.